ARMED SERVICES BOARD OF CONTRACT APPEALS

Appeal of --	)	
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Luhr Bros., Inc.	)	ASBCA No. 52887
	)	
Under Contract No. DACW29-92-C-0057	)	

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OPINION BY ADMINISTRATIVE JUDGE PAGE

Luhr Bros., Inc. (Luhr, contractor or appellant) seeks on behalf of Cross Construction, Inc. (Cross or subcontractor) an equitable adjustment for delays to a marine construction contract. Luhr does not contest 157 of the 252 days attributed by the Government to rough seas resulting from adverse weather, but claims 95 days of delay due to unanticipated "rolling waves" ("rollers"), allegedly unrelated to weather and resulting from an unusual and unknown subsurface condition (a Type II differing site condition (DSC)). (R4, tab A) Luhr also claims entitlement under the Changes clause, asserting the Government wrongfully withheld superior knowledge about surface and subsurface conditions. Finally, appellant contends the Government admitted this contract was defective by warning later contractors that adverse conditions may delay work in the area, but withheld that vital information here. The contracting officer (CO) rejected the claim, attributed unworkable conditions to weather-induced rough seas at an exposed work location, denied the Government possessed or withheld superior knowledge, and disputed allegations the contract was defective. Following timely appeal, a hearing was conducted, extensive expert witness testimony was submitted, and briefs were filed. Entitlement only is before us; we deny the appeal.

FINDINGS OF FACT

Contract No. DACW29-92-C-0057 awarded to Luhr on 26 May 1992 required repair or replacement of pile dikes and tie-ins in the Southwest Pass Channel (SWP) of the Mississippi River between Mile -6.21R[1] and Mile -20.14R. The fixed price contract, in the

estimated amount of $5,586,800.00, required completion of work within 300 days after receipt of notice to proceed. Notice to proceed was acknowledged 15 July 1992. Modifications later extended the completion date to 4 February 1994. (R4, tabs C-1, C-2, D) The appeal arose from delays to work at the dike at Mile -20.14R (dike -20.14R), located at the end of the SWP where the river enters the Gulf of Mexico (Gulf). (R4, tabs C-41, C-42) Dike -20.14R is oriented perpendicular to the flow of water, and, unlike all other dikes in this contract, is directly vulnerable to exertions of the Gulf on one side and the Mississippi River on the other. (R4, tab D)

Among the contract's standard clauses derived from the Federal Acquisition Regulation (FAR) were: FAR 52.233-0001 DISPUTES (DEC 1991); FAR 52.236-0002 DIFFERING SITE CONDITIONS (APR 1984); FAR 52.236-0003 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK (APR 1984); and FAR 52.243-4 CHANGES (AUG 1987). FAR 52.249-0010 DEFAULT (FIXED PRICE CONSTRUCTION) (APR 1984) fixed the contractor's remedy for delay due to "unusually severe weather" as an extension of time only. (R4, tab D) Specification Section H-6 (Special Clauses) PHYSICAL DATA (FAR 52.236-4 APR 1984) advised that field and laboratory data were available from the Government; weather information could be obtained from the National Weather Service (NWS); and hydrographs shown on the drawings did not constitute a prediction. (R4, tab D) Contract drawings indicated the highly exposed location of the work, especially drawing Nos. 8 (PLAN DIKE 20.14R); 12 (PROFILE DIKE 20.14R); and 14 (PILE DIKE 20.14R REPAIR DETAILS). Drawing No. 17 (STAGE HYDROGRAPHS) provided historic information on river gage readings from 1981 to January 1992. (R4, tab D)

Pile dikes were to be constructed by driving vertical and slightly angled timbers (piles) to a required depth, then securing the piles to horizontal timbers (wales) by means of wire rope. The bottom of the lower wales at dike -20.14R was at elevation 2 1/2 feet[2]; contract hydrographs showed the waterline historically to fluctuate between elevations zero and 4 feet.

Luhr entered into a fixed-price subcontract with Cross for dike construction and repair (tr. 46-47, 109-10). Mr. Rene Cross, President of Cross had extensive marine construction experience around the Gulf, and was familiar with the Mississippi River and conditions in the contract area. (Tr. 79-83, 103-04) In 1986, Mr. Cross served as general superintendent for H&B Marine on a Government contract for dike repairs between Mile -19.59L and Mile -20.14L in the SWP. Repairs to dike -20.14L were made 12 February - 2 May 1986, with 28 days lost due to rough seas. (Tr. 83-84; Ex. A-1 at 1, 91, 107, 143-44, 171, 176, 237)

Mr. Cross had visited the site for the captioned contract in April 1992, prior to bid. He believed conditions at Mile -20.14R were the same as the east bank; relied upon his 1986 experience in bidding; and did not obtain weather or site data noted in the contract. (Tr. 102-07, 170-72) Mr. Cross knew the channel around Mile -20.14 was susceptible to adverse waves, as evidenced by H&B Marines' 27 February 1986 Quality Control Report

(QCR) which stated it had encountered a "3' to 4' roller from Gulf making working conditions impossible." (Ex. A-1 at 41) Mr. Cross testified these waves had the same appearance as "rollers" complained of during the instant contract. (Tr. 185-86) He also knew from the 1986 contract that seas in excess of 1 to 1 1/2 feet did not allow work. (Tr. 91-93) Mr. Cross was not aware that the NWS could provide extensive information regarding winds, waves, and other climatic conditions. He estimated repairs at dike -20.14R would take approximately 36 days, and added 6 days in anticipation of adverse weather. (Tr. 102-07, 171-75, 188, 204) High water was a problem on the Luhr contract, especially from January through October 1993[3], when Cross attempted to construct dike -20.14R. This contrasted with conditions during the 1986 contract at dike -20.14L directly across the channel, when water elevations generally were below 2 1/2 feet, and the wales were for the most part out of the water. (Exs. G-45, G-46 at 7-16, 57-61; tr. 317-18; R4, tab D, drawing nos. 13, 14, 17, specification § C-1) Dike -20.14R differed significantly from dike -20.14L; it was about twice as long, and had a greater design load with increased stress resulting from its exposure to both the Gulf and the river. Stone jetties on either side provided some protection, but did not shield dike -20.14R as much as dike -20.14L. (Tr. 331-32, 338)

Cross mobilized on 22 July 1992 and began work at the upper end of the project. (Ex. A-2 at 1-4; tr. 110). Mr. Cross testified he visited the jobsite about every 1-2 weeks (tr. 111), although these visits were not documented. Mr. Michael Alesich, Cross's job superintendent, made periodic site visits to determine whether work at Mile -20.14R was possible. He generally left Cross's Venice LA yard around 5:30 AM, stopped to read the tide gauge at the Bar Channel Pilot Station at Mile -18.2 (BCPS), and arrived at the site about 7:00 AM. Mr. Alesich spent about 5 minutes at Mile -20.14R, and regarded conditions as unworkable if swells exceeded 1 1/2 feet. (Tr. 216-19) He did not record these visits, could not remember when they took place and recalled going only "once in a while" during the summer of 1993. (Tr. 111, 212-14, 224, 227-28)

Mr. Charles R. Freeman, Jr., quality assurance inspector, was the Government's on-site representative. (Tr. 406-07). He was in the field 5-6 days a week, and prepared most of the daily Quality Assurance Reports (QAR) documenting project conditions. Between April-September 1993, the Government's inspections of dike -20.14R were often made from aboard a nearby dredge, and decreased to about weekly. (Ex. A-2 at 716-57) Mr. Freeman had no special knowledge of or training in hydraulics or wave mechanics. (Tr. 409-10) He testified he used the term "roller" generally to describe undulating waves from the Gulf (the south) ranging from 1 to 4 feet high which did not break. Squalls were a common occurrence in the summer; it rained frequently; and rough seas occurred during bad weather. (Tr. 411-12, 414, 418-19; ex. A-2 at 651-804) Appellant did not establish that Mr. Freeman understood the term "roller" to denote rough seas caused by anything other than severe weather or high water.

From 6 April - 30 August 1993, Cross relied upon Government assessments of sea conditions in determining whether to work at Mile -20.14R. (Tr. 196-97; ex. G-9 at 4) Mr.

Cross admitted the information did not distinguish whether waves were swell action common in the Gulf, or "rollers" as now defined by the appellant. He understood the Government's indication of "rough seas" to mean waves in excess of 1 1/2 to 2 feet which prevented work. (Tr. 197-200, 203)

By 24 January 1993, the only work remaining on Cross's subcontract was construction of dike -20.14R; no claim is made for delay prior to that date. (Tr. 122) Cross attempted to work, but conditions were unsafe 25-27 January due to "rolling wave action, high winds and strong crossing currents" and Cross demobilized. (R4, tab C-9) The 27 January 1993 QAR noted that Cross decided to try a jack-up barge rigged for wrapping and tying procedures, when currents and wave action subsided. No work was performed 31 January - 2 February 1993 while the barge was being outfitted. (R4, tab C-10; ex. A-2 at 581, 585, 590)

Cross's attempts on 3, 4, 6 and 7 February 1993 to use the jack-up barge at Mile -20.14R were thwarted by strong currents and "rolling wave action." (R4, tabs C-13, C-14). According to the subcontractor's QCR, the BCPS tide gauge measured 2.7' on 3 February; 1.4' on 6 February; and 2.3' on 7 February 1993. (Ex. A-2 at 598, 612, 614) Cross again demobilized when it was unable to work on 8 February 1993 due to rough seas. (R4, tab C-15) The QAR show no work was done at Mile -20.14R from 8 February - 23 March 1993 due to rolling wave action, adverse weather including thunderstorms and squalls, currents, and rough seas. (R4, tabs C-16, C-17) With the exception of 6-7 February, the Government granted extensions for 50% of the time between 3 February - 23 March 1993 for unusually severe weather. (R4, tab C-17; ex. G-29 at 2-3, 11-12) This partial extension was for delay to Cross's operations only, as Luhr performed other work. (R4, tab C-12; ex. A-2 at 595-704)

Extreme fog aborted the parties' attempt to observe conditions at Mile -20.14R on 24 March 1993. (Ex. A-2 at 697) Cross prepared to remobilize to Mile -20.14R on 29 March 1993. (R4, tab C-20; ex. A-2 at 705) On 30 March 1993, Mr. Cross verbally notified the Government a "standing wave" in the vicinity of Mile -20.14R precluded completion of the work. (R4, tab C-21; tr. 147) At that point, Cross had driven approximately 300 linear feet of the unfinished dike. Cross contended the standing wave could be the result of recent improvements to the river and SWP. The Government regarded Mr. Cross's comments as notice of a possible DSC. (R4, tab C-21) On 2 April 1993, Government representatives and Mr. Cross visited Mile -20.14R to investigate the alleged DSC, but seas were calm and no DSC was observed. (R4, tabs C-20, C-21; tr. 372-73, 385)

Cross mobilized to Mile -20.14R on 3 April 1993; the QCR for that day shows the BCPS tide gauge reading 2.3'. (R4, tab C-21; ex. A-2 at 706, 709; tr. 148) Work was prevented by thunderstorms and squalls on 4 April 1993. (Ex. A-2 at 711) Cross moved its equipment to a normally protected area about 1 1/2 miles upstream of Mile -20.14R. (Tr. 149) Rough seas on 5 April 1993 rocked the barge, and the crane was damaged when the

cable holding the leads broke. (R4, tab C-22) Cross filed an insurance claim on 24 August 1993 citing operator error as the cause of the accident, and was compensated for property damage. (Ex. G-10 at 2-4, 10) Cross claimed the accident did not delay performance as "unworkable weather conditions prevented all pile dike repair at station -20.14R during the time the crane was being repaired." (Ex. G-9 at 10) We find damage to the crane not caused by rough seas in the vicinity of dike -20.14R, as it occurred upstream (tr. 149) and Cross attributed the accident to operator error (ex. G-10 at 2-4, 10).

Cross visited Mile -20.14R on the morning of 15 April 1993 to videotape sea conditions. (Ex. A-6). Mr. Cross did not check the weather beforehand, but believed work should have been possible if winds were from the north. (Tr. 155, 181-84) He testified waves were in excess of 1 1/2', ran "approximately from the south [the Gulf of Mexico] to the north," and were representative of the "rollers" resulting in conditions too rough to work. (Tr. 154-55) Although Cross's 15 April 1993 video best evidences appellant's assertions about the appearance of waves it terms "rollers," additional information shows the tape better supports the Government's contention that alleged "rollers" actually were weather-induced rough seas. Had Cross inquired, it would have learned that the NWS issued a Small Craft Advisory in the vicinity at 4:30 AM and continuing through the day. Seas were forecast to be rough ranging from 7-10' in height, with winds from the south at 20 to 30 knots and shifting to the west and northwest at 20 to 25 knots. (Ex. G-48 at 22-25) The Government granted a time extension for 15 April 1993 for unusually severe weather, when rough seas and swells did not permit work. (R4, tab C-29 at 2-3, 13) The QAR for April and May 1993 recognized continual high river stages and swift currents, and the contractor's difficulty in mobilizing for short periods. (Ex. G-29 at 13-14)

Cross notified Luhr on 29 April 1993 of an alleged DSC at dike -20.14R, attributing the difficulties to the destruction of the east jetty by Hurricane Andrew in 1992 which resulted in significant wave action from the northeast, east and southeast making it too rough to drive piles safely and accurately. Cross also stated that, for reasons it was unsure, it was experiencing "a roller developing from inside the river anywhere from 2 feet to 4 feet high." The letter stated that the contract's hydrographs indicated November through March should have been the best months to work at dike -20.14R, but that Cross had been able to work only 3 days out of approximately 30 attempts during that period. Cross advised it had encountered a DSC and an extremely high river forcing a shutdown. (R4, tab C-26)

Luhr's 3 June 1993 letter said it had "been unable to proceed with work due to the conditions" at dike -20.14R which destroyed earlier repairs, and recommended construction of the dike from stone instead of piling as a possible solution. (Ex. G-21) The Government' response of 23 June 1993 found the contractor failed to prove conditions at Mile -20.14R were anything but weather-related. The Government refused to redesign the dike, and told the contractor to provide data indicating the worsening since bid if it believed jetty deterioration was a significant factor. (Ex. G-23)

The Government's QAR for 6 April - 3 September 1993 noted delays attributed to severe weather conditions including winds, high river stages, rough seas, swells, and "rollers" or rolling wave action. (Ex. A-2 at 716-58) The Government continued to dispute the existence of a DSC, and granted unilateral time extensions for rough seas due to adverse weather as the sole remedy under the contract's DEFAULT clause. Performance was extended 116 days for intermittent delays from 22 July 1992 - 31 May 1993 (R4, tab C-24), and 92 days of continuous delay from 1 June - 31 August 1993 (R4, tab C-25). Luhr did not execute any of the modifications, and advised Cross intended to pursue a claim. (Exs. A-30, A-32, A-34, A-37, A-39)

Cross informed the Government on 23 August 1993 that operations at Mile -20.14R would resume 30 August - 3 September 1993, conditions permitting. (Ex. A-2 at 755) Between 1 September and 10 December 1993 when it finished, Cross experienced delays attributed variously by the QAR to squalls, high river stages, strong currents, rough seas, winds and "rollers," for which the Government granted extensions totaling 44 days. (R4, tab C-39; exs. G-34, G-36, G-38, G-40)

Mr. Cross testified high river stages made work difficult "but would not shut you down." (Tr. 189-90). However, high stages affected tying cables connecting piles to the wales and the record shows high water did impede work. (Tr. 191; ex. A-2, *passim, esp.* at 716-17, 724-804) The Government permitted Cross to raise wales by 0.4' out of the water at high river stages so dike -20.14R could be finished, according to QAR dated 26 September - 3 October 1993. (R4, tab C-29; ex. A-2 at 777-91)

Cross's 10 June 1994 letter asserted a Type II DSC and charged the contract was silent about alleged site changes since 1986. Cross contended the devastation of the east jetty resulted in little or no protection from winds which battered the site, and that the delay caused the subcontractor to go into another summer season during which it struggled with "Southerly winds and high river stages" further impacting work. Cross also complained of the "hydraulic affect of the increased river velocities causing a rolling effect" hampering production rates at Mile -20.14R, which Cross attributed to the recent riverbank restoration from Venice to Mile -18. (Ex. A-11)

Negotiations on 2 December 1994 were unsuccessful; the Government rejected Cross's contentions regarding the east jetty, advised site conditions had not changed since bid opening, and stated it was not the Government's responsibility to advise of changes since 1986 when Cross was last onsite. (Ex. G-43). Cross accepted the Government's position regarding the jetty, and no longer asserts that as a delay factor. (Exs. A-12, A-13)

By letter of 20 May 1997, Cross certified its claim, and attached a 10 February 1997 analysis by Dr. Henry T. Falvey of the purported DSC which contended, among other things, that the Government had superior knowledge regarding waves generated by salt water wedges and channel improvements between 1986 and 1992 which had a significant effect upon the characteristics of the salt wedge. Cross also alleged superior knowledge was

demonstrated in an internal Government memorandum dated 10 June 1993 discussing problems in other contracts caused by inclement weather and various river conditions, noting these could result in an unpredictable work environment. Cross asserted the Government admitted these specifications were defective by adding language to a 1996 contract warning that the proximity of pile dike -20.00R to the Gulf may delay work due to large wind waves. (R4, tabs C-40 at 8-30, C-41)

Luhr's letter of 1 August 1997 certified the claim and requested a final decision by the CO (COFD). (R4, tab C-42) The 16 June 1998 COFD disallowed the claim, denying a DSC or that the Government had superior knowledge of surface waves induced by either a salt water wedge or unusual site conditions. The CO declared the contractor was on notice that the highly exposed nature of the work made it susceptible to wave action; rough sea conditions preventing work were caused by adverse weather; and the Government had provided time extensions authorized by the contract as the only remedy. The CO admonished that contract provisions ¶ H-6 PHYSICAL DATA (FAR 52.236-4 APR 1984) and ¶ I.70 FAR 52.236-0003 SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK (APR 1984) placed affirmative duties upon the contractor to ascertain site characteristics and weather which might affect work, and that the contract did not contain express indications of sea conditions. Cross was told it was not entitled to rely upon its 1986 experience to determine site conditions without more. The Government denied any admission the 1992 specifications were defective because it placed cautionary language in a subsequent contract. (R4, tab B)

Timely notice of appeal was received by the Board on 8 September 1998. Luhr summarized its final theory for the alleged Type II DSC in ¶ 44 of Appellant's Posthearing Brief:

> Dr. Falvey's written and oral testimony explained that the "rollers" at Station –20.14R occurred during periods of high flood stage, when the salt water wedge is at its thickest (tr. 241-242). The pile dike at Mile -20.14R is located in a shallow area (approximately 20'). The shallow depth and channel orientation, combined with a narrow layer of fresh water moving at a low velocity in the opposite direction over the thicker salt water wedge, created roller waves (ex. A-4 at 12, A-4, attach. 10-11). This is a unique site-specific phenomenon (tr., 266) whereby, on those days when wind/swell generated waves can be excluded, the physical configuration of the site at Mile -20.14R (a shallow depth and channel orientation), and the opposing water flows (a shallow layer of low-velocity fresh water flowing outward over the incoming salt water layer), creates roller waves (tr. 24-293).

As indicated appellant relied upon the testimony of Dr. Henry T. Falvey, an expert in fluid mechanics. (Tr. 232-33) Dr. Falvey holds degrees in engineering; is president of Henry T. Falvey & Associates, Inc.; and is a Faculty Affiliate in Civil Engineering at Colorado State University. Dr. Falvey worked 25 years for the Hydraulics Branch of the U.S. Bureau of Reclamation, and spent 2 years in the Hydraulic Laboratory of the Swiss Federal Institute in Lausanne as a Senior Research Officer. His areas of specialty include fluid mechanics of hydraulic structures, physical model studies, cavitation, air entrainment and air demand, hydraulic machinery, canal automation, fish protection facilities, and numerical simulation; he has published numerous articles. (Ex. A-3) His experience in salinity intrusion was in modeling atmospheric simulations, and his work in coastal engineering limited to a reconnaissance study for an undersea aqueduct. He participated in a study of wind-generated waves on Lake Geneva in Switzerland. (Tr. 233-37) Dr. Falvey's expertise in fluid mechanics primarily dealt with structures and air; his experience in coastal engineering, water wave mechanics, saline intrusion in an estuarine environment, and shoreline dynamics was minimal compared to that of the Government experts.

Dr. Falvey produced two reports and written direct testimony, changing in successive versions the basis for his theory that the alleged "rollers" were not weather-related, in apparent response to criticism of Government experts. His hypothesis attempted to marry the concept of energy generated by interfacial waves with channel topography at Mile -20.14R to prove a unique, site-specific phenomenon unknown to the scientific community. (Ex. A-4; tr. 238-42)

Dr. Falvey made numerous assumptions in developing appellant's Type II DSC theory. For days Cross did not work, he examined wind conditions for 8:00 AM, assuming that to be the time the decision regarding work was made. (Ex. A-4, attach. 2 at 3-8) He then focused on days when the tide changed from flood to ebb during the work day, and assumed a strong incoming tide at 8:00 AM. (Tr. 271) Claiming to have eliminated wind as a factor for "documented rollers," that "rollers" were tidal related, and that channel topography played a role, Dr. Falvey stated "[**I]f** the wind analysis showed that work should have been possible, but working conditions were impossible **and if** the tide changed from a flood tide to an ebb tide, **then** the inability to work was caused by tidal rollers. (Ex. A-4, attach. 2 at 7, 8 [Emphasis in original])

Dr. Falvey testified that the degree to which the saline/fresh water interface is diffuse is a significant factor in whether a salt water wedge can generate surface waves (tr. 285-86). He examined the interface aided in part by a Government high-altitude photograph of the mouth of the SWP (ex. G-56) which he believed provided detail regarding what happened when saltwater entered the SWP, especially where Cross worked. (Ex. A-4 at 12; tr. 238-40) He stated salt water was evident at the ends of the jetties, and pointed out "two longitudinal rollers that form where the excavated channel enters the Gulf." Dr. Falvey attempted to explain the mechanics of "an approximate flow pattern for the fresh and salt water discharges within the channel," and concluded that a deep salt water flow would occur at Mile -20.14R. (Ex. A-4 at 12)

Dr. Falvey admitted he had nothing to prove whether the saline/fresh water interface in the area of dike -20.14R was sharp or diffuse, nor did he have any salinity measurements (tr. 245-46) or information regarding the relative depths of fresh and salt water (tr. 294). He did not know wind conditions when the photograph was made, nor did he have data on water velocity. Upon cross examination regarding his statement that the photograph showed "two longitudinal rollers," he equivocated as to whether these actually were rollers, and admitted they could have been swells or local wind waves. (Tr. 262-66) He admitted making inferences in developing his theory from the satellite photograph, but was unaware it was an infrared photograph, and that the differences in water color were due to temperature, not salinity. (Tr. 249-53) We find that to the extent Dr. Falvey's analysis is based upon observations of the photograph, appellant's contention is unsupported.

Dr. Falvey analyzed wave characteristics in two videotapes in developing his Type II DSC theory: Mr. Cross's 15 April 1993 site video (ex. A-6), and the Government's Waterways Experiment Station (WES) tape of a laboratory experiment. (Exs. A-4, attach. 2 at 7, A-7) Dr. Falvey stated the "contrasting video descriptions and Mr. Cross's description of the project conditions gave me all the information" required to analyze "what appeared to be an underwater phenomenon." (Ex. A-4 at 2) He said Cross's video alerted him to the site-specific nature of the "roller phenomenon." (Ex. A-4 at 8) Dr. Falvey summarized his observations: "rollers" had irregular periods and wave heights of up to 4 feet and were concentrated around Mile -20.14R; water surface observed on the left descending bank was choppy without "rollers"; the direction of the "rollers" (roughly 90 degrees) coincided with neither that of the wind nor that of breaking waves outside the breakwater. (Ex. A-2, attach. 2 at 2)

Dr. Falvey asserted the WES videotape (ex. A-7) demonstrated the alleged wave-producing effect of a sharp salt/fresh water interface, which he regarded as "extremely likely" to exist at Mile -20.14R even though there was no data to verify that belief. (Tr. 293-94) He claimed his analysis of the WES video convinced him that "an incoming salt water wedge that meets a change in alignment in a trapezoidal channel, such as is present at Station -20.14R, due to the turn in the channel, can be expected to travel up the slope, nearer to the water surface and cause flow disturbances on the water surface." (Ex. A-4 at 8) Dr. Falvey concluded from his calculations that the flow was unstable, and that waves could form depending upon river stage and tidal direction independent of wind direction and velocity. (Ex. A-4, attach. 2 at 7)

The WES video showed a laboratory demonstration, performed in a 30' x 1 1/2' x 1' glass flume, which indicated formation of interfacial waves where less dense fresh water flowed over heavier salt water. No explanatory report accompanied the video, nor was any information beyond the video's narrative provided regarding the scientific parameters under which the study was done. The narrative cautioned that careful analyses must be made before extrapolating laboratory observations to the outside environment. Although subsurface waves were noted, and some amplification occurred where a sill or barrier

impeded the incoming salt water, the narrative advised evidence of these interfacial waves may not be seen on the surface. (Ex. A-7) We do not find the WES video probative of appellant's alleged DSC theory.

Dr. Falvey claimed to have eliminated waves generated by distant meteorological events (swell) and waves produced by local winds (sea); however, appellant did not prove information relied upon comported with actual project conditions, making the conclusions unreliable. For example, Dr. Falvey relied upon wind and tide data for 8:00 AM, although there was no proof a daily determination to work was made at that time. In his July 1999 direct testimony, Dr. Falvey provided additional analysis regarding whether swell impacted conditions using Government hindcast data (computer simulations using highly extrapolated values as opposed to physical measurements) of winds acting over distant areas for a station about 11 1/2 miles south-southeast of dike -20.14R. (Tr. 452; ex. A-4 at 10-12) Dr. Falvey concluded there was good correlation between the wind velocity and direction for the nearby Burrwood anemometer and the hindcast data. (Ex. A-4 at 11) However, that wind data did not clearly reflect working conditions, as the anemometer used to gather data on local winds was 100 feet in the air as opposed to near water level, and the hindcast data was collected at Greenwich Mean Time resulting in a 6-hour time difference with the Burrwood readings. (Tr. 490)

Dr. Falvey's 8 March 1999 report focused on the channel dug by the Government which "ran north and south, at about a 45-degree angle to the alignment of the Southwest Pass." (Ex. A-4, attach. 2) He asserted the turn of the channel occurred almost exactly at Mile -20.14 and was significant. (Ex. A-4 at 7-8) However, the channel was dug prior to this contract; there was no evidence appellant availed itself of information regarding channel topography prior to bid or that the topography caused the rough seas.

Dr. Falvey also claimed river stages did not delay Cross, as it worked when stages were high. (Tr. 282-84) Although Cross was able to work at times under those conditions, the broad contention is unsupported by project records which repeatedly cite high river stages as a factor preventing work from December 1992 through December 1993. (Ex. A-2, *passim)*

The Government relied upon the testimony of three experts to rebut appellant's Type II DSC theory. Dr. Donald R.F. Harleman has degrees in civil engineering, is Ford Professor of Environmental Engineering Emeritus and Senior Lecturer at the Massachusetts Institute of Technology, and his curriculum vitae listed many honors and awards. (Ex. G-1) Dr. Harleman is an expert in hydraulics and environmental engineering, with extensive work and publications in the area of density stratified flows, especially salinity intrusion and salt water wedges in estuaries. (Ex. G-5) The second Government expert witness was Dr. Robert G. Dean, Graduate Research Professor in the Coastal and Oceanographic Engineering Department of the University of Florida. Dr. Dean has degrees in civil engineering and physical oceanography, and his resume noted numerous awards, honors, accomplishments and publications. (Ex. G-2) He is an expert in coastal

engineering, specializing in water wave mechanics and shoreline dynamics; has taught hydraulics, oceanography, civil engineering and coastal engineering for approximately 23 years; and has consulted widely. Dr. Dean was an author of the book *Water Wave Mechanics for Engineers and Scientists*, and has contributed to several other books. (Ex. G-6) The third Government expert was Dr. Harley S. Winer, a Government hydraulic engineer and former consultant. His experience includes numerical modeling of estuarine, riverine, and coastal hydrodynamics and salinity regimes, and he has a number of awards and publications. His master's thesis in civil engineering was "Wave Period Effect Upon the Stability of Breakwater Armor Units," and his doctoral dissertation in engineering mechanics was entitled "Numerical Modeling of Wave-Induced Currents Using a Parabolic Wave Equation." (Ex. G-3) Each Government expert was sharply critical of appellant's theories, and the lack of supporting data and credible scientific bases. We accept each of these witnesses as experts in their stated fields, and find their testimony more relevant and credible than that of appellant's expert.

Dr. Harleman disagreed with the mechanisms proposed for the alleged "rollers," and criticized appellant's failure to recognize that swell waves generated by distant storms and weather fronts can easily dominate local wave conditions. He stated that at any given time swell waves, of the magnitude attributed to the "rollers" by appellant, can approach the site from any direction, regardless of whether the site is sheltered from local wind direction. Swell waves in the vicinity of the river will be higher than those in the open Gulf due to the well-known phenomenon of wave "steepening" which occurs when incoming saline waves encounter the strong opposing current of the fresh water river outflow and undergo an increase in height. Steepening is weather-related because it increases with greater fresh water discharge due to rainfall. (Ex. G-5 at 6)

Dr. Harleman rejected interfacial waves as the cause of the rough seas. He is a published expert in calculation of wave formation at the saline/fresh water interface (ex. A-4, attach. 2 at 6), and found appellant's conclusions to be incorrect. Dr. Harleman stated that interfacial waves are formed by shear at the wedge interface caused by differential velocities between the two layers. His analysis showed that conditions at Mile -20.14R are inconsistent with formation of waves at the sharp salt/fresh interface, as occurred in the WES laboratory video. (Ex. G-17 at 3-6, 16-17) Dr. Harleman concluded there was no proof an incoming salt water wedge at Mile -20.14R resembled the sharp interface seen in the WES video, and that appellant failed to prove the laboratory demonstration reflected what occurred at the site. He rejected appellant's theory that "rollers" form "on days when the tide passed from flood to ebb stage." (Ex. A-4 at 8-9) In the SWP, fresh water flows outward throughout the flood and ebb stages because the tidal range is too small to reverse the direction of the strong fresh-water flow in the upper half-depth. (Ex. G-5 at 9, 10) Dr. Harleman said that the longitudinal motion of the diffuse salt wedge induced by the 24+ hour tidal period was very slow and not capable of producing large amplitude surface "rollers." (Ex. G-7 at 4-7) He criticized the notion that the incoming salt water wedge could ride up the right bank and curl over, thereby producing "rollers," noting this explanation is without scientific foundation. (Ex. G-5)

Dr. Harleman believed appellant's attempts to analyze wind and tide failed due to the lack of scientific observation, collection and documentation of field data on wave conditions. The record shows that for a significant period for the claimed delay the Government visited the site on roughly a weekly basis, and Cross was there perhaps every two weeks, far short of daily, first-hand observations of sea conditions much less proof of "rollers." Dr. Harleman criticized appellant for basing its hypothesis on days when Cross did not work, noting this was not a scientifically credible test. (Ex. G-5 at 8-9) He observed that 84% of appellant's "roller days" are between 5 April and 6 September 1993 when project logs noted "rough seas" every day of that period, with a high correlation with high river stages, a weather-related condition. (Ex. G-17 at 8)

Dr. Winer agreed with Dr. Harleman, and criticized appellant's theory that "rollers" resulted when subsurface waves banked off the channel and/or dike. He analogized: "[T]he proponents of this mechanism are conceptually thinking of the saltwater wedge as if it were a high-speed phenomenon, such as a car going too fast around a turn and thus going off the road." (Ex. G-19 at 1) Dr. Winer stated there was no evidence that an interfacial wave could be generated at Mile -20.14R by a salt water wedge meeting the fresh water, and there was insufficient energy to be translated into that level of surface turbulence. He contended wind stresses were the only mechanism for producing for an extended period of time the rough seas encountered by Cross. (Ex. G-19 at 4-5)

Dr. Dean also disagreed strongly with appellant's "proof" of a Type II DSC. Summarizing his objections, which echoed those of Drs. Harleman and Winer: the adverse waves were not the result of an interaction of river flow with a salt water wedge, but rather the propagation of waves from the Gulf of Mexico with some increase in wave heights due to counter currents, high water stages, and high flows experienced in 1993; differences in conditions between the 1986 and 1992-93 contracts were due both to higher water levels in 1993 and the more exposed work environment at Mile -20.14R; Cross's only solid wave information was its 15 April 1993 video, which shows the waves propagating as "swell" from the Gulf and not "rollers" as urged; and the criteria adopted by Dr. Falvey for normal wind-generated waves affecting the worksite do not recognize the impact of "swell." (Ex. G-18 at 6-19)

DECISION

Luhr alleges it experienced non-weather related unworkable sea conditions at Mile -20.14R which constituted a Type II differing site condition (Type II DSC). The Differing Site Conditions clause (FAR 52.236-2(a)(2) (APR 1984)) permits recovery for a Type II DSC where there are "unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character provided for in the contract." To prevail on a Type II DSC, the contractor must demonstrate the physical condition was unknown, unusual, and differed materially from conditions ordinarily encountered and generally recognized as inhering in

the type of work provided for in the contract. *Servidone Constr. Corp. v. United States*, 19 Cl. Ct. 346, 360 (1990), *aff'd*, 931 F.2d 860 (Fed. Cir.1991). Luhr must show that prior knowledge of the alleged DSC could not reasonably have been anticipated by its study of the contract documents, its inspection of the site, and its general experience as a contractor in the area. *Perini Corporation v. United States*, 381 F.2d 403, 410 (Ct. Cl. 1967); *Steele & Sons, Inc.*, ASBCA No. 49077, 00-1 BCA ¶ 30,837 at 152,200. The contractor has a relatively heavy burden of proof. *Charles T. Parker Constr. Co. v. United States*, 433 F.2d 771, 778 (Ct. Cl. 1970).

Luhr must also prove that the alleged "rollers" were not weather-related, as FAR 52.249-0010 DEFAULT (FIXED PRICE CONSTRUCTION) (APR 1984) fixes the contractor's remedy for delay of performance due to "unusually severe weather" as an extension of time only. There is strong precedent that conditions resulting from unusually severe weather generally do not constitute changed conditions for which a contractor is entitled to an equitable adjustment under the Differing Site Conditions clause. *Turnkey Enterprises, Inc. v. United States*, 597 F.2d 750 (Ct. Cl. 1979); *Apache Construction Company, Inc.*, ASBCA No. 36895, 90-2 BCA ¶ 22,718; *H.B. Mac, Inc.*, ASBCA No. 32455, 86-3 BCA ¶ 19,145.

Luhr failed to prove the adverse seas prohibiting work were caused by anything other than unusually severe weather (including swells from distant storms and high river stages) or that a Type II DSC existed. It was foreseeable that the impact of rough water would be exacerbated by working in close proximity to the water surface. Appellant's efforts to show its difficulties arose from some combination of tides, an incoming salt water wedge, and the effect of the orientation of the channel fell far short of proving a Type II DSC. Adverse weather including high water, strong currents and storms was documented in the QAR for the time claimed. The Government correctly awarded extensions of time for the adverse weather, the contract's sole remedy under the circumstances. Luhr failed to show it made prebid inquiry regarding the considerable weather and physical site data available for Mile -20.14R which would have yielded useful information regarding historic weather conditions, and detail about the channel topography. It relied instead upon Mr. Cross's 1986 experience on the opposite bank, disregarding observations of "rollers" which showed rough seas should have been anticipated and did not adequately take into account known risks of working in close proximity to water vulnerable to the forces of both the Gulf of Mexico and the Mississippi River.

To the extent appellant relies upon the WES video to prove a Type II DSC, that reliance is misplaced as there was no proof that the laboratory circumstances were representative of Mile -20.14R. Luhr claimed to have statistical evidence, based upon observations reported in daily project logs, supporting the existence of "rollers" on days it was delayed. This was not supported by the record; while "rollers" were reported on occasion, there was no proof these observations were even made at the time assumed, or even on the dates rough seas prevented work. These deficiencies cast further doubt upon Luhr's claim to have proven statistically the existence of "rollers," as the percentages

asserted are of no greater value than the supporting data. Luhr did not convincingly explain how tides exacerbated the rough seas, resulting in rollers.

We decline to adopt appellant's expert testimony, as the opinion was intrinsically unpersuasive and did not rest upon a reliable foundation. *Hensel Phelps Constr. Co.*, ASBCA No. 49270, 99-2 BCA ¶ 30,531 at 150,796 citing *Sternberger v. United States*, 401 F.2d 1012, 1016 (Ct. Cl. 1968) and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1991). Although appellant's expert has credentials in fluid mechanics relating to air and structures, there was not adequately demonstrated the understanding of the complex dynamics of an estuary (such as the one at Mile -20.14R) shown by the Government's experts. The best evidence of the existence of adverse seas was Cross's 15 April 1993 video. While it showed undulating waves making work impossible at Mile -20.14R, the video better supported the Government's contention that the waves were caused by adverse weather conditions when viewed with the knowledge that a Small Craft Advisory was in effect.

Luhr also argues the Government had superior knowledge about surface and subsurface conditions it wrongfully withheld. To prevail on the issue of superior knowledge, appellant must prove by a preponderance of the evidence that it undertook performance without vital knowledge of a fact which affected performance costs or duration; the Government was aware the contractor had no knowledge of and had no reason to obtain such information; any contract specification supplied misled the contractor or did not put it on notice to inquire; and the Government failed to provide the relevant information. *Hercules, Inc. v. United States*, 24 F.3d 188, 197 (Fed. Cir. 1994), *aff'd on other grounds*, 516 U.S. 417 (1996).

The theory of superior knowledge does not apply unless there is a showing that the balance of knowledge is so clearly on the Government's side that a shift of the normal assumption of risk from the contractor to the Government is warranted. *Gulf and Western Industries, Inc.*, ASBCA No. 21090, 87-2 BCA ¶ 19,881 at 100,574. Luhr has not proven the Government possessed superior knowledge, or that it withheld any vital information and cannot recover that theory.

Appellant also argues that the Government had admitted this contract was defective because it made changes to subsequent agreements. We disagree, and do not find this contract to be defective because the Government placed a warning in a later contract of the potential for large wind waves to affect work in the vicinity. "Changes in later contracts do not constitute an admission that the contract involved in this appeal was ambiguous or defective." *Compania Petrolera Nacional*, ASBCA No. 44583, 94-3 BCA ¶ 26,988 citing *Reflectone, Inc.*, ASBCA No. 34891, 89-3 BCA ¶ 21,962, *aff'd sub nom. Reflectone, Inc. v. United States*, 891 F.2d 299 (Fed. Cir. 1989) (table). The Government's knowledge that dike -20.14R was susceptible to vicissitudes of both the river and the Gulf was not exclusive. This was readily discernible to any knowledgeable contractor, and Cross had

first hand experience of the potential for rough seas to disrupt work at low elevations in the SWP.

For the reasons discussed, the appeal is denied.

Dated: 31 May 2001

REBA PAGE
Administrative Judge
Armed Services Board
of Contract Appeals

I concur

MARK N. STEMPLER
Administrative Judge
Acting Chairman
Armed Services Board
of Contract Appeals

I concur

EUNICE W. THOMAS
Administrative Judge
Vice Chairman
Armed Services Board
of Contract Appeals

[1] The "R" indicates a location on the right descending river bank. Because the Mississippi River flows south toward the Gulf of Mexico, the right bank is on the west side.

[2] Water elevations are given relative to the National Geodetic Vertical Datum (NGVD). Contract drawing no.13; specifications *passim.*

[3] River gages were read at Venice, Louisiana, approximately 32 miles from Mile -20.14R. (Tr. 368).

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. 52887, Appeal of Luhr Bros., Inc., rendered in conformance with the Board's Charter.

Dated:

EDWARD S. ADAMKEWICZ
Recorder, Armed Services
Board of Contract Appeals