IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

IN THE MATTER OF THE COMPLAINT OF INGRAM BARGE COMPANY AS OWNER OF THE M/V DALE A. HELLER AND THE IB9525, IN025300, IN085089, IN095041, IN096081, IN107057, AND IN117513, PETITIONING FOR EXONERATION FROM OR LIMITATION OF LIABILITY,	)	Civil Action No.: 13 C 3453 Civil Action No.: 13 C 4292 (Consolidated)
Consolidated with,	)	Judge Amy J. St. Eve
IN THE MATTER OF AMERICAN COMMERCIAL LINES, LLC, AS OWNER AND INLAND MARINE SERVICE, INC. AS OWNER *PRO HAC VICE* OF THE M/V LOYD MURPHY FOR EXONERATION FROM OR LIMITATION OF LIABILITY.	)	

MEMORANDUM OPINION AND ORDER

AMY J. ST. EVE, District Court Judge:

On May 6, 2016, Petitioner Ingram Barge Company ("Ingram"), as owner of the M/V Dale A. Heller ("Dale Heller"), moved to limit the testimony of the United States' expert, Dr. Kenneth Orloff, pursuant to the Federal Rules of Evidence and *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993). (R.765). After the parties briefed the present motion, the Court held a *Daubert* hearing on July 7, 2016, at which Dr. Orloff testified. For the following reasons, the Court, in its discretion, grants in part and denies in part Ingram's motion.

BACKGROUND

I. Factual Background

This admiralty case arises from the Dale Heller's unsuccessful attempt to navigate its fourteen-barge tow past a federal dam located near the town of Marseilles, Illinois during a high-water situation on April 18, 2013. Other maritime vessels agreed to assist the Dale Heller in this southbound transit attempt from its holding location at Ballards Island, including: (1) the M/V Loyd Murphy ("Loyd Murphy"),[1] operated by Inland Marine Service, Inc. ("IMS") and owned by American Commercial Lines, LLC; (2) the M/V City of Ottawa, a United States Army of Engineers ("Corps") vessel; and (3) the M/V Creve Coeur, another Corps vessel.[2] While traversing Illinois River Mile 247.0 near the Marseilles Dam, the Dale Heller's tow broke apart, and seven of its barges either allided with the dam or sank upriver from it. Subsequent to this incident, the river waters overtopped the surrounding earthen dike and flowed into the town of Marseilles, causing substantial damage to real and personal property.

Ingram and IMS both filed a complaint in admiralty for exoneration from or limitation of liability in connection with this April 18, 2013 incident. (R.1; R.1, 13-cv-04292). The United States filed a claim in both limitation actions for damages to the Marseilles Dam and related structures. (R.129, R.374). Individual claimants also filed general maritime claims against Ingram, IMS, and the United States for their resulting property damage.

II. Dr. Orloff's Qualifications

Dr. Orloff has a Bachelor's Degree in Physics, a Master's Degree in Physics, and a Ph.D. in Mechanical Engineering with specialization in Aeronautical Engineering from the University of California. He has conducted extensive research for NASA and has held numerous academic

[1] On the evening of April 17, the Loyd Murphy tied its 15-barge tow to the Dale Heller. It remained alongside the Dale Heller at Ballards Island throughout April 18, until approximately one hour prior to the attempted transit.

[2] Other vessels, including the M/V City of Joliet, the M/V Cody Boyd, and the Nancy S. provided additional assistance to the Dale Heller throughout April 17-18, 2013.

positions in the fields of physics, aeronautics, and aerodynamics. Dr. Orloff also holds several Federal Aviation Administration certificates and has logged more than 8,000 hours flying commercial and private aircrafts. Since 1984, Dr. Orloff has conducted forensic investigations and provided expert testimony in the field of accident reconstruction based on recorded radar data, particularly in litigation arising from aircraft accidents. (R.765-1, Orloff CV at 1-5).

Dr. Orloff does not specialize in hydrology, hydraulic engineering, marine engineering, or naval architecture, and has never provided expert testimony in litigation arising from a river towboat accident. (*Id.*). He has, however, authored an expert report in a case involving a maritime collision on Lake Erie. (R.765-2, Orloff Dep. Tr. at 13-16). In addition, his formal education and professional research have involved the study of fluid mechanics and hydrodynamics in a marine environment, specifically relating to floatplanes. (*Id.* at 17-18).

III. Dr. Orloff's Expert Opinions

In his expert report dated December 23, 2015, Dr. Orloff first uses video, audio, and GPS data sources[3] to generate a real-time reconstruction of the events leading up to and including the dam allision on April 18, 2013. (R.765-3, Orloff Rep. at 4-12). Ingram does not challenge the admissibility of Dr. Orloff's accident reconstruction and time synchronization opinions. (R.766, Opening Br. at 3 n.1).

Dr. Orloff's report next estimates the relative levels of drag resistance on a stationary tow of barges in order "to compare barge tow drag at different times and locations between Ballard's Island and the Marseilles Dam." (R.765-3, Orloff Rep. at 12). In particular, Dr. Orloff generates drag estimates for the Dale Heller's tow at (1) 2035 CDT on April 17, holding at Ballards Island (Table E); (2) 1700 CDT on April 18, holding at Ballards Island but sliding downriver slowly

[3] In particular, Dr. Orloff used data from the United States Coast Guard's Nationwide Automated Identification System ("AIS") to create an "AIS plot," which he then correlated with other visual data and audio records.

(Table F); and (3) 1720 CDT on April 18, during the attempted transit, downstream of Ballards Island but upstream of the Marseilles Dam (Table G). (*Id.* at 18-20, 25).

To generate these drag equations, Dr. Orloff followed the methodologies of two hydraulic engineers and integrated the findings of a third hydraulic engineer and proffered United States expert, Dr. Marcelo Garcia ("Garcia"). In particular, Dr. Orloff used the drag equation set forth by Dr. J. Rogers Adams ("Adams") in his report entitled *Identification of Study Approaches to Determine Physical Impacts of Commercial Navigation on the Upper Mississippi River System* (1992). Dr. Orloff then integrated Dr. Garcia's flow pattern and flow velocity results into his calculations—and reviewed his time synchronization and other record evidence, including deposition testimony and radio recordings—in order to render opinions concerning (i) "the physics and fluid dynamics associated with the sequence of events, including the decision of towboat captains to attach the Loyd Murphy's 15-barge tow to the Dale Heller's 14-barge tow" and (ii) the "methods and procedures used to bring the tow from Ballards Island towards and partially into the canal to the cause of the accident." (*Id.* at 2). According to Dr. Orloff, he selected the Adams equation because it provided more flexibility than other drag equations to calculate the drag encountered on the port side—versus the starboard side—of the Dale Heller. In addition, he believed the Adams equation to be a "fundamentals-based" approach, appropriate to calculate relative drag values.

During the course of expert discovery, Ingram and IMS' hydraulic engineering experts, Dr. Forrest Holly ("Holly") and George Randall ("Randall"), challenged Dr. Orloff's drag calculations – in particular, his failure to calculate absolute drag values. As part of his rebuttal analysis, therefore, Dr. Orloff used the drag equation set forth by hydraulic engineer Dr. Robert Latorre ("Latorre") in his reports entitled *Shallow River Pushboat Design* (1985) and *The*

Resistance of a 5x3 Barge Tow Moving in Shallow Water (1986). Dr. Orloff used the Latorre equation as his "empirical methodology," appropriate for absolute drag estimates. Indeed, this rebuttal work, produced in March 2016, included absolute drag values for the Dale Heller and the Loyd Murphy at select time intervals throughout April 17-18, along with a conversion of drag to horsepower required. After a subsequent challenge by Randall with respect to one drag calculation (1700 CDT on April 18 for the Loyd Murphy's tow), Dr. Orloff produced a supplemental correction to his rebuttal analysis in May 2016.

DAUBERT STANDARD

"A district court's decision to exclude expert testimony is governed by Federal Rules of Evidence 702 and 703, as construed by the Supreme Court in *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 113 S. Ct. 2786, 125 L.Ed.2d 469 (1993)." *Brown v. Burlington No. Santa Fe Ry. Co.*, 765 F.3d 765, 771 (7th Cir. 2014). "The rubric for evaluating the admissibility of expert evidence considers whether the expert was qualified, whether his methodology was scientifically reliable, and whether the testimony would have assisted the trier of fact in understanding the evidence or in determining the fact in issue." *Hartman v. EBSCO Indus., Inc.*, 758 F.3d 810, 817 (7th Cir. 2014); *see also Higgins v. Koch Dev. Corp.*, 794 F.3d 697, 704 (7th Cir. 2015) ("Rule 702 and *Daubert* require the district court to determine whether proposed expert testimony is both relevant and reliable"). Although the Seventh Circuit reviews "the district court's application of *Daubert* [] de novo," if "the court adhered to the *Daubert* framework, then its decision on admissibility is reviewed for abuse of discretion." *Estate of Stuller v. United States*, 811 F.3d 890, 895 (7th Cir. 2016).

A district court's evaluation of expert testimony under *Daubert* does not "take the place of the jury to decide ultimate issues of credibility and accuracy." *Lapsley v. Xtek, Inc.*, 689 F.3d

802, 805 (7th Cir. 2012); *see also Ortiz v. City of Chicago*, 656 F.3d 523, 536 (7th Cir. 2011) ("The admissibility determination is not intended to supplant the adversarial process, and so even 'shaky' testimony may be admissible"). Once it is determined that "the proposed expert testimony meets the *Daubert* threshold of relevance and reliability, the accuracy of the actual evidence is to be tested before the jury with the familiar tools of 'vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof.'" *Lapsley*, 689 F.3d at 805 (quoting *Daubert*, 509 U.S. at 596). A district court's inquiry under *Daubert* is a flexible one and district courts have wide latitude in performing this gate-keeping function. *See Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 141, 119 S.Ct. 1167, 143 L.Ed.2d 238 (1999); *Hartman*, 758 F.3d at 818. "'[T]he key to the gate is not the ultimate correctness of the expert's conclusions,'" rather, "'it is the soundness and care with which the expert arrived at her opinion[.]'" *C.W. ex rel. Wood v. Textron, Inc.*, 807 F.3d 827, 834 (7th Cir. 2015) (citation omitted). The "proponent of the expert bears the burden of demonstrating that the expert's testimony would satisfy the *Daubert* standard" by a preponderance of the evidence. *Lewis v. Citgo Petroleum Corp.*, 561 F.3d 698, 705 (7th Cir. 2009).

The Seventh Circuit has clarified that *Daubert*'s reliability and relevancy requirements "continue to apply in a bench trial." *Metavante Corp. v. Emigrant Sav. Bank*, 619 F.3d 748, 760 (7th Cir. 2010). "However, the usual concerns of the rule—keeping unreliable expert testimony from the jury—are not present in such a setting[.]" *Id.* As such, the Court may defer making reliability determinations until after the evidence is presented. *Id.*; *see also Estate of Stuller*, 811 F.3d at 895 n.3 ("Where the factfinder and the gatekeeper are the same, the court does not err in admitting the evidence subject to the ability later to exclude it or disregard it if it turns out not to meet the standard of reliability established by Rule 702"); *In re Salem*, 465 F.3d 767, 777 (7th

Cir. 2006) ("the court can hear the evidence and make its reliability determination during, rather than in advance of, trial"). A district court conducting a bench trial must nevertheless provide more than "conclusory statements of admissibility or inadmissibility to show that it adequately performed its gatekeeping function." *Metavante*, 619 F.3d at 760.

ANALYSIS

In this motion, Ingram asks the Court to bar Dr. Orloff's testimony concerning "navigation, hydraulic engineering, naval architecture, and river towboat and barge operations." (R.766, Opening Br. at 15). Ingram challenges four specific opinions, including:

1. The accident could have been avoided if the M/V LOYD MURPHY tow was not connected to the M/V DALE A. HELLER tow at Ballards Island because the majority of horsepower was devoted to holding the LOYD MURPHY tow;

2. Without the LOYD MURPHY tow attached, [the] trees the barges were tied to would not have uprooted and the DALE HELLER would have been able to hold its tow at Ballards Island throughout the high water event;

3. The DALE HELLER should have stopped its tow during the transit from Ballards Island to the Marseilles Canal, waited in the river, and instructed the Lockmaster to change the Dam gate settings before proceeding into the Marseilles Canal; and

4. The DALE HELLER tow should have entered the Canal at a faster speed.

(R.765, Motion at ¶ 2) (the "Opinions"). In support of its *Daubert* motion, Ingram argues that: (1) Dr. Orloff, an aeronautic engineering expert, is not qualified to render navigation-related opinions in this maritime case; (2) Dr. Orloff's navigation-related opinions do not result from a reliable methodology insofar as he failed to perform certain drag and/or horsepower calculations; and (3) absent appropriate calculations or marine navigation expertise, Dr. Orloff's opinions do not assist the trier of fact.

The Court first addresses Dr. Orloff's qualifications before addressing Ingram's specific reliability and relevance challenges.

I. Dr. Orloff Is Qualified to Render Navigation Opinions in This Case

"For a witness to be considered an 'expert,' Rule 702 requires that person to be qualified as such by knowledge, skill, experience, training, or education." *Lewis*, 561 F.3d at 705 (quotations omitted). The United States admits that Dr. Orloff is not an "expert in hydrology, hydraulic engineering, marine engineering, naval architecture, navigation or marine operations." (R.787, Response Br. at 5). Instead, the government offers Dr. Orloff as an expert in fluid dynamics and accident reconstruction, opining on what "could have been done"—versus what "should have been done" operationally—to prevent the April 18 dam allision. (*Id.*). According to Dr. Orloff, the study of fluid mechanics "takes the laws of nature and physics and applies them to fluids," whether gas, air, or water. The equations he applies with respect to flow measurements—regardless of the fluid type—are identical.[4] After hearing Dr. Orloff's live testimony, the Court is satisfied that his academic background in physics and fluid dynamics qualifies him to testify about the consequences of the Loyd Murphy's rigging decisions at Ballards Island (Opinions Nos. 1-2), and about the transit options available to the Dale Heller (Opinions No. 3-4).

A. Background

At the *Daubert* hearing, Dr. Orloff testified to his formal education in physics and mechanical engineering, his fourteen-year career as a research scientist with NASA, and his academic tenure teaching, among other subjects, physics and fluid dynamics at the college level. In particular, Dr. Orloff testified that he studied water flows as part of his doctoral dissertation – an area that he continued to study throughout his tenure at NASA, conducting wake turbulence research on low-speed aircrafts. Dr. Orloff also testified that he taught upper-division physics,

[4] Dr. Orloff testified that a distinction between hydromechanics and aeromechanics exists with respect to supersonic values, once compressibility effects come into play (beyond 300 miles per hour). This distinction, however, is not relevant here.

engineering, and aeronautics courses at Harvey Mudd College and San Jose State University. In this capacity, he used a textbook entitled *Fluid Mechanics with Engineering Applications* and reviewed principles applicable to both hydrodynamics and aerodynamics. He has not, however, taught—or taken—courses in hydrodynamics, hydraulics, or hydrology.

Dr. Orloff then testified to his extensive experience as an expert in accident reconstruction cases, including those which involved drag analyses. In particular, Dr. Orloff highlighted his prior expert analysis in a case involving a floatplane, investigating the interplay between the vessel and the water, and in *In re Steinle*, where he expressed accident reconstruction opinions relating to a maritime collision between two recreational vessels. Apart from these prior engagements, however, Dr. Orloff's expert witness history is limited to aviation cases. None of his prior work has involved river barges or towboats.

B. Ingram's Argument

Ingram argues that "Orloff's education and experience in an unrelated area of engineering do not qualify him to offer opinions concerning hydraulic engineering and navigation," citing *Ancho v. Pentek Corporation*, 157 F.3d 512 (7th Cir. 1998). (R.766, Opening Br. at 4). In *Ancho*, the Seventh Circuit affirmed the district court's decision to exclude the testimony of a mechanical engineer. The plaintiff in *Ancho* sued the manufacturer of the "Pentek Intelligent Automatic Car" ("PIAC") materials handling system, after his ankle became locked in a "pinch point" between two PIAC components at a plant where he worked. *Id.* at 514. The plaintiff retained an expert, who offered "two alternative proposals which, in his opinion, Pentek could have employed to avoid the problems associated with the PIAC's pinch points[.]" *Id.* In affirming the district court's *Daubert* decision, the Seventh Circuit observed that the plaintiff's proffered expert (i) failed to present "any architectural designs or materials to illustrate his

proposals," (ii) failed to visit the accident site, including the conveyor system at issue, (iii) had no experience "in the field of architectural design relating to plants of this nature" and was not "familiar with the operation of this type of conveyor system," and (iv) failed to address a key problem regarding the practicality of his proposals. *Id.* at 517-19. With respect to his qualifications, the Seventh Circuit noted, "Just as a qualified and board certified heart surgeon does not possess sufficient knowledge of orthopaedic medicine to render an expert opinion on spine surgery, likewise we agree with the trial court's ruling that a mechanical engineer such as Lobodzinski lacks qualifications to give expert testimony about plant reconfiguration." *Id.* at 519.

The Court does not find *Ancho* dispositive on the issue of whether Dr. Orloff is qualified to render navigation-related opinions in this case. Unlike in *Ancho*, where the plaintiff offered the excluded expert as his only "plant reconfiguration" expert, *see id.*, here, the United States has offered the separate expert opinion of a hydraulic engineer, Dr. Marcelo Garcia. As Dr. Orloff explained at the *Daubert* hearing, his methodology included: (i) inputting Dr. Garcia's findings (such as river depth, width, and speed) into drag methodologies endorsed by non-testifying hydraulic engineers (Dr. Adams and Dr. Latorre); (ii) applying his knowledge of fluid dynamics to make drag calculations; and (iii) deriving opinions about the Dale Heller and the Loyd Murphy based on these calculations and his accident reconstruction plot.[5] Thus, unlike in *Ancho*, Dr. Orloff does not purport to possess sufficient knowledge of hydraulic engineering or marine navigation. *Contra Ancho*, 157 F.3d at 519. Rather, as Dr. Orloff testified, his expert scope is limited to fluid dynamics, physics, and accident reconstruction.

[5] This case is further distinguishable from *Ancho* in that Dr. Orloff's report evidences his underlying facts and data, and Dr. Orloff conducted an on-site visit to the Marseilles Lock and Dam.

The Seventh Circuit has viewed Rule 703 as permitting an expert "to base an opinion in part on what a different expert believes on the basis of expert knowledge not possessed by the first expert[,]" so long as the "the soundness of the underlying expert judgment is [not] in issue." *Dura Auto. Sys. of Indiana, Inc. v. CTS Corp.*, 285 F.3d 609, 613 (7th Cir. 2002). Here, Ingram has challenged neither the soundness of Dr. Garcia's expert work, nor Dr. Orloff's use of the Adams and Latorre publications in conjunction with each other. *See Black & Decker v. Bosch Tools*, No. 04 C 7955, 2006 WL 5156873, at *1 (N.D. Ill. Sept. 8, 2006) ("When an expert bases her opinion on information supplied by another, the Court's must focus on the reliability of the expert's foundation"). Indeed, according to Dr. Orloff, the Adams equation is a "basic equation for hydrodynamics or aerodynamics." Furthermore, IMS' own expert endorsed the Latorre methodology. (R.787-1, Ex. 6, Randall Dep. Tr. at 127).[6] Dr. Orloff may, therefore, base his opinions on the data and/or methodologies derived from these three hydraulic engineers.[7]

After hearing his testimony, the Court finds that Dr. Orloff's background in physics and fluid dynamics—and his expert specialty in accident reconstruction—qualifies him to testify about the consequences of the Loyd Murphy's rigging decisions at Ballards Island (Opinions Nos. 1-2), and about the transit options available to the Dale Heller (Opinions No. 3-4). *See Gayton v. McCoy*, 593 F.3d 610, 617 (7th Cir. 2010) ("The question we must ask is not whether an expert witness is qualified in general, but whether his qualifications provide a foundation for him to answer a specific question") (citation and quotation omitted). Ultimately, Dr. Orloff's lack of specialization in hydraulic engineering and/or marine navigation goes to the weight of his

[6] Dr. Orloff's proper application of these equations—which Ingram disputes—is a different question.

[7] The Court also finds that Dr. Orloff is not serving as the "spokesman" or "mouthpiece" for the hydraulic engineers in an attempt to circumvent hearsay rules. Rather, Dr. Orloff builds from their analyses with his own expertise in fluid dynamics. This is permissible under Rule 703. *See Dura*, 285 F.3d at 613-14; *LG Elecs. v. Whirlpool Corp.*, No. 08 C 242, 2010 WL 3613814, at *6-7 (N.D. Ill. Sept. 3, 2010) (recognizing that "parties may not use experts to simply recite otherwise-inadmissible statements"); *cf. Lapsley*, 689 F.3d at 815 ("We do not require experts to drop a proverbial apple each time they wish to use Newton's gravitational constant in an equation").

opinions, not their admissibility. *See Loeffel Steel Products, Inc. v. Delta Brands, Inc.*, 372 F. Supp. 2d 1104, 1113 (N.D. Ill. 2005); *see also Loeffel Steel Products, Inc. v. Delta Brands, Inc.*, 387 F. Supp. 2d 794, 802, 808-09 (N.D. Ill. 2005) (recognizing that an "admitted lack of specific experience" was "not a disqualifying factor" but ultimately barring expert testimony on reliability grounds and citing *Dura Automotive*).

II. Reliability and Relevance of Dr. Orloff's Opinions

Ingram next argues that Dr. Orloff has failed to apply a reliable methodology to the facts of this case, as required under *Daubert* and Rule 703. *See Stuhlmacher v. Home Depot U.S.A., Inc.*, 774 F.3d 405, 409 (7th Cir. 2014) ("Expert testimony is admissible at trial if the testimony is relevant to a fact in issue, is based on sufficient facts or data, and is the product of reliable scientific or other expert methods that are properly applied"). Although an expert's opinion must be founded on sufficient facts or data, *see Bielskis v. Louisville Ladder, Inc.*, 663 F.3d 887, 894 (7th Cir. 2011), "[t]he soundness of the factual underpinnings of the expert's analysis and the correctness of the expert's conclusions based on that analysis are factual matters to be determined by the trier of fact, or, where appropriate, on summary judgment." *Manpower, Inc. v. Ins. Co. of Penn.*, 732 F.3d 796, 806 (7th Cir. 2013) (citation omitted). A "district court enjoys broad latitude both in deciding how to determine reliability and in making the ultimate reliability determination." *Higgins*, 794 F.3d at 704 (citation omitted).

A. Opinion Nos. 1-2 Concerning the Loyd Murphy

1. Methodology

In Opinion No. 1, Dr. Orloff opines that, "during the entire time that the combined tows were at Ballards Island, the majority of horsepower from the towboats that were restraining the

tow was devoted to holding the Loyd Murphy's tow, not the Dale Heller's tow." (R.765-3, Orloff Rep. at 21).

As Dr. Orloff explained at the hearing, in order to reach this conclusion, he first examined his comparative drag estimates for the Dale Heller tow at 2035 CDT on April 17 and 1700 CDT on April 18 using the Adams equation (Tables E and F). Tables E and F demonstrate a 2.9 factor increase in drag resistance (2,865 pounds versus 8,223 pounds), as well as a 65 percent increase in average river velocity, between these two time periods. (*Id.* at 19-20). Dr. Orloff then looked to his own time synchronization, derived from AIS data and record evidence including contemporaneous radio recordings and cell phone footage. (*Id.* at 9, Table A). This time synchronization indicated that: (1) by 1417 CDT on April 18, the trees at Ballards Island had fallen and the combined tow had begun to slide downriver, despite the Dale Heller, the Loyd Murphy, the Cody Boyd, and the City of Joliet running at full throttle (22,000 combined horsepower) to hold the combined tow in position; and yet (2) once the Loyd Murphy tow detached around 1611 CDT, the Dale Heller was able to hold its tow in position with help from two assist vessels – namely, the City of Joliet (5,000 hp) and the City of Ottawa (2,1000 hp).[8] Later, around 1648 CDT, the Dale Heller and the City of Ottawa, alone, were able to hold the Dale Heller's tow against the increased drag resistance and river velocity. (*Id.*).[9] In addition, Dr. Orloff looked to AIS data, as confirmed by video data, to determine the "placement, location, and dimensions" of the Dale Heller tow and the Loyd Murphy tow on April 18. He then placed this data atop Dr. Garcia's two-dimensional flow model, demonstrating the flow speeds at Ballards Island at 1700 CDT on April 18. (*Id.* at 19, Figure 14; Hearing Ex. 7). Consistent with

[8] Each of these vessels had less horsepower than the Loyd Murphy.

[9] The City of Joliet had disconnected in preparation for its own southbound transit into the Marseilles Canal with its two barges. The Joliet passed into the Canal around 1703 CDT. (Table A).

radio recordings indicating that the Dale Heller would have been "better off" without the Loyd Murphy's "extra width," Dr. Orloff's reconstruction diagram placed the Loyd Murphy's tow in the swiftest part of the river. (*See* Figure 14).

Based on this analysis—his relative drag estimates juxtaposed against his time synchronization and Figure 14—Dr. Orloff concluded that the Loyd Murphy had used most of the combined tow's horsepower while at Ballards Island. (Opinion No. 1). Based on the same underlying facts and data, Dr. Orloff further concluded that, "had the Loyd Murphy disconnected its tow from the Dale Heller's tow earlier, the trees on Ballards Island would likely not have uprooted, and the Dale Heller tow, isolated from the Murphy's tow, would likely have been able to hold at Ballards Island throughout the high-water event on the Illinois River." (Opinion No. 2).

In response to expert criticism, Dr. Orloff later used the Latorre equation to estimate absolute drag values for both the Dale Heller and the Loyd Murphy. According to Dr. Orloff, this empirical approach confirmed the results of his "fundamentals-based" approach using the Adams equation. In particular, his calculations revealed: (1) a 2.4 factor increase in drag resistance for the Dale Heller's tow from 2035 CDT on April 17 to 1700 CDT on April 18 (6,759 pounds versus 16,409 pounds) (Hearing Ex. 9B);[10] (2) a negative "remaining horsepower" value for the Loyd Murphy at a 10.7 feet/second river velocity, meaning, in Dr. Orloff's words, that the Loyd Murphy was "sliding downriver" once it detached its tow from the Dale Heller's tow (Hearing Ex. 9A, 9C);[11] and (3) that the absolute drag value of the Dale Heller's tow—even at

[10] In addition, as explained below, the absolute drag value for the Dale Heller at 1720 CDT on April 18 *below* Ballards Island was "nearly half" of its value at 1700 CDT while holding *at* Ballards Island (8,169 pounds versus 16,409 pounds). (Hearing Ex. 9B).

[11] Dr. Orloff's initial 10.5 feet/second river velocity assumption, meanwhile, resulted in a "remaining horsepower" value of 4.8 percent for the Loyd Murphy at 1700 CDT on April 18. (Hearing Ex. 9A).

the river's "peak flow" on April 18, 2013 (105,000 cfs)—was still less *below* Ballards Island than its value *at* Ballards Island at 1700 CDT (15,062 pounds versus 16,409 pounds) (Hearing Ex. 9B).

2. Ingram's Argument

Ingram argues that Dr. Orloff's approach is replete with methodological flaws, pointing to Randall's critiques of Dr. Orloff's drag calculations. In particular, Randall faults Dr. Orloff's (i) use of only one part of the Adams equation, (ii) his failure to calculate required horsepower, and (iii) his failure to consider "complicating factors" such as barge shape, river bank contours, and reverse propeller flow. In addition, Ingram points to Dr. Holly's expert analysis, which used the Adam equation to calculate that the Loyd Murphy needed only 27% of its reserved horsepower to hold its position at Ballards Island. Ingram further argues that Dr. Orloff only performed drag calculations for the Dale Heller's tow – *not* for the combined tow at Ballards Island. Even in his supplemental materials, Ingram argues, Dr. Orloff's drag and horsepower calculations for the Loyd Murphy are unreliable because they (i) concern the Loyd Murphy's tow in the center of the river, not at Ballards Islands alongside the Dale Heller tow; and, (ii) in any event, support Dr. Holly's analysis that the Loyd Murphy *had* surplus horsepower and was not a liability to the Dale Heller. Finally, Ingram argues that Dr. Orloff "cherry-picked" factual evidence in support of his conclusions, rendering his methodology unreliable.

3. Analysis

In this case, the critiques offered by Randall and Dr. Holly as to Dr. Orloff's drag calculations—using either the Adams methodology or the Latorre methodology—do not render Dr. Orloff's drag opinions inadmissible. *See United States v. Brumley*, 217 F.3d 905, 911-12 (7th Cir. 2000) ("another expert might disagree with this opinion, but the disagreement does not

render the opinion inadmissible. Rather, Brumley was entitled to cross-examine Agent Schmidt and to put on his own expert to offer a counter opinion"); *see also Kumho*, 526 U.S. at 153 (recognizing a permissible range under *Daubert* "where experts might reasonably differ, and where the jury must decide among the conflicting views of different experts") (citing *Daubert*, 509 U.S. at 596); *Medicines Co. v. Mylan Inc.*, No. 11-CV-1285, 2014 WL 1257957, at *4 (N.D. Ill. Mar. 27, 2014) (noting that expert disagreement does not transform the use of an otherwise "accepted method into an unreliable methodology").

At the *Daubert* hearing and in his initial report, Dr. Orloff acknowledged the limitations of his "fundamentals-based" drag calculations. In addition, Dr. Orloff testified to the limitation of his "empirical" approach insofar as he could not use the Latorre equation (based on a 5x3 barge tow resistance) to render drag or horsepower calculations for the combined tow. These limitations, however, do not amount to unreliability under *Daubert*. At trial, Ingram and/or IMS can challenge the accuracy of Dr. Orloff's underlying data using vigorous cross-examination and presenting contrary evidence. *See Lapsley*, 689 F.3d at 805; *see also Stollings v. Ryobi Techs., Inc.*, 725 F.3d 753, 768 (7th Cir. 2013) ("The fact that an expert's testimony contains some vulnerable assumptions does not make the testimony irrelevant or inadmissible"). In addition, Ingram and/or IMS may present their rebuttal drag and/or horsepower calculations for the Loyd Murphy, the Dale Heller, or the combined tow during trial.[12]

The "fundamentals-based" methodology selected by Dr. Orloff—to determine the comparative drag resistance of one vessel at two time intervals, and to examine record evidence

[12] Ingram argues that Dr. Orloff's "untimely supplemental calculations should not be considered because Ingram has not had the opportunity to question Orloff about his revisions." The Court finds that Dr. Orloff's May 2016 refinement of one drag calculation in response to another expert's criticism did not cause Ingram undue prejudice, where (i) the underlying equation remained the same, and (ii) Ingram had the opportunity to question Dr. Orloff on this calculation at the *Daubert* hearing.

to render conclusions about an attached vessel within those time intervals—may be subject to criticism.[13] That does not, however, render it unreliable under *Daubert*, especially given that the methodology is recognized in his scientific field.[14] *See Ancho*, 157 F.3d at 515 (recognizing that, under the reliability inquiry, the "district court must consider whether the testimony has been subjected to the scientific method; it must rule out subjective belief or unsupported speculation"). Here, Dr. Orloff's opinions concerning the Loyd Murphy—and the Dale Heller's ability to hold position at Ballards Island with the City of Ottawa's assistance—proceed not from "subjective belief or unsupported speculation," but rather from his own calculations, Dr. Garcia's flow modeling, his AIS data compilation, and contemporaneous audio recordings.

On the other hand, Dr. Orloff's assertion that "the trees on Ballards Island would likely not have uprooted" is speculative and untied to any expert calculation or record evidence. As he testified at the hearing, in rendering this opinion, Dr. Orloff had no information on the trees' diameter, root structure, or general holding power. (*See also* R.765-2, Orloff Dep. Tr. at 75-76). Moreover, Dr. Orloff failed to identify any pertinent "knowledge, skill, experience, training, or education" in this area. *Lewis*, 561 F.3d at 705. Because this particular assertion is "unsupported speculation," the Court grants this aspect of Ingram's motion. *See Ancho*, 157 F.3d at 515.

Ingram's remaining arguments—that Figure 14 is a misleading depiction of the combined tow's position at Ballards Island, and that Dr. Orloff "cherry-picked" factual evidence to support

[13] The Court notes, though, that Dr. Orloff's supplemental "empirical" analyses (using the Latorre equation) seem to confirm the results of his "fundamentals-based" analyses (using the Adams equation). As the United States observes, his empirical results indicate that Loyd Murphy "was very close to its performance limit." (R.787, Response Br. at 16-17).

[14] According to Dr. Orloff, the Adams equation is a "basic equation for hydrodynamics or aerodynamics." Randall, moreover, endorsed the Latorre methodology. (R.787-1, Ex. 6, Randall Dep. Tr. at 127).

his conclusions—likewise speak to the weight of the proffered opinions, not their admissibility.[15] *See NutraSweet Co. v. X-L Eng'g Co.*, 227 F.3d 776, 789-90 (7th Cir. 2000); *Nolan v. United States*, No. 12 C 0247, 2015 WL 5159888, at *7 (N.D. Ill. Sept. 1, 2015). At trial, for example, Ingram may present evidence bearing on the "great concern that the [Dale Heller] would not be able to hold its barges with all available assistance, as river conditions continued to deteriorate and nightfall would shortly be occurring." (R.814, Reply Br. at 9). According to Dr. Orloff's empirical calculations, the Dale Heller encountered less drag resistance during the applicable "high-water mark" (105,000 cfs) on April 18 than it encountered at Ballards Island at 1700 CDT, when—as AIS data confirmed—it nonetheless held position with the City of Ottawa's assistance. Having chosen a sound methodology to reach this finding, Dr. Orloff's failure to consider Captain White's operational "concern" does not negate the admissibility of his expert opinion under *Daubert*. Rather, this challenge speaks to the weight the Court will give to Dr. Orloff's opinion.

Ultimately, the Court finds that—with the exception of Dr. Orloff's assertion regarding the trees on Ballards Island—Opinion Nos. 1 and 2 are "based on sufficient facts or data" and result from "reliable scientific or other expert methods that are properly applied." *Stuhlmacher*, 774 F.3d at 409. The Court observes, moreover, that if it later determines that any opinion testimony is not properly based on facts in the record, it will strike the testimony at such time. *See Metavante*, 619 F.3d at 760; *see also Armament Sys. & Procedures, Inc. v. IQ Hong Kong Ltd.*, No. 00-C-1257, 2007 WL 4747940, at *2 (E.D. Wis. Apr. 27, 2007) (reserving the right to

[15] With respect to Figure 14, Ingram argues that Captain White backed the Dale Heller into Ballards Island at an angle – not flat against the Island. In support, Ingram points to one page of Captain White's deposition transcript and a graphic illustration produced by another government expert witness, Captain Kinsey. The United States, in turn, argues that Captain Kinsey's diagram is "exemplary only" whereas Dr. Orloff's is "based on the AIS plot, onboard data from the [Dale Heller], and photographic evidence that he can defend and explain under examination." (R.787, Response Br. at 20). Indeed, at the *Daubert* hearing, Dr. Orloff testified that his Figure 14 is "very accurate." The accuracy of Figure 14 impacts the weight the Court will give to Dr. Orloff's opinions.

"entertain objections and disregard testimony" should the proffered expert testimony "cross the line" into irrelevancy or unreliability during bench trial). Here, *Daubert* concerns—including "the trier of fact being fooled by evidence of dubious merit"—are not as significant because the Court acts as factfinder and gatekeeper. *See Taubensee Steel & Wire Co. v. Macsteel Int'l USA Corp.*, No. 9 C 1505, 2011 WL 1651239, at *4 (N.D. Ill. May 2, 2011); *The Medicines Co. v. Mylan Inc.*, No. 11-CV-1285, 2014 WL 1979360, at *5 (N.D. Ill. May 15, 2014); *Loeffel Steel*, 372 F. Supp. 2d at 1122-23.

Finally, Ingram challenges the relevance of Opinion Nos. 1 and 2. Specifically—when asked at his deposition why he performed no calculations showing the thrust of the Loyd Murphy on the Dale Heller's tow—Dr. Orloff testified that "Figure 14 tells the whole story . . . All you have to do is look at where the Loyd Murphy's tow was relative to the flows in the river and where the Dale Heller's tow was relative to the flows in the river and you can render that opinion very easily without any calculations." (R.765-2, Orloff Dep. Tr. at 70-71). The Court agrees with Ingram that obvious observations do not require expert presentment. *See United States v. Hall*, 93 F.3d 1337, 1343 (7th Cir. 1996) ("Unless the expertise adds something, the expert is at best offering a gratuitous opinion"); *see also Sullivan v. Alcatel-Lucent USA Inc.*, No. 12 C 07528, 2014 WL 3558690, at *6 (N.D. Ill. July 17, 2014) ("Expert testimony does not assist the trier of fact when the jury is able to evaluate the same evidence and is capable of drawing its own conclusions without the introduction of a proffered expert's testimony"). It is not clear to the Court, however, that relative river flows—and the precise placement and configuration of the Dale Heller tow and the Loyd Murphy tow vis-à-vis Ballards Island—are "obvious" without expert evidence, including Dr. Orloff's AIS data compilation. The Court declines, therefore, to strike Opinion Nos. 1 and 2 on relevance grounds.

B. Opinion Nos. 3-4 Concerning the Dale Heller

In Opinion No. 3, Dr. Orloff opines that, "had the tow held its position at 1720 CDT until, say, 1730 CDT, the pool level would have returned to its previous level. The transit could have then resumed and Captain White or Captain Ice could have requested that the gates again be closed as they were approaching the protection cells. There would have been ample time to complete the transit, and the outflow near the canal would have been reduced." (R.765-3, Orloff Rep. at 26).

Dr. Orloff's "mid-transit stop" opinion derives from his relative drag calculations. In particular, Dr. Orloff observed that the drag resistance at the "sheltered" area below Ballards Island at 17:20 CDT (Table G) was less than the drag resistance at Ballards Island at 1700 CDT (Table F).[16] From this observation, he surmised that, if the Dale Heller and the City of Ottawa alone were able to hold the Dale Heller's tow at 1700 CDT, then several assist vessels—with a greater combined horsepower—could have held the tow at 1720 CDT against a lower drag resistance. According to Dr. Orloff, thus, "from a fluid mechanics standpoint . . . there was no reason they couldn't stop below Ballards Island." This calculation is consistent, the United States argues, with Captain Ice's contemporaneous mid-transit radio transmission that, "If we have to, I know we could stop her right here. We're—You're under that point, you know[.]" (R.787, Response Br. at 13) (citing 4/18 VDR 2 t/s 17:26:41).[17]

As Ingram observes—and as Dr. Orloff testified to at the hearing—his "mid-transit stop" analysis fails to take into account pilotage considerations, including those associated with speed,

[16] Dr. Orloff's empirical analyses likewise confirmed that the drag below Ballards Island at 1720 CDT was half of the drag at Ballards Island at 1700 CDT. (Hearing Ex. 9B).

[17] The United States argues that this opinion is also consistent with other experts' "widow of opportunity" analyses. (R.787, Response Br. at 23) (citing the testimony of Ingram and IMS' hydraulic engineering experts).

timing, assist boat positioning, danger, and difficulty.[18] Here again, however, Dr. Orloff's lack of practical navigation expertise does not render his expert opinions inadmissible. Ingram is free to offer counter opinions from its hydraulic engineering and/or navigation experts—or facts as observed by Captain White—to challenge the weight of Dr. Orloff's proffered testimony. *See Lapsley*, 689 F.3d at 805.

In rendering Opinion No. 3, it seems that Dr. Orloff also examined (i) his pool elevation graphic (based on Dr. Garcia's findings, Figure 15), and (ii) his own time synchronization (Table A), to reconstruct the timing of the lockmaster's gate movements in relation to pool elevation. While this particular reconstruction analysis "assists the trier of fact in understanding the evidence," *Ancho*, 157 F.3d at 515, Dr. Orloff fails to identify the facts or data underlying his particular assessment that "Captain White or Captain Ice could have requested that the gates again be closed as they were approaching the protection cells[.]" To the contrary, as Dr. Orloff testified, he has no knowledge of (i) applicable regulations, (ii) the lockmaster's authority and discretion with respect to the lock area, or (iii) the interaction between inland river mariners and the Corps or the Coast Guard. Because this particular assertion is "unsupported speculation," the Court grants this aspect of Ingram's motion. *See id.* Dr. Orloff is free, however, to testify to the ability of the Dale Heller tow to hold below Ballards Island from a fluid mechanics standpoint, and to offer reconstruction analysis concerning the gate movements and pool elevation, without offering unsupported conclusions on what Ingram or IMS "could have" told the Marseilles lockhouse to do—or what the Marseilles lockhouse would have done—under a given scenario.

In Opinion No. 4, Dr. Orloff opines that, had the Dale Heller approached the protection cells near the canal's entrance with the same forward speed as the City of Joliet at 1703 CDT,

[18] At the hearing, Dr. Orloff suggested that it seemed "obvious" to him that, given the tow's slow navigation speed (1-2 miles per hour) and the combined horsepower of the assist vessels, the Dale Heller should have held the tow below Ballards Island. Dr. Orloff has no relevant pilotage experience, however, to support this conclusion.

minimizing the tow's exposure to outflows created by the dam's cross-currents, its transit may have been successful. (R.765-3, Orloff Rep. at 23-24). According to Dr. Orloff, "the same physics and fluid dynamics apply" to both transit missions. (*Id.*; *see also* R.765-2, Orloff Dep. Tr. at 106-08). In particular, Dr. Orloff testified that the same rotation and translation principles apply to the Dale Heller as to the Joliet, irrespective of the presence of assist vessels. According to Dr. Orloff, the critical difference between the Dale Heller and the Joliet was "time spent in the outdraft area" – a function of the vessel's speed relative to the river current.

Ingram, in turn, points to Randall's expert testimony that "you can either run for it, like the Joliet did, or go in with the amount of assist that can withstand the outdraft; but you can't do both." (R.766, Opening Br. at 14).[19] Ingram further points to witness testimony indicating that, from an operational perspective, the Dale Heller *had* to move slowly in order to use its assist vessels. Ingram also notes that, unlike the Joliet, the Dale Heller's tow consisted of 14 barges entering unfavorable outdraft conditions as a result of a re-opened gate setting. These factual distinctions and operational considerations, however, do not render Dr. Orloff's application of his physics and fluid dynamics expertise unreliable. *See Manpower*, 732 F.3d at 806. The Court reserves the right to disregard Dr. Orloff's testimony from a "fluid mechanic standpoint" should it prove non-useful to determining liability issues in this bench trial. *See Estate of Stuller*, 811 F.3d at 895 n.3.[20]

[19] Dr. Orloff testified that he and Randall "agree" on this issue concerning assist boats. Specifically, Dr. Orloff agreed that, if the assist boats were able to create enough force to overcome the rotation created by the outdraft, the transit could have been successful. Ultimately, however, they were not.

[20] In its reply brief, Ingram asks the Court to exclude Dr. Orloff's navigation-related opinions as cumulative of other experts named by the United States. Federal Rule of Evidence 403 permits the Court to "exclude relevant evidence if its probative value is substantially outweighed by a danger of . . . needlessly presenting cumulative evidence." Fed. R. Evid. 403. The Court denies Ingram's request, however, as premature. *See Thompson v. City of Chicago*, 722 F.3d 963, 971 (7th Cir. 2013). The Court will reconsider Ingram's request if it appears that the United States is "needlessly presenting cumulative evidence" in the form of several navigation experts. *See id.*

CONCLUSION

For these reasons, the Court, in its discretion, grants in part and denies in part Ingram's *Daubert* motion.

Dated: July 14, 2016

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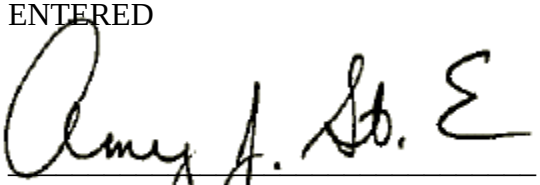

AMY J. ST. EVE
United States District Court Judge