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No. 67456-1-I

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COURT OF APPEALS, DIVISION ONE  
STATE OF WASHINGTON

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KING COUNTY DISTRICT COURT, WEST DIVISION,  
Judge Mark Chow, and KING COUNTY DISTRICT COURT,  
EAST DIVISION, Judge David Steiner, and KING COUNTY  
DISTRICT COURT, SOUTH DIVISION, Judge Darrell Phillipson,  
BRETT R. BALLOW, and LESLIE P. FAUSTO,

Appellants,

v.

STATE OF WASHINGTON,

Respondent.

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COURT OF APPEALS DIV 1  
STATE OF WASHINGTON

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APPELLANTS' OPENING BRIEF

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## I. INTRODUCTION

This case is about providing meaning to scientific measurements in a courtroom. A breath alcohol concentration (BrAC) test is a scientific measurement of the alcohol concentration in a person's breath sample. Despite a machine's accuracy or precision, the result from any machine contains an unavoidable level of uncertainty. A BrAC test result is merely an approximation of the individual's true BrAC. The uncertainty tells the trier of fact how close the approximation may be to the true value.

This limitation on scientific evidence has been recognized by our Courts in the context of DNA evidence. Evidence of a DNA "match" must be accompanied by an appropriate estimate of the likelihood [i.e. uncertainty] that a conclusion isolating the defendant from other persons can be drawn. In other words, *"[W]ithout the probability assessment [i.e. uncertainty], ... the jury does not know whether the [DNA] patterns are as common as pictures with two eyes, or as unique as the Mona Lisa."*<sup>1</sup>

Appellants are simply asking for the same standard to be applied to scientific evidence in a DUI case.

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<sup>1</sup> *U.S. v. Yee*, 134 F.R.F.D 161, 181 (N.D. Ohio 1991).

## **II. ASSIGNMENTS OF ERROR**

1. Did the superior court err in reversing the district court decision that requires the State to introduce a statement of uncertainty with each BrAC test result introduced at trial to comply with ER 702?

## **III. ISSUES PERTAINING TO ASSIGNMENTS OF ERROR**

1. This Court has identified the sole issue for consideration on appeal:

“In a DUI prosecution, where RCW 46.61.506(4) provides that the results of a “breath test performed by any instrument approved by the state shall be admissible” at a criminal trial so long as the requirements of that statutory provision are met, do ER 702, *City of Fircrest v. Jensen*, 158 Wn.2d 384, 143 P.3d 776 (2006), *City of Seattle v. Clark-Munoz*, 152 Wn.2d 39, 93 P.3d 141 (2004), *State v. Cauthron*, 120 Wn.2d 879, 846 P.2d 502 (1993), and related authorities, mandate that the introduction into evidence of the results of an otherwise valid breath alcohol test must be coupled with the government’s introduction into evidence of the Washington Toxicology Laboratory Division’s calculated “confidence interval” applicable to that test?”<sup>2</sup>

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<sup>2</sup> See Order Granting Discretionary Review; entered December 15, 2011.



#### **IV. STATEMENT OF THE CASE**

##### **1. Procedural History.**

Brett Ballow and Leslie Fausto were arrested in King County, Washington, for Driving Under the Influence (of intoxicants) and submitted to breath alcohol content (“BrAC”) testing. Due to a prior ruling in the district courts, known as “Ahmach”<sup>3</sup>, such tests were not admissible at trial.

The King County Prosecutor’s Office requested a hearing under local rule – LCrRLJ 8.2(2)<sup>4</sup> – for the district court to convene a hearing to review the Ahmach ruling to decide whether to lift the

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<sup>3</sup> *State v. Ahmach, et al*, King County District Court Case No. C00627921. The issues involved in this ruling are not relevant to the present case. Ahmach is noted merely for historical reference.

<sup>4</sup> (2) Motion of Countywide Significance. Upon the filing of a motion in a criminal case, any party may request that such motion be designated as an “issue of countywide significance”. A judge in any division of the Court may, on his/her own motion or upon receiving such a request from a party, request of the Presiding Judge that such motion be designated as an “issue of countywide significance”. Upon receiving such request from a judge, the Presiding Judge may designate such motion as an “issue of county-wide significance”.

Upon designation of a motion as an “issue of countywide significance”, the Presiding Judge shall assign three judges to act as a panel to hear the motion. The panel of judges shall hear testimony and argument and enter Findings of Fact and Conclusions of Law and Decision (“Ruling”) on the motion. Judges of the Court shall then have the following options: (1) accept such Ruling in its entirety; (2) not accept such Ruling and schedule a hearing before such judge for the presentation of testimony and argument; or (3) accept the Findings of Fact and Conclusions of Law, in whole or in part, and make a separate Decision thereon. The record made before such panel shall be taken before a court reporter and a transcript shall be made available to any judge of the Court upon his or her request. Copies of the transcript shall be made available through the court reporter to any person upon payment of the costs of transcription.

suppression order.<sup>5</sup> Within this hearing the defendants, including Ballow and Fausto, raised the issue herein; that in accordance with ER 702 the State must present a corresponding statement of uncertainty related to BrAC test results to admit the evidence at trial.<sup>6</sup> A three judge panel lifted the *Ahmach* suppression order, but agreed with the defendants that a statement of uncertainty must be introduced to admit the test results at trial.<sup>7</sup>

The State sought a Writ of Review before the King County Superior Court.<sup>8</sup> The superior court partially reversed the district court decision.<sup>9</sup> The defendants sought discretionary review with the Court of Appeals. This Court granted review.

## **2. District Court Decision.**

### **A. Findings of Fact.**

The King County District Court convened a five day hearing before a three judge panel devoted exclusively to the issues of lifting the *Ahmach* suppression order and addressing the defense motion regarding statements of uncertainty with breath test

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<sup>5</sup> CP 29-30.

<sup>6</sup> CP 20.

<sup>7</sup> CP 28-29.

<sup>8</sup> CP 1.

<sup>9</sup> CP 993-999.

results.<sup>10</sup> The court heard testimony from the State Toxicologist Ms. Fiona Couper, laboratory supervisor Jason Sklerov, former head of the Breath Test Section of the toxicology department Rod Gullberg, and University of Washington professor Dr. Ashley Emory.<sup>11</sup>

The trial court ruling covers 31 pages; 17 of which contain findings of the court based on the testimony and records presented.<sup>12</sup> The State did not challenge any of these findings before the Superior Court.<sup>13</sup> Un-challenged findings are verities on appeal. *State v. O'Neill*, 148 Wn.2d 564, 571, 62 P.3d 489 (2003). However, a brief review of the findings is necessary to understand the issue raised on appeal.

#### Finding Regarding General Scientific Community

- Instrument bias (systemic error) is the tendency of an instrument to consistently report values that are artificially elevated or depressed compared to the true value of a measured item (measurand). All measuring instruments have bias associated with them. If measurement results are not corrected for bias then the results will be artificially elevated or depressed compared to the true value of the measurand.<sup>14</sup>

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<sup>10</sup> CP 20.

<sup>11</sup> CP 55-56; CP 129-723.

<sup>12</sup> CP 20-50.

<sup>13</sup> CP 1-92.

<sup>14</sup> CP 21.

- Methods of determining and correcting for instrument bias are commonly used and accepted in the scientific community. It is generally accepted in the scientific community that all reported instrument results will be corrected for bias.<sup>15</sup>
- Every measurement is “uncertain,” in that no matter how good the instrument or the methodology, one can never know for sure the actual value of the measurand. Every measurement is merely an approximation and for any measurement there are an infinite number of values dispersed within a range around the value obtained by the measurement that are consistent with the measured value, and that with varying degrees of credibility can be attributed to the true value of the measurand.<sup>16</sup>
- Measurement uncertainty is a quantitative statement characterizing the dispersion (range) of values that can be actually and reasonably be attributed to the measurand. Every measurement made by every instrument has an uncertainty associated with it. In order to determine the uncertainty of a measurement, bias must first be corrected for. There are many methods for calculating and showing uncertainty. One such method, now adopted by the WTLD, is a confidence interval.<sup>17</sup>
- Given the inherent variability of measurement, a statement of a measurement result is incomplete without a statement of the accompanying estimate of uncertainty, (i.e., the range of values within which the value of the measurand can be said to lie within a specified level of confidence).<sup>18</sup>

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<sup>15</sup> CP 22.

<sup>16</sup> CP 22.

<sup>17</sup> CP 22.

<sup>18</sup> CP 22.

- It is well accepted in the scientific community that testing laboratories will use procedures for estimating uncertainty of measurement whenever possible.<sup>19</sup>
- It is well accepted within the scientific community that a statement on the estimated uncertainty of measurement is needed for a test reports when it is relevant to the validity or application of the test result, or when the uncertainty affects compliance to a specific standard. A decision not to calculate uncertainty is not appropriate under generally accepted scientific principles.<sup>20</sup>
- It is generally accepted in the scientific community that forensic reports, and testimony from them, must include a clear descriptor of the limitation of the analysis, that is, of the uncertainty.<sup>21</sup>
- Knowledge of the uncertainty associated with measurement results is essential to the proper interpretation of the results. Without quantitative assessment of uncertainty it is impossible to determine if statutory minimum limits have been exceeded. It is generally accepted within the scientific community that:
  - All results from every forensic test made should indicate the uncertainty in the measurements that are made.
  - Forensic reports, and any courtroom testimony stemming from them, must include the limitations of the analysis, including probabilities where possible.<sup>22</sup>
- There are many methods of estimating the uncertainty which are recognized within the scientific community. WTLD uses a

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<sup>19</sup> CP 24.

<sup>20</sup> CP 24-25.

<sup>21</sup> CP 25.

<sup>22</sup> CP 25.

confidence interval system developed by Rod Gullberg. The particular method chosen to determine uncertainty lies entirely within the purview of the WTLD.<sup>23</sup>

- ISO 17025, General Requirements for the Competence of Testing and Calibration Laboratories, is a standard recognized throughout the general scientific community as specifying the general requirements for the competence to carry out tests and/or calibrations. ISO 17025 has been accepted by the Washington Toxicology Laboratory as the standard for their accreditation and work. ISO and other standard setting organizations have required that uncertainty be included in measurement reports.<sup>24</sup>

#### Breath Testing

- The field of forensic breath testing recognizes that there is some bias associated with every breath test instrument, and every breath test. Even the appropriate application of all protocols will not eliminate bias. Bias or systemic error in BrAC results must be determined and the results corrected for the bias. To correct a result, the bias value must be added to (or subtracted from) the indicated result. The failure to correct for bias leads to the reporting of a value known to be in error.<sup>25</sup>
- The WTLD determines the bias of every DataMaster at least annually at the time of each instruments' annual Quality Assurance Procedure (QAP). BrAC results are never corrected for bias, however, unless a specific request is made by a defense attorney or defendant. Except in those few cases where a request has been made, inherent bias causes the test values reported by every Datamaster in Washington State to be artificially high (or low) as compared

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<sup>23</sup> CP 25.

<sup>24</sup> CP 24.

<sup>25</sup> CP 25.

with the true value of an individual's BrAC. The Datamaster can be, but is not in Washington, programmed to calculate the bias adjustment automatically and print out the corrected values. Without correcting for bias, all values reported by the Datamaster are artificially skewed by an amount up to 5%.<sup>26</sup>

- The best estimate of an individual's true BAC reading is the bias corrected mean of the values reported by the Datamaster. The bias corrected mean may, when compared to the actual readings, produce a substantially different result. The bias corrected mean may produce results below the legal thresholds (.02, .04, .08, .15) even when the actual test readings are both above the minimum level. In this situation there is a greater than 50% chance that the actual BAC reading is below the legal threshold. The failure to correct for bias may result in erroneous conclusions regarding whether a particular individual's BrAC is above or below a legal limit.<sup>27</sup>
- All BrAC measurements have uncertainty and so represent a range of values, any of which could represent the true value with a given level of confidence. Even the appropriate application of all protocols will not eliminate measurement uncertainty. Thus, no reliable result can be reported without an estimate of uncertainty. It is impossible to determine the likelihood that the result of a breath test actually exceeds the legal limit without determining the uncertainty of the test.<sup>28</sup>
- The uncertainty associated with BrAC testing will vary from one machine to another and from one QAP to another.<sup>29</sup>
- The confidence interval of a Datamaster result can be calculated using algebra and a statistical table. This is likely beyond the capabilities of most defendants, jurors, attorneys

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<sup>26</sup> CP 27.

<sup>27</sup> CP 26.

<sup>28</sup> CP 27.

<sup>29</sup> CP 25.

and judges. Upon request the WTLD will calculate the bias and uncertainty associated with a particular test. Absent a request, the WTLD makes no report or mention of bias or uncertainty.<sup>30</sup>

- Absent the reporting of uncertainty, there is a substantial possibility that even an expert would not make a meaningful analysis of a particular breath reading. Testimony revealed that many BAC readings in excess of .08, when considered in light of the confidence interval, are likely to have actual readings less than .08. The top three officials of the WTLD were unable to accurately determine a true BAC without an uncertainty calculation.<sup>31</sup>
- The WTLD uses a common spreadsheet program to correct for bias and calculate uncertainty. At the time of the QAP, the uncertainty range for all possible BrAC readings can be calculated for each Datamaster and are valid through the time of the next QAP.<sup>32</sup>

### **B. Analysis.**

The district court, relying on *City of Fircrest v. Jensen*,<sup>33</sup> *State v. Cauthron*,<sup>34</sup> and ER 702, held that breath test results were incomplete without an associated statement of uncertainty.<sup>35</sup> Therefore, breath test evidence would not be admitted at trial unless the State produced such statement for each test.

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<sup>30</sup> CP 25.

<sup>31</sup> CP 28.

<sup>32</sup> CP 28.

<sup>33</sup> 158 Wn.2d 384, 143 P.3d 776 (2006).

<sup>34</sup> 120 Wn.2d 879, 846 P.2d 502 (1993).

<sup>35</sup> CP 45-48.



### 3. Writ of Review.

The State sought review and superior court partly reversed. Acknowledging the relevance of a statement of uncertainty under ER 702, the court nonetheless held the district court erred as a matter of law where it mandated suppression of BrAC test evidence in cases where the State fails to present such evidence.<sup>36</sup> Instead, the decision to suppress must be made on a case-by-case basis.<sup>37</sup>

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<sup>36</sup> CP 996-997.  
<sup>37</sup> CP 997.

## **V. ARGUMENT**

### **1. To Meet Requirements Of ER 702 Must The State Introduce A Statement Of Uncertainty For A BAC Test In A DUI Trial?**

“If the citizens of [this State] are to have any confidence in the breath-testing program, that program has to have some credence in the scientific community as a whole.” Justice Chambers in *City of Seattle v. Clark-Munoz*, 152 Wn.2d 39, 47-48, 93 P.3d 141 (2004).

#### **A. Standard of Review.**

The interpretation of evidence rules is a question of law reviewed de novo. *State v. DeVincentis*, 150 Wn.2d 11, 17, 74 P.3d 119 (2003). Review of a court’s application of an evidentiary rule falls under abuse of discretion. *State v. Sanchez-Guillen*, 135 Wn. App. 636, 642, 145 P.3d 406 (2006). Here, the district court properly interpreted the requirements of ER 702 in relation to holding that statements of uncertainty are necessary to make BrAC test results helpful to the trier of fact. Accordingly, the district court did not abuse its discretion in ruling that suppression was appropriate for failure to comply with this evidentiary requirement.

## **B. BAC Testing Is Scientific Evidence Under ER 702.**

The State has charged Ballow and Fausto each under the “per se” prong of the DUI statute.<sup>38</sup> RCW 46.61.502(1)(a). A person is guilty under this prong if, within two hours after driving, they have “an alcohol concentration of 0.08 or higher as shown by analysis of the person’s breath or blood,” and regardless of the presence or absence of any manifestations of alcohol intoxication.<sup>39</sup>

In this context, however, “[b]reath test evidence alone is not conclusive proof of the per se offense.” *State v. Brayman*, 110 Wn.2d 183, 191, 751 P.2d 294 (1988). The State always has the burden to “prove beyond a reasonable doubt that the machine was in proper working order *and* that the [BrAC<sup>40</sup>] reading was a correct one.” *State v. Brayman*, 110 Wn.2d at 192. [Emphasis added] That is, the State must prove an individual’s actual BrAC exceeded the permissible threshold, not simply that the result from the breath test did. *City of Seattle v. Gellein*, 112 Wn.2d 58, 62-63, 768 P.2d 470

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<sup>38</sup> CP 126-127.

<sup>39</sup> RCW 46.61.502(1)(a). Although a breath test’s significance under the per se prong is evident, its practical effect on a finding pursuant to the “under the influence of or affected by” prong may be no less profound. Even on the “under the influence” prong, “evidence of intoxication is far stronger where there is a positive blood (or breath) alcohol test.” *State v. Cohen*, 125 Wn. App. 220, 225, 104 P.3d 70 (2005). And see *State v. Garthe*, 678 A.2d 153, 158 (N.J. 1996) (“[A] citizen’s right to drive, and sometimes to liberty, will depend on the verdict of a machine.”)

<sup>40</sup> Breath Alcohol Concentration.

768 P.2d 470 (1989). A per se violation of RCW 46.61.502 is defined by a citizen's actual BrAC, not a number produced by a machine. Seattle v. Gellein, 112 Wn.2d at 62-63.

Prosecution under RCW 46.61.502 requires the State to produce a BrAC test satisfying the requirements set forth under RCW 46.61.506. The State Toxicologist has been authorized to approve techniques and methods to obtain BrAC evidence.

RCW 46.61.506(4) sets forward a multi-step process for the use of an approved BrAC testing device to collect and analyze a defendant's breath sample.<sup>41</sup> Compliance with these steps makes the test results admissible for use at trial. City of Fircrest v. Jensen, 158 Wn.2d 384, 397, 143 P.3d 776 (2006). Admission, however, is permissive. Jensen, at 399. The trial court may employ ER 702, as

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<sup>41</sup> (4)(a) A breath test performed by any instrument approved by the state toxicologist shall be admissible at trial or in an administrative proceeding if the prosecution or department produces prima facie evidence of the following: (i) The person who performed the test was authorized to perform such test by the state toxicologist; (ii) The person being tested did not vomit or have anything to eat, drink, or smoke for at least fifteen minutes prior to administration of the test; (iii) The person being tested did not have any foreign substances, not to include dental work, fixed or removable, in his or her mouth at the beginning of the fifteen-minute observation period; (iv) Prior to the start of the test, the temperature of any liquid simulator solution utilized as an external standard, as measured by a thermometer approved of by the state toxicologist was thirty-four degrees centigrade plus or minus 0.3 degrees centigrade; (v) The internal standard test resulted in the message "verified"; (vi) The two breath samples agree to within plus or minus ten percent of their mean to be determined by the method approved by the state toxicologist; (vii) The result of the test of the liquid simulator solution external standard or dry gas external standard result did lie between .072 to .088 inclusive; and (viii) All blank tests gave results of .000.

it would with any scientific evidence, to determine whether BrAC results will be admitted. Jensen, at 398.

Jensen is instructive because the State argued that the admission standards set forward in RCW 46.61.506(4) was the legislature's attempt to place BrAC evidence "on the same level as other scientific tests, such as DNA tests results." Jensen, at 397; and see State v. Canaday, 90 Wn.2d 808, 813, 585 P.2d 1185 (1978) (Holding that Frye<sup>42</sup> is standard for admission of BAC testing in Washington State.). The Court agreed. *Id.*

A BrAC test is more than just analogous to scientific testing; it is a scientific test.<sup>43</sup> The descriptions of testing procedures for BrAC tests show both its complexity and reliance on scientific principles to generate an accurate and reliable result to be used in a criminal prosecution. See State v. Baker, 56 Wn.2d 846, 851, 355 P.2d 806 (1960); State v. Brayman, 110 Wn.2d at 187 (1988); State v. Straka, 16 Wn.2d 859, 864, 810 P.2d 888 (1991); and Clark-Munoz, 152 Wn.2d at 42.

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<sup>42</sup> Frye v. United States, 293 F. 1013 (D.C. Circ. 1923).

<sup>43</sup> Ludvigsen v. City of Seattle, 162 Wn.2d 660, 682 (2007)(Madsen, J., concurring).

No rule or regulation, however, dictates how a BrAC test result is to be presented to the jury. Consistent with Jensen and the cases involving DNA testing the method of delivering BrAC evidence to the jury is determined by relevant scientific standards and ER 702.

**C. Requirements Under ER 702 To Admit Scientific Evidence At Trial. Must Be Helpful To Trier Of Fact.**

ER 702 states;

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

Washington courts determine the admissibility of scientific evidence using a two-part inquiry: First, the proposed testimony must meet the standard for admissibility under Frye... Second, the testimony must be admissible under ER 702. State v. Greene, 139 Wn.2d 64, 69-70, 984 P.2d 1024 (1999).

The principles upon which a DataMaster<sup>44</sup> operates are now well “established and accepted.” State v. Ford, 110 Wn.2d 827, 835 (1988). Nonetheless, where breath test results are at issue, “[o]nce the Frye standard is satisfied...the trial court resumes its role as gatekeeper and may exclude otherwise admissible evidence by applying the rules of evidence.” Fircrest v. Jensen, at 397.

ER 702 has independent force and effect [and]...has a *significant role* in admissibility of scientific evidence aside from Frye. State v. Copeland, 130 Wn.2d 244, 259-60, 922 P.2d 1304 (1996)(emphasis added). Under ER 702, the trial court is given “broad discretion” in determining whether an expert’s testimony is admissible.” K. Tegland, Wash. Prac., Evidence, §702.15 (5<sup>th</sup> Ed. 2007).

Relevant to the present appeal is the requirement that scientific evidence must “be helpful to the trier of fact.” State v. Cauthron, 120 Wn.2d at 890. Thus, “[e]ven if generally accepted in principle, proffered scientific evidence is inadmissible under ER 702 unless it is helpful to the trier of fact.” State v. Greene, 139 Wn.2d at 73; State v. Cauthron, 120 Wn.2d at 890.

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<sup>44</sup> Name of breath testing machine used in Washington State.

**D. Breath Test Evidence Must Not Mislead The Trier Of Fact Regarding Certainty Of Test Result.**

It has been well settled law since at least 1990 that under ER 702 “[s]cientific evidence may be helpful and appropriate as long as it *“does not mislead the jury to the prejudice of the opposing party.”* State v. Guilliot, 106 Wn. App. 355, 363, 22 P.3d 1266 (2001); State v. Farr-Lenzini, 93 Wn. App. 453, 461, 970 P.2d 313 (1999); State v. Thomas, 123 Wn. App. 771, 778, 98 P.3d 1258 (2004); State v. Jones, 59 Wn. App. 744, 750, 801 P.2d 263 (1990); Moses v. Payne, 555 F.3d 742, 756 (9<sup>th</sup> Cir. 2009).

[Emphasis add]

Accordingly, when engaging in an analysis under ER 702, Courts must remain cognizant of what is now a well-recognized fact:

“The major danger of scientific evidence is its potential to mislead the jury; an aura of scientific infallibility may shroud the evidence and thus lead the jury to accept it without critical scrutiny.” See, Gianelli, The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later, 80 Colum.L.Rev. 1197, 1237 (1980); Reese v. Stroh, 74 Wn. App. 550, 558, 801 P.2d 263 (1994) (Although the court in Reese was discussing the Frye standard, as the Court below noted, Stroh’s concerns relating to scientific evidence directly apply to the issues here.).



Washington courts have explicitly noted the pernicious influence the concept of “black boxes” have on jurors. Reese v. Stroh, 74 Wn. App. at 557-558. Black boxes are “technologies that, because they are mechanical or mysterious, appear infallible to the average juror. Reese, 74 Wn. App. at 557-558. The Court warned:

When a witness gives his personal opinion on the stand—even if he qualifies as an expert—the jurors may temper their acceptance of his testimony with a healthy skepticism born of their knowledge that all human beings are fallible. But the opposite may be true when the evidence is produced by a machine: like many laypersons, jurors tend to ascribe an inordinately high degree of certainty to proof derived from an apparently “scientific” mechanism, instrument, or procedure. Reese v. Stroh, 74 Wn. App. at 559.

There can be little doubt that a BrAC Datamaster is a “black box,” as that term is used in Reese.

**E. Evidence Addressing Uncertainty Of Scientific Measurement Is Helpful To Trier Of Fact.**

Although the question presented herein is one of first impression with respect to BrAC testing, it has been conclusively answered in the context of DNA testing. In Cauthron, the State introduced DNA typing evidence that there was a “match” between DNA recovered from the crime scene and the defendant’s DNA.

State v. Cauthron, 120 Wn.2d at 884. The State did not provide the trier-of-fact with “any probability statistics” concerning the result, however. Cauthron, 120 Wn.2d at 906. The defense objected based on the absence of probability statistics but the test result was admitted.

On appeal, the Court first found “that DNA typing meets the Frye test of admissibility” holding “that DNA typing is generally accepted in the relevant scientific community.” Cauthron, at 899. This was not the end of the analysis, however, as the Court revealed that “[t]he critical inquiry is this: once it has been determined that two [DNA samples] match, what is the likelihood that the suspect and the evidence from the crime scene have the same source?” Cauthron, at 899.

Noting the requirement of ER 702 that testimony concerning DNA must be helpful to the trier of fact, the Court found, based solely on the failure to present probability statistics, that “[t]his testimony should not have been admitted, because it does not meet the test for expert testimony.” Cauthron, at 906.

Quoting a National Academy of Science’s publication, DNA

Technology in Forensic Science<sup>45</sup>, the Court explained that:

To say that two patterns match, without providing any scientifically valid estimate (or, at least, an upper bound) of the frequency with which such matches might occur by chance, is meaningless.

It then concluded:

Because the testimony presented did not include the background probability information, it was insufficient... Testimony of a match in DNA samples, without the statistical background or probability estimates, is neither based on a generally accepted scientific theory nor helpful to the trier of fact. Cauthron, at 907.

It is important to note that even though the Court recognized that DNA testing passed Frye, it found that the manner in which the State chose to report the results from this generally accepted scientific method, i.e. without probability statistics, rendered them unhelpful to the trier of fact. DNA evidence cannot be admitted unless it is accompanied by the appropriate probability statistics.

Moreover, although the defense attorneys in Cauthron clearly had a strong understanding of the statistics involved, and presented their own experts on the matter, the Court placed no burden on the defense to raise the issue as a matter of weight

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<sup>45</sup> The Court's decision relied heavily upon the work of the National Academy of Sciences and its publication *DNA Technology in Forensic Science* (National Academy Press 1992).

during cross-examination. Compliance with the Rules of Evidence is a requirement each party must satisfy to admit their own evidence. The DNA evidence was sought to be introduced by the State and the responsibility rests with the State to satisfy the requirements of ER 702 if it wants evidence to be admitted.

In Copeland, the Court found that DNA evidence offered at the trial level was admissible because it was accompanied by an appropriate estimate of the likelihood of the result. State v. Copeland, 130 Wn.2d 244 (1996). In doing so, the court enunciated and relied upon one of the primary principles established in Cauthron: For DNA evidence to be admissible, “statistical evidence of genetic profile frequency probabilities must be presented to the jury.” State v. Copeland, 130 Wn.2d at 264.<sup>46</sup>

Although DNA typing is a qualitative test looking for a “match” and BrAC testing is a quantitative test looking for a “concentration”, the function served by likelihood statistics in DNA and a confidence interval (i.e. uncertainty) in breath testing are analogous. Both are providing information necessary to understand

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<sup>46</sup> In footnote 1, the Court once again notes its reliance on the National Academy of Sciences Committee on DNA Technology in Forensic Science and its publication *DNA Technology in Forensic Science* (National Academy Press 1992).

what the test result means. With DNA, the likelihood is telling you the probability that a match means that the DNA associated with crime belongs to a particular individual. With BrAC testing, uncertainty is telling you the probability that a breath test result means that particular BrAC values can actually and reasonably be attributed to a citizen's true BrAC. Each is a clear characterization of the limitation on the inference that science recognizes can be drawn from a particular scientific result.

The State's witness Jason Sklerov admitted during testimony that requiring probability statistics in the context of DNA typing was similar to reporting a confidence interval for the results of a breath test.<sup>47</sup> Rod Gullberg also agreed that the reporting of a likelihood in the DNA context was performing an analogous function to that which would be performed by the reporting of uncertainty in the context of breath alcohol testing.<sup>48</sup>

Turning to the scientific community, a 2009 National Academy of Sciences<sup>49</sup> report entitled *Strengthening Forensic*

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<sup>47</sup> CP 235.

<sup>48</sup> CP 497.

<sup>49</sup> The National Academy of Sciences was formed in the 1860s by Abraham Lincoln with the purpose of providing advice and guidance to the United States in matters of science. It is one of the most highly respected and authoritative organizations in the scientific

Science in the United States: A Path Forward, directly addresses this issue.<sup>50</sup> In it, the Academy cautioned:

The law's greatest dilemma in its heavy reliance on forensic evidence... concerns the question of whether—and to what extent—there is *science* in any given 'forensic science' discipline.<sup>51</sup>

Focusing on one of its primary areas of concern, the Academy warned that “[f]ew forensic science methods have developed adequate measures of the accuracy of inferences made by forensic scientists. All results for every forensic science method *should indicate the uncertainty in the measurements* that are made.”<sup>52</sup> “There is a critical need in most fields of forensic science to raise the standards for reporting and testifying about the results

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community. CP 620. Despite what the State seems to think, forensic science doesn't somehow follow different physical laws than other physical sciences such as physics and chemistry. The same natural laws applicable to every other scientific lab and scientific measurement apply to forensics labs and forensic measurements as well. CP, 625.

<sup>50</sup> NAS (2009). “The Committee spent an enormous amount of time listening to testimony from and reviewing materials published by numerous experts, including forensic practitioners, heads of public and private laboratories, directors of medical examiner and coroner offices, scientists, scholars, educators, government officials, members of the legal profession, and law enforcement officials. Not only did [the committee] examine how the forensic disciplines operate, [it] also carefully considered any peer-reviewed, scientific research purporting to support the validity and reliability of existing forensic disciplines. Additionally, [the committee] invited experts in each discipline to refer [it] to any pertinent research. Committee members and staff spent countless hours reviewing these materials. And before the Report was released, it was peer-reviewed by outside experts in the fields of science, law, and forensic practice.” CP, 639. Ex. 83.

<sup>51</sup> National Academy of Sciences (NAS) *Strengthening Forensic Science in the United States: A Path Forward* (2009), pg. 87.

<sup>52</sup> *Id.* at 184 (emphasis added).

of investigations.”<sup>53</sup>

As a general matter, laboratory reports generated as the result of a scientific analysis...should identify, as appropriate, the sources of uncertainty in the procedures and conclusions along with estimates of their scale (to indicate the level of confidence in the results)...*to allow the nonscientist reader to understand what has been done and permit informed, unbiased scrutiny of the conclusion*...Some forensic laboratory reports meet this standard of reporting, but most do not...most reports do not discuss measurement uncertainties or confidence limits...Forensic reports, and any courtroom testimony stemming from them, must include clear characterizations of the limitations of the analyses, including associated probabilities where possible.<sup>54</sup>

“For example, methods for measuring the level of blood alcohol in an individual or methods for measuring the heroin content of a sample can do so only within a confidence interval of possible values.”<sup>55</sup> In this context, the same principles for determining uncertainty of blood alcohol tests apply to breath alcohol testing as well.<sup>56</sup> Accordingly, the Academy specifically notes that for forensic breath alcohol tests, the “measured results need to be reported, along with a confidence interval that has a

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<sup>53</sup> Id. at 185.

<sup>54</sup> Id. at 186 (emphasis added).

<sup>55</sup> Id. at 116-117.

<sup>56</sup> CP 308; 316-317; 676-677; 690.

high probability of containing the true blood-alcohol level (e.g., the mean plus or minus two standard deviations).”<sup>57</sup>

For this reason, “[m]any would consider inadequate statistical thought in...data analysis to be unethical scientific practice.”<sup>58</sup> As Dr. Wayne Jones, acknowledged as one of the foremost experts in forensic toxicology in the world during the hearings below, declared: “[a]n urgent need exists to report results of forensic alcohol analysis as a range of values, that is as a confidence statement”<sup>59</sup> and “[i]f systematic error does exist this must be added or subtracted from the mean result of alcohol analysis before the uncertainty calculations are made.”<sup>60</sup>

Rod Gullberg recognized this same state of affairs in the field of forensic breath alcohol years ago writing:

The legal admission of forensic breath-test results is rarely accompanied by an estimation of its uncertainty. This results, in part, from final decision-makers failing to appreciate its relevance. Defense attorneys, prosecutors,<sup>61</sup> judges and lay juries often

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<sup>57</sup> NAS at 117.

<sup>58</sup> Gullberg 458 (2009).

<sup>59</sup> CP 573; 575; Ex. 72.

<sup>60</sup> Jones 10 (2003).

<sup>61</sup> As one of the judges commented during the hearing: "...my concern is there may be 50 people in the state, attorneys, who understand this at a level able to converse with you about this topic; people in this room and some more that are specialized and spend their life doing DUI kind of work. And then there's a great many who know a kind of a little bit who might recognize that number but not know what to do with it, etcetera, and then



lack scientific training and naively accept measurement results as certain... Moreover, forensic scientists themselves often fail to consider or appreciate measurement uncertainty...

Although some forensic scientists may find the notion of 'error' unsettling, it is a reality of measurement that must be appreciated... Only when measurement 'error' is acknowledged and properly estimated can... analytical goals [be] achieved.<sup>62</sup>

Both the National Academy and Gullberg note that the failure of labs to determine and report the uncertainty of their BrAC results is poor science that needs to be rectified if those making decisions based upon them are to understand what they mean. Moreover, both Gullberg and the Academy are telling this Court that current law is part of the problem, facilitating a race to the bottom because

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there's a vast, large group of attorneys that wouldn't have a clue what we're talking about, okay, who do a DUI once every year or two or something, okay? From a public policy standpoint, wouldn't it be better to alert the unknowing that there's this issue you've got to find out about, as opposed to relying only on those who know how to request and what they get and what it means?" CP 231.

<sup>62</sup> Gullberg 563 (2006). Sklerov also testified that even when requests for a test's uncertainty are received, the attorney's doing so have a clear "misunderstanding" of what uncertainty is. CP 219-220. See also, Saks, *Failed Forensics: How Forensic Science Lost Its Way and How It Might Yet Find It*, 4 Annu. Rev. Law Soc. Sci. 149, 153 (2008) ("...lawyers had, and continue to have, little training in the basic methods of science. They do not know how to think about validation of science claims or how to frame an assessment of such claims. In particular, most lawyers have little or no training in statistics, a key element of the applied sciences of which forensics should have been a part. Many lawyers simply could not distinguish between real science and pretensions to science. Lawyers—on both sides—who did (and do) know the difference often were too overwhelmed by resource limitations and caseload pressures to be able to mount a meaningful challenge to the evidence. Moreover, scientifically naive courts were sometimes romanced by the claim that they were being presented with science by scientists—terms appropriated by police forensic personnel even though much of what they do would be described in more conventional scientific workplaces as the work of technicians.").

it fails to hold forensic science to the same basic principles that apply to all scientific investigation.

In order to establish the admissibility of BrAC results, the State introduces evidence that the process of administering the test meets statutory requirements for “accuracy and reliability.” State v. Straka, 116 Wn.2d 859, 810 P.2d 888 (1991); RCW 46.61.506(4)(a). Any argument, however, that the trier of fact can judge the uncertainty associated with a test result through this testimony alone is contradicted by the testimony of the State

Toxicologist:

I don't believe anyone would actually come out with [the confidence interval for a particular result] based on our summary of the quality assurance system...based on testimony about quality assurance procedures, no [the jury] would not come out with those figures.<sup>63</sup>

As the hearing below demonstrated, when provided with the “accuracy and reliability information” absent the uncertainty, even the State’s top three experts were unable to properly interpret breath test results from their own program. In fact, absent the associated uncertainty, the fact that they were able to conclude that

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<sup>63</sup> CP 404-405.

these were “accurate and reliable” tests actually seems to have misled each of them into having more confidence in the results than justified. Only when the results were corrected for bias and accompanied by their uncertainty could they be properly understood.

Moreover, when the State’s top three witnesses were presented with specific and distinct BrAC results but not their associated uncertainty, each expressed a high level of confidence based on the “accuracy and reliability information” that the results exceeded 0.08 g/210L. Once the uncertainty of each result was considered, however, even though each result was “accurate and reliable,” it was found that the likelihood that each citizen’s BrAC was actually less than a 0.08 was 14%<sup>64</sup>, 19.2%<sup>65</sup>, 29.8%<sup>66</sup> and 44%.<sup>6768</sup>

If the State’s top experts can’t interpret what a BrAC result

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<sup>64</sup> CP 397-401 (Fiona Couper).

<sup>65</sup> CP 260-263 (Jason Sklerov).

<sup>66</sup> CP 397-401 (Fiona Couper).

<sup>67</sup> CP 523-530 (Rod Gullberg).

<sup>68</sup> This is not an illustration that the State’s experts are incompetent. It is well recognized in ISO 21748 v (2004) that: “Knowledge of the uncertainty associated with measurement results is essential to the interpretation of the results. Without quantitative assessments of uncertainty, it is impossible to decide whether observed differences between results reflect more than experimental variability... or whether laws based on limits have been broken. Without information on uncertainty, there is a risk of misinterpretation of results. Incorrect decisions taken on such a basis may result in...incorrect prosecution in law.”

means without being informed of the result's uncertainty how can one expect a lay juror or judge to fare any better?

As explained by Gullberg:

Results of scientific measurements are compelling to those untrained in numerical or analytical issues while many believe that all numerical results possess absolute certainty.<sup>69</sup> The professional expert witness, however, must present numerical information accompanied by their limitation and avoid conveying the "illusion of certainty". The misuse and misleading application of statistics, designed to convey an unjustified interpretation, must also be considered unethical. Doubt and uncertainty should be respectable concepts in the forensic sciences. While fitness-for-purpose can and should certainly be established, assumptions and uncertainty in breath alcohol analysis must be acknowledged.<sup>70</sup>

Although the importance of including the uncertainty of a BrAC result is obvious when in the immediate vicinity of any of the critical levels established under Washington law ( 0.02 g/210L, 0.04 g/210L, 0.08 g/210L and 0.15 g/210L), as the Court below noted: "it is hard to imagine a situation where a confidence level would not be important."<sup>71</sup>

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<sup>69</sup> See CP 627. Based on his experience, Dr. Emery agreed that when presented with a result absent its uncertainty "I think the average layperson will just accept it."

<sup>70</sup> Gullberg2 25 (2006). Gullberg was in agreement with the contents of this passage. CP 560.

<sup>71</sup> CP 45.

The reason is two-fold. First, being “in the vicinity” of a critical level is defined by a result’s uncertainty.<sup>72</sup> That is, the values reported by a breath test machine are “in the vicinity” of a critical level if the uncertainty demonstrates that the values that can actually and reasonably be attributed to a citizen’s BrAC includes those that fall below the limit under consideration.<sup>73</sup> What is critical to understand is that in the context of a particular test result, “until we run the numbers we don’t know exactly where that range will lie.”<sup>74</sup> Thus, we don’t know what “in the vicinity” of a critical level means unless and until we have determined a result’s uncertainty.

Related to this is the fact that “in the vicinity” is determined by the level of confidence we are reporting our result to. Thus, for a single result, “in the vicinity” will be different according to whether the uncertainty is reported to a 95%, 99% or 99.7% level of confidence.<sup>75</sup> If the trier-of-fact is not informed of this, they will be unable to properly interpret a BrAC result and therefore be misled by it.

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<sup>72</sup> CP 300.

<sup>73</sup> CP 567.

<sup>74</sup> SK3 59.

<sup>75</sup> These correspond to coverage factors of  $k = 2, 2.576$  and  $3$ .

## V. CONCLUSION

The ultimate mission of the system upon which we rely to protect the liberty of the accused as well as the welfare of society is to ascertain the factual truth. *Commonwealth of Northern Mariana Islands v. Bowie*, 243 F.3d 1109, 1114 (9<sup>th</sup> Cir. 2001). Complete, competent, and impartial forensic-science investigations can be that ‘touchstone of truth’ in a judicial process that works to see that the guilty are punished and the innocent are exonerated.<sup>76</sup> On the other hand, forensic practices that fail to satisfy basic scientific principles undermine the quest for truth resulting in convictions of the innocent and acquittals of the guilty.<sup>77</sup> In this age of science we must build legal foundations that are sound in science as well as in law.<sup>78</sup> The law should seek verdicts consistent with scientific reality, and with each other, and it can achieve this goal only by requiring scientific evidence to conform to the standards and criteria to which scientists themselves adhere.<sup>79</sup>

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<sup>76</sup> Peterson, *The Evolution of Forensic Science: Progress Amid the Pitfalls* 36 *Stetson Law Rev.* 621, 660 (2007).

<sup>77</sup> NAS at 4.

<sup>78</sup> Justice Stephen Breyer in, *Reference Manual on Scientific Evidence* 4 – 8 (2<sup>nd</sup> ed. 2000).

<sup>79</sup> Black, *Evolving Legal Standards for the Admissibility of Scientific Evidence*, 239 *Science* 1508, 1512 (1988).

Appellants herein are asking for nothing more or less than what is required in the context of DNA testing. A BrAC result presented to the trier-of-fact must be accompanied by its associated uncertainty. Issues related to the magnitude of the uncertainty associated with a scientific result are a matter for the trier-of-fact to consider and weigh with any other evidence presented. Whether or not the trier-of-fact is permitted to consider and weigh a BrAC result in the first place, however, is dependent upon whether they are provided with the information necessary to properly understand and interpret the result under ER 702. In the cases considered here, the district court judges concluded the necessary information includes the BrAC result's associated uncertainty.

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