

**STATE OF MINNESOTA  
IN COURT OF APPEALS  
A10-912**

State of Minnesota,  
Appellant,

vs.

Lori Ann Edstrom,  
Respondent.

**Filed December 21, 2010  
Affirmed in part, reversed in part, and remanded  
Hudson, Judge**

Carver County District Court  
File No. 10-CR-09-472

Lori Swanson, Attorney General, St. Paul, Minnesota; and

Samuel J. Edmunds, Assistant Chanhassen City Attorney, Eagan, Minnesota (for appellant)

Steven J. Meshbesh, Adam T. Johnson, Meshbesh & Associates, P.A., Minneapolis, Minnesota (for respondent)

Considered and decided by Larkin, Presiding Judge; Peterson, Judge; and Hudson, Judge.

**S Y L L A B U S**

1. The district court did not err by holding a *Frye-Mack* hearing regarding the general acceptance and scientific reliability of gas headspace chromatography as performed on urine samples.

2. The district court did not abuse its discretion by admitting expert testimony regarding the acceptability and reliability of gas headspace chromatography for the purpose of a *Frye-Mack* hearing.

3. The *Frye-Mack* hearing established that gas headspace chromatography is generally accepted in the scientific community, and it is a reliable technique for determining the alcohol concentration in a urine sample, including a first-void urine sample.

## OPINION

**HUDSON**, Judge

The state appeals the district court's pretrial rulings granting respondent's request for a *Frye-Mack* hearing regarding urine testing, denying the state's motion to exclude expert testimony, and excluding from evidence respondent's urine test result. Because we conclude that the district court did not err in holding a *Frye-Mack* hearing or abuse its discretion in denying the state's motion to exclude expert testimony, but that the district court abused its discretion by excluding respondent's urine test result, we affirm in part, reverse in part, and remand for further proceedings.

## FACTS

The facts are undisputed. On May 3, 2009, respondent Lori Edstrom was arrested by Carver County Sheriff's Deputy James Horvath on suspicion of driving while impaired. Deputy Horvath read Edstrom the implied-consent advisory and transported Edstrom to the Carver County jail. Deputy Horvath requested that Edstrom submit to a urine test. Edstrom consented. Deputy Amy Ahlers collected the urine sample from

Edstrom. Deputy Ahlers did not require Edstrom to void her bladder prior to providing the sample. Deputy Horvath sent Edstrom's urine sample to the Bureau of Criminal Apprehension (BCA), which tested it and reported an alcohol concentration of .08.

The state charged Edstrom with driving a motor vehicle under the influence of alcohol in violation of Minn. Stat. § 169A.20, subd. 1(1) (2008) (count one) and driving a motor vehicle “when the person's alcohol concentration at the time, or as measured within two hours of the time, of driving, operating, or being in physical control of the motor vehicle is .08 or more” in violation of Minn. Stat. § 169A.20, subd. 1(5) (2008) (count two).

Edstrom requested a *Frye-Mack* hearing on the issue of the acceptance and reliability of urine testing as performed on first-void urine samples—samples that are obtained without having the individual void his or her bladder prior to obtaining the sample. Edstrom further moved to suppress her urine test result on the ground that it did not satisfy the *Frye-Mack* standard for admissibility of scientific evidence. The state countered that a *Frye-Mack* hearing was unnecessary because this court has previously concluded that urine testing, including first-void urine testing, is reliable. The state also moved to exclude any expert testimony on the acceptability and reliability of urine testing. The district court denied the state's motion to exclude expert testimony, scheduled a *Frye-Mack* hearing, and reserved ruling on Edstrom's motion to suppress.

At the *Frye-Mack* hearing, the parties presented several expert witnesses who testified about the validity of urine testing. BCA forensic toxicologist Dr. Edward Stern and BCA forensic scientists Brent Nelson and Lindsey Garfield testified for the state;

forensic consultant Thomas Burr testified for Edstrom. By stipulation, the district court admitted transcripts of the testimony of Dr. Stern and Burr in an earlier Minnesota district court case, in lieu of lengthy, live testimony. The district court also received a number of scientific articles from both parties regarding the collection and analysis of urine samples.

The district court determined that (1) “[u]rine testing for alcohol concentration is a scientifically accepted procedure in the wider scientific community” and (2) gas headspace chromatography, the scientific technique used by the BCA to determine the alcohol concentration in a urine sample, is “scientifically sufficient” and was properly performed in this proceeding. Despite its findings regarding the adequacy and reliability of gas headspace chromatography, however, the district court suppressed the urine test result. Specifically, the district court determined that the potential prejudicial effect of the urine test result would outweigh its probative value because “[t]he alcohol content reading from a urine sample is *only one factor* in determining impairment of an individual [and] is not *scientifically conclusive* as to impairment.” Having suppressed the urine test result, the district court dismissed count two, driving a motor vehicle with an alcohol concentration of .08 or more, because the state lacked probable cause in the absence of the urine test result. *See* Minn. Stat. § 169A.20, subd. 1(5). But the district court permitted count one, driving a motor vehicle while under the influence of alcohol, to proceed to trial because the state had produced other evidence of Edstrom’s impairment. *See* Minn. Stat. § 169A.20, subd. 1(1).

This pretrial appeal by the state follows.

## ISSUES

I. Did the district court err in conducting a *Frye-Mack* hearing on gas headspace chromatography?

II. Did the district court abuse its discretion by denying the state's motion to exclude expert testimony on the acceptability and reliability of gas headspace chromatography for the purposes of the *Frye-Mack* hearing?

III. Did the district court err in finding that gas headspace chromatography satisfies the *Frye-Mack* standard, even as performed on first-void urine samples?

IV. Did the district court err in excluding the urine test result as being more prejudicial than probative?

## ANALYSIS

When appealing a pretrial ruling, the state must clearly and unequivocally establish that the district court's ruling has a critical impact on the state's case. *State v. Scott*, 584 N.W.2d 412, 416 (Minn. 1998); *State v. Beall*, 771 N.W.2d 41, 44 (Minn. App. 2009). Edstrom stipulates that the suppression of her urine test result and the consequent dismissal of count two will have a critical impact on the state's case. Accordingly, the state has established that it is entitled to appellate review of the district court's pretrial rulings.

### I

The *Frye-Mack* standard governs the admissibility of scientific evidence in Minnesota and requires that scientific evidence be generally accepted and considered reliable by the scientific community to be admissible. *State v. Jobe*, 486 N.W.2d 407,

419 (Minn. 1992) (citing *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923); *State v. Mack*, 292 N.W.2d 764, 768 (Minn. 1980)). A *Frye-Mack* hearing is only necessary when the evidence at issue was obtained using a technique that is both scientific and novel. See *State v. Klawitter*, 518 N.W.2d 577, 585 (Minn. 1994) (holding that nystagmus testing need not be subjected to *Frye-Mack* inquiry as it was not a novel scientific technique); *State v. Hodgson*, 512 N.W.2d 95, 98 (Minn. 1994) (holding that bite-mark analysis need not be subjected to *Frye-Mack* inquiry as it was not a novel scientific technique). A *Frye-Mack* hearing may also be held once a technique is no longer considered novel, but in that instance, the focus of the inquiry shifts from the technique's general acceptability to the reliability of the results in the case at hand. *State v. Roman Nose*, 649 N.W.2d 815, 822–23 (Minn. 2002).

The state contends that the district court erred in conducting a *Frye-Mack* hearing because gas headspace chromatography is no longer considered an emerging scientific technique. Edstrom counters that the district court was required to hold a *Frye-Mack* hearing because no Minnesota appellate court has evaluated the acceptability and reliability of gas headspace chromatography—particularly as performed on first-void urine samples—under the *Frye-Mack* standard. The district court granted Edstrom's request for a *Frye-Mack* hearing in large part because neither this court nor the Minnesota Supreme Court has evaluated gas headspace chromatography under the *Frye-Mack* standard.

We conclude, based on the supreme court's decision in *Roman Nose*, that the district court did not err in holding a *Frye-Mack* hearing. In *Roman Nose*, the Minnesota

Supreme Court held that the district court erred in denying a request for a *Frye-Mack* hearing to determine the acceptability and reliability of the PCR-STR method for DNA testing. *Id.* at 821–23. The court concluded that, even though the method had been used in Minnesota for over ten years, a *Frye-Mack* hearing was still necessary because the court had never considered whether the technique was generally accepted and considered reliable by the scientific community. *Id.* The court therefore remanded for a *Frye-Mack* hearing on the PCR-STR method. *Id.* at 823.

As the state correctly notes here, this court has repeatedly addressed the admissibility of evidence regarding gas headspace chromatography as performed on first-void urine samples. *See, e.g., Hayes v. Comm’r of Pub. Safety*, 773 N.W.2d 134, 138–39 (Minn. App. 2009) (concluding that district court did not err by excluding expert testimony regarding validity and reliability of first-void urine test in implied-consent proceeding); *Genung v. Comm’r of Pub. Safety*, 589 N.W.2d 311, 313 (Minn. App. 1999) (concluding that district court did not err by finding that first-void urine test was conducted properly and reported driver’s alcohol concentration accurately in implied-consent proceeding), *review denied* (Minn. May 18, 1999); *City of Springfield v. Anderson*, 411 N.W.2d 292, 293–94 (Minn. App. 1987) (concluding that district court did not abuse its discretion by excluding expert testimony regarding first-void urine testing in criminal prosecution for driving with alcohol concentration over .10 where expert agreed sample was valid). But neither this court nor the supreme court has yet had occasion to address the fundamental question of whether the results of gas headspace

chromatography—whether performed on first-void or later-void urine samples—satisfies the *Frye-Mack* standard for the admissibility of scientific evidence.<sup>1</sup>

In *Roman Nose*, the supreme court emphasized the importance of conducting a *Frye-Mack* hearing regarding the acceptability and reliability of novel scientific evidence to avoid the risk of “the judge [being] put in the role of scientist.” 649 N.W.2d at 822–23. Thus, even though Minnesota has long used gas headspace chromatography to determine the alcohol concentration in urine samples, and even though this court has examined the performance of gas headspace chromatography on first-void urine samples in other contexts, we conclude that the district court did not err in holding a *Frye-Mack* hearing.

## II

The state argues that the district court abused its discretion by admitting expert testimony regarding the acceptability and reliability of gas headspace chromatography for purposes of a *Frye-Mack* hearing.

“Expert testimony generally is admissible if: (1) it assists the trier of fact; (2) it has a reasonable basis; (3) it is relevant; and (4) its probative value outweighs its

---

<sup>1</sup> Edstrom points out that, while *Anderson* involved a criminal DWI prosecution, the court did not evaluate first-void urine testing on the merits because the defendant there did not challenge the suitability of the urine sample at issue. Edstrom also contends that *Hayes* and *Genung* are distinguishable because they were both decided within the specific parameters of the implied-consent statute, not a DWI prosecution. Although Edstrom’s observations are correct, in those cases, this court repeatedly and squarely affirmed the district court’s rejection of expert testimony regarding the “first-void” or “urine pooling” theory itself, regardless of the context in which it has arisen. What we have *not* done until today is subject our analysis and rationale for doing so to the rigors of a *Frye-Mack* hearing.



potential for unfair prejudice.” *State v. Jensen*, 482 N.W.2d 238, 239 (Minn. App. 1992), review denied (Minn. May 15, 1992); see Minn. R. Evid. 702 (outlining requirements for expert testimony). The decision to admit or exclude expert testimony is within the discretion of the district court. *State v. Reese*, 692 N.W.2d 736, 740 (Minn. 2005). Therefore, the district court’s decision will be reversed only if the district court clearly abused its discretion. *State v. Ritt*, 599 N.W.2d 802, 810 (Minn. 1999).

Here, the district court denied the state’s motion to exclude expert testimony regarding the acceptability and reliability of gas headspace chromatography. It is unclear whether the district court was denying the motion with regard to the *Frye-Mack* hearing alone or with regard to both the *Frye-Mack* hearing and the trial on the merits. To conduct a thorough *Frye-Mack* hearing, however, the district court necessarily had to permit expert testimony about the acceptability and reliability of the scientific technique at issue. Therefore, to the extent the district court denied the state’s motion with regard to the *Frye-Mack* hearing, we conclude that it was not an abuse of discretion to do so.

### III

“The standard of review of admissibility determinations under *Frye-Mack* is two-pronged.” *Goeb v. Tharaldson*, 615 N.W.2d 800, 815 (Minn. 2000). Whether the scientific technique is generally accepted in the relevant scientific field is a question of law that this court reviews de novo. *Id.* Whether “the [scientific technique] itself is reliable and . . . its administration in the particular instance conformed to the procedure necessary to ensure reliability” is reviewed for an abuse of discretion. *Id.* at 814–15 (quoting *State v. Moore*, 458 N.W.2d 90, 98 (Minn. 1990)).

Gas headspace chromatography involves the isolation of compounds contained in a urine sample and the measurement of the concentration of each compound. The urine sample is placed in a vial and diluted with a liquid solution. Then, the vial is heated until the urine sample equilibrates, meaning that the gas and liquid forms of the compounds in the liquid solution reach a constant ratio. Next, the vapor is transferred to a gas chromatography column. The vapor travels through the column, and as it does so, the compounds in the vapor separate from each other and attach to the column. A detector identifies each of the compounds and measures the quantity of the compounds in the urine sample.<sup>2</sup>

The uncontroverted evidence presented at the *Frye-Mack* hearing demonstrates that gas headspace chromatography is generally accepted in the scientific community for the purposes of measuring the concentration of alcohol in a urine sample. Gas headspace chromatography clearly detects the presence of alcohol in a urine sample and measures the concentration of alcohol in that sample. And there is no evidence to suggest that gas headspace chromatography is any less accepted by the scientific community when it is used on a first-void, as opposed to a later-void, urine sample. We therefore conclude that gas headspace chromatography satisfies the first prong of the *Frye-Mack* standard of the general acceptance by the scientific community. *See Jobe*, 486 N.W.2d at 419.

We next examine the second prong of the *Frye-Mack* standard: the reliability of the scientific evidence.

---

<sup>2</sup> *See generally* 5 David L. Faigmon, et al., *Modern Scientific Evidence*, § 41:36 at 500–01 (2009–2010 ed.) (describing technique of gas chromatographic analysis using a headspace sampling method).

Dr. Stern, Nelson, and Garfield, who testified on behalf of the state, described the measures taken to ensure the reliability of the BCA's urine test results. To prevent chemical changes to a urine sample after collection, the BCA (1) places sodium fluoride in the containers used to collect urine samples; (2) refrigerates urine samples between the time they arrive at the BCA and the time they are tested; and (3) freezes urine samples once testing is completed. To ensure that the urine test result accurately reports the alcohol concentration in the urine sample being tested, the BCA (1) performs calibration tests on the instruments; (2) includes control samples when testing each sample; and (3) tests each urine sample twice.

Here, deputies Horvath and Ahlers collected Edstrom's urine sample using the BCA urine-testing kit, which included a container with sodium fluoride. Deputy Horvath mailed the urine sample to the BCA, and it arrived within two days. Once the sample arrived, a BCA evidence technician placed it in a refrigerator. Over the next two days, Nelson twice performed gas headspace chromatography on Edstrom's urine sample in accordance with the BCA's procedures. These tests revealed alcohol concentrations of .0896 on the first day and .0892 on the second day, which were within the BCA's acceptable margin of error.<sup>3</sup> Nelson reported Edstrom's urine alcohol concentration as

---

<sup>3</sup> Nelson stated that the acceptable margin of error was three percent, but this seems to be incorrect based on Stern's testimony and the BCA's own procedures for performing gas headspace chromatography. The BCA's procedures state that where the alcohol concentration results are .100 or greater, the difference must be less than or equal to three percent, but here, where the alcohol concentration results are less than .100, the difference must be less than or equal to .003. But even though Nelson misstated the BCA's standards, he was correct that the .0896 and .0892 results fell within the BCA's .003 margin of error.

.08 in compliance with the BCA's protocol, which requires using the lower test result and dropping the final decimal place.

The uncontroverted evidence establishes that gas headspace chromatography reliably measures the alcohol concentration in the urine sample being tested. The BCA uses standard scientific methods for ensuring the reliability of its urine test results, and it employed those methods in testing Edstrom's urine sample.<sup>4</sup> Thus, Edstrom's urine test result was reliable, and the district court did not abuse its discretion in so concluding.

At the *Frye-Mack* hearing and on appeal, Edstrom relies heavily on Burr's testimony to contend that first-void urine samples are unreliable and that, as a consequence, the results of gas headspace chromatography performed on first-void urine samples are also unreliable and therefore inadmissible. But Burr's criticisms of first-void urine testing do not call into question the admissibility of first-void urine test results. At best, his criticisms address the weight to be given to such results. We address each of Burr's criticisms in turn.

Initially, Burr testified that urine samples generally—and first-void urine samples particularly—cannot reliably be used to extrapolate an individual's blood alcohol

---

<sup>4</sup> Burr, who testified on behalf of Edstrom, stated that he did not believe that “the procedures that are in place for the collection, storage, and transportation of the sample are sufficient to ensure its reliability when it gets to the laboratory.” Burr therefore questioned whether gas headspace chromatography would always determine the alcohol concentration of a urine sample at the time it was collected. Burr conceded, however, that he had no reason to believe that Edstrom's urine sample was collected, stored, or transported improperly such that Edstrom's urine test result failed to report the alcohol concentration of the sample at the time it was collected, as well as the time at which it was tested. For these reasons, with regard to this case, Burr's criticism is theoretical and does not undermine the reliability of Edstrom's urine test result.

concentration. As Dr. Stern, Garfield, and Nelson testified, however, the BCA simply reports the alcohol concentration of a urine sample, regardless of whether it is a first-void or later-void sample; it does not extrapolate blood alcohol concentration from urine alcohol concentration. While Burr's testimony in this regard may reflect the scientific consensus regarding the extrapolation of blood alcohol concentration from urine alcohol concentration, that practice is simply not at issue here.

Next, Burr testified that urine alcohol concentration—particularly the concentration contained in a first-void urine sample—cannot be used to establish per se that an individual is or was impaired. Burr testified that, instead, urine alcohol concentration is only one factor to be considered in determining impairment. Dr. Stern, Garfield, and Nelson generally agreed with Burr's testimony in this regard. And the district court, in fact, stated that the alcohol-content reading from a urine sample is “*only one factor* in determining impairment of an individual.” Although this may be true, it does not call into question the scientific community's general acceptance of reliability of the urine test result to determine the urine alcohol concentration of a particular urine sample.

Burr further testified that a first-void urine sample cannot be used to determine an individual's urine alcohol concentration at the time that the sample is collected because a first-void urine sample contains the urine that has been collecting between the time of an individual's previous void through the time of collection. Burr indicated that, as a consequence, gas headspace chromatography will reveal only the individual's average urine alcohol concentration during that period, not the individual's urine alcohol

concentration at the time of collection. Again, this testimony does not undermine the acceptance or reliability of gas headspace chromatography in determining the alcohol concentration in a particular urine sample.

Edstrom's position is simply this: for purposes of prosecuting an individual for driving when "the person's alcohol concentration at the time, or as measured within two hours of the time, of driving, operating, or being in physical control of the motor vehicle is .08 or more," the state must isolate the urine alcohol concentration of the urine that the individual is secreting at the time of driving or within two hours of driving. *See* Minn. Stat. § 169A.20, subd. 1(5) (allowing alcohol concentration to be "as measured within two hours of . . . driving"). But the statute does not contain such a requirement. *See id.* And we decline the invitation to create one under the auspices of a *Frye-Mack* ruling.

For these reasons, we hold that the use of gas headspace chromatography to determine the alcohol concentration of a urine sample meets the *Frye-Mack* standard for admissibility of scientific evidence, regardless of whether the sample being tested is the product of a first void or a later void.

#### IV

Finally, the state argues that the district court abused its discretion in suppressing Edstrom's urine test result. "Evidentiary rulings rest within the sound discretion of the [district] court and will not be reversed absent a clear abuse of discretion." *State v. Amos*, 658 N.W.2d 201, 203 (Minn. 2003). Here, the district court found that gas headspace chromatography meets the *Frye-Mack* standard. Nonetheless, the district court excluded the result of Edstrom's urine test based on testimony that an individual's urine alcohol

concentration is one factor to be considered in determining whether that individual is impaired, but is not per se evidence of impairment. The district court found that the prejudicial effect of admission of the urine test result outweighed its probative value because a jury would likely treat a urine test result of .08 as per se evidence of impairment with respect to count one, driving under the influence, because .08 is the statutory minimum urine alcohol concentration required to prove count two, driving with an alcohol concentration over .08. The district court also expressed concern that “no amount of scientific testimony” offered by Edstrom would be able to mitigate this prejudice.

In the absence of the urine test result, the district court determined that the state could not proceed with count two, which requires evidence of a particular alcohol concentration as measured within two hours of driving. The district court therefore dismissed count two, even though the state had clearly produced the requisite evidence of Edstrom’s alcohol concentration and the district court had just concluded a *Frye-Mack* hearing in which it determined that gas headspace chromatography is generally accepted as a reliable method for determining the alcohol concentration of a urine sample. *See* Minn. Stat. § 169A.20, subd. 1(5).

Relevant evidence is not subject to exclusion unless it poses a risk of *unfair* prejudice, *i.e.*, the tendency to persuade by impermissible means. *See State v. Mahkuk*, 736 N.W.2d 675, 687 (Minn. 2007) (applying Minn. R. Evid. 403). Although there was a risk that a jury might give too much weight to the urine test result with regard to count one, driving under the influence, the exclusion of probative evidence is too drastic a

remedy for a risk the defense can counter with expert testimony and at closing argument. We also believe that a jury is capable of comprehending testimony, or an instruction, that alcohol concentration as measured within two hours of driving is but one factor to be considered in determining whether a driver is impaired at the time of driving.

For these reasons, we conclude that the district court abused its discretion in excluding Edstrom's urine test result and in dismissing count two as a consequence.

### **D E C I S I O N**

We conclude that the district court did not err by conducting a *Frye-Mack* hearing regarding gas headspace chromatography and did not abuse its discretion by admitting expert testimony regarding gas headspace chromatography for the purpose of the *Frye-Mack* hearing. We also agree with the district court that the evidence at the *Frye-Mack* hearing established that gas headspace chromatography is generally accepted in the scientific community as a reliable technique for determining the alcohol concentration in a urine sample, regardless of whether it is a first-void or later-void urine sample. But we conclude that the district court abused its discretion by excluding Edstrom's urine test result and by dismissing count two. We therefore remand this matter to the district court for further proceedings on both counts.

**Affirmed in part, reversed in part, and remanded.**