



Introduction

The secure continuous remote alcohol monitor (SCRAM) tether represents the hope of monitoring defendants who are on probation, ensuring that they refrain from alcohol, without resorting to jail. If not proven reliable, however, the SCRAM tether may not be used as even a screening device, and jail time should not result from its reports. This article discusses a recent district court case involving a SCRAM tether and explores the evidentiary difficulties surrounding its use.¹

The SCRAM Tether as Seen Through the Eyes of *Davis-Frye* and *Daubert*

BY HON. DENNIS N. POWERS
AND DANIEL GLAD

The SCRAM Tether

The SCRAM tether is an ankle-fitted device that analyzes the chemical composition of perspiration. It looks much like the Global Positioning System tethers long familiar to those subject to house arrest. The SCRAM tether works by sampling the insensible—i.e., constantly flowing—perspiration emitted through the skin and measuring the perspiration for traces of alcohol.² The possibility of measuring the alcohol level of a person's skin secretions was first suggested in a 1936 academic study. The SCRAM tether is manufactured by Alcohol Monitoring Systems (AMS), which has sold approximately 2,200 units to various agencies in 23 states.

The SCRAM tether uses the same chemistry and technology found in the more familiar Breathalyzer: the Draeger fuel cell. The SCRAM tether, placed flush against the skin, samples perspiration and stores it in a series of chambers. The samples in the chambers then react with the fuel cell, producing readings based on the constituents of the perspiration. A conversion factor is applied to the readings obtained by the SCRAM tether to calculate the transdermal alcohol content (TAC), a measure equivalent to blood alcohol content (BAC). The SCRAM tether communicates with AMS's central computers by a modem. If alcohol is detected, AMS alerts a local monitoring agency.

The Underlying Case

In May 2004, a defendant before the 52nd District Court was involved in a multi-vehicle collision. The passenger of the other vehicle died as a result of her injuries. The defendant was charged with two counts: manslaughter with a motor vehicle and operating a motor vehicle while intoxicated causing death. The defendant was subsequently released on bond, a condition of which was no use of alcohol, monitored by her wearing a SCRAM tether.

The court was notified of three possible bond violations—alleged drinking episodes—by the defendant that were detected by the SCRAM tether. Because of these alleged violations, a bond revocation hearing was scheduled pursuant to MCR 6.106(I)(2)(b).

Fast Facts

The SCRAM tether is a widely-used monitoring device to ensure compliance with bond conditions.

The SCRAM tether fails to meet the requirements of *Daubert* as scientific evidence—it has not been sufficiently peer reviewed, is not generally accepted, and has proven unreliable.

In the instant case, the SCRAM tether detected a constant transdermal alcohol content for nearly 10 hours, and reported the defendant as drinking while she was in the hospital.

Bond Revocation

A court weighs two factors when considering bond: the likelihood of a defendant's appearance for court dates³ and the protection of the community.⁴ With regard to the former in this case, the defendant had continually appeared before the court when ordered, without failure. Concerning the latter, the defendant had no criminal record of any kind and showed no prior instances of posing a danger to the community until the instant case. Therefore, in order to revoke bond, the court had to find a violation of a bond condition that could potentially endanger the community, e.g., the use of alcohol.

The *Daubert* Requirement

In Michigan courts, as in federal courts, before its admission as evidence, a scientific instrument must have gained general acceptance of the relevant scientific community, evinced by reliability and acceptance by disinterested members of the scientific community.⁵ Michigan has followed the shift in the evidentiary law of the federal courts following the United States Supreme Court's landmark decision in *Daubert v Merrell Dow Pharmaceuticals, Inc*⁶ by adopting the language nearly identical to FRE 702⁷ into its scheme of expert evidence. The renowned list of "*Daubert* factors" is now binding on Michigan courts.⁸

Reliability and general acceptance, two holdovers from the *Davis-Frye* test that remain part of the *Daubert* requirements, should

not be mere rhetorical phrases snatched out of the ether, nor conclusory statements offered in place of rigorous analysis of the science in question. *Daubert* offers the following factors as key points of inquiry in establishing acceptance: (1) testing of the hypothesis, (2) peer review of the hypothesis or technique, (3) error rates of and standards for the technique, and (4) the degree of acceptance within the relevant scientific community.⁹ The first three factors are an expansion of what constitutes reliability, while the fourth is a holdover of the notion of general acceptance from the *Davis-Frye* test. Near unanimity is not required to establish acceptance, but some measure of approval from the scientific community must be shown before use of scientific evidence.

Worth noting from the outset is that the SCRAM tether is not, nor was it designed, for use as a quantitative analytical device. Jeffrey Hawthorne, the inventor of the SCRAM tether, admitted as much during testimony in the case, noting that there are simply too many factors that cannot be controlled, therefore precluding use of the SCRAM tether as a quantitative evidentiary tool. It is only to be used as a screening device; the court's inquiry focused only on that use.

Measuring Transdermal Alcohol Generally

The SCRAM tether is not the first transdermal alcohol measuring device on the market, but it is among the newest. And the theory underlying transdermal measurement of alcohol is not new. However, the passage of time does not by itself connote reliability or acceptance. At the time of the hearing, there had been no complete studies on the diffusion of alcohol through the skin. Hawthorne even agreed that "the pharmacokinetics of transdermal alcohol in humans [are] not well understood." Among the recent studies of the theory available when the court broached this issue were those paid for by AMS, and these had not been subject to any type of scrutiny. Furthermore, fuel cells, including the one used in the SCRAM tether, are not specific to ethyl alcohol, which is the type found in beverages, and can indeed produce false positives or, in AMS's parlance, "interferences."

Reliability studies regarding the extrinsic variables that may trigger the SCRAM's fuel cell were simply lacking.

While the BAC curve is a well-studied and settled matter of science, the curve of an interference during transdermal measurement of alcohol is not. Telling these two curves apart is crucial in order to conclude that a subject was indeed drinking alcohol. At the time of the hearing, the only studies done on an interference curve were done by AMS and were not subject to any type of outside scientific scrutiny. Interferences are expected from environmental sources of alcohol: anti-freeze, wallpaper paste, etc. A detection curve of these outside sources of alcohol is expected to look markedly different from a curve associated with a drinking episode, although no studies have attempted to confirm this assumption. Many commentators, including Dr. Michael Hlastala, the expert witness for the defense, have hypothesized that something other than alcohol could trigger a false positive and produce a curve similar to that expected from a drinking episode. Again, reliability studies regarding the extrinsic variables that may trigger the SCRAM's fuel cell were simply lacking. While Hawthorne claimed his device never registers false positives, it is apparent to others that the SCRAM tether does. Certainly this subject bears further scientific inquiry, both for the sake of scholarship and before it can be accepted as evidence in court.

Further complicating matters is the fact that a device using a fuel cell (like that found in the SCRAM tether) can also be triggered by endogenous—i.e., internally produced—alcohol. These interferences can result from a wide host of sources. Acetone, produced by the body during the breakdown of fats, will cause the body to internally produce alcohol, resulting in the subsequent emission of alcohol. Diabetics and those fasting can endogenously produce isopropyl alcohol, which also would be detected as an interference. A number of foods cause the body to produce endogenous alcohol, including certain types of chocolate cake, apple walnut bread, raisin bread, sourdough English muffins, wheat bread, and even chocolate donuts. If one were to eat any of these foods, a positive reading on a transdermal alcohol measuring device could result.

Given the absolute dearth of disinterested peer-reviewed articles at the time of the

hearing, the fact that the rate of error (measured either by instances of false positives or interferences) was unknown, and that the only acceptance shown of the broad theory of transdermal measurement of alcohol was by the inventor who has a financial stake in the device or by a researcher paid by AMS to self-publish articles, the court found that the general theory underlying the SCRAM tether did not satisfy the general acceptance and reliability standards *Daubert* requires.

The SCRAM Tether Specifically

Turning from the demonstrably shaky theory of transdermal measurement of alcohol to the SCRAM tether in particular, the court had even less confidence in the general acceptance of the SCRAM tether. Even if the underlying theory of transdermal measurement of alcohol were to gain greater acceptance in the scientific community, the SCRAM tether itself has a long and separate road to travel in order to meet the *Daubert* standard.

The only research available before the hearing that dealt specifically with the SCRAM tether was performed by J. Robert Zettl. Zettl was paid by AMS for his services, and Zettl's research apparently has not been published by anyone other than AMS. The SCRAM tether has yet to be impartially researched; Zettl's research has not been subject to the scrutiny attendant with publication in a peer-reviewed journal.¹⁰ Zettl's publications, while they may be of interest to a court, are more akin to marketing material than impartial research, and as such cannot be used as the foundation for acceptance by the relevant scientific community. Additionally, the conversion factor used to convert the amount of alcohol detected by the SCRAM tether into a measure comparable to BAC was derived entirely by AMS and had not been scrutinized in any published journal at the time of the hearing.

Dr. Hlastala also called into question the lack of a calibration schedule for the SCRAM

tether. According to Hlastala, even a device used only for qualitative analysis needs some sort of regular calibration. Given the great variance among individuals, Hlastala believed the tether should be calibrated on each individual before being pressed into service, and again recalibrated every six to twelve hours.

That the formula used to compute the level of alcohol measured, along with the device itself, had not been subject to any type of peer scrutiny at the time of the hearing was a failure to meet one of the *Daubert* factors. Additionally, it reflected the lack of general acceptance of the SCRAM tether by the scientific community.

Alleged Drinking Episodes

Having dealt with the general acceptance of the SCRAM tether, the court turned to the alleged drinking episodes that gave rise to the bond revocation hearing. The facts underlying the alleged drinking episodes spoke in no small part to the unreliability of the SCRAM tether, and may explain the lack of acceptance and support the SCRAM tether has outside the hallways of AMS.

The first SCRAM-detected drinking episode occurred on November 13, 2004, at about 12:30 a.m. The SCRAM tether continued to detect alcohol in the defendant until 4:00 p.m. on November 15, 2004—more than 63 hours of alleged drinking. Given the length of time of the positive TAC readings, Hawthorne believed that the defendant engaged in a series of drinking episodes. Hlastala believed that this was not a drinking episode, given the inordinate length of time and the fairly constant readings for 10 hours; rather, it could be explained by a malfunction or shift in the baseline of the SCRAM tether. Indeed, it would be very surprising, or as Hlastala put it, a "biological impossibility," for someone to have such a constant BAC or TAC.

After the first alleged bond violation, the defendant was ordered to report twice daily

to a local provider of drug and alcohol testing for Breathalyzer tests. The defendant never tested positive for alcohol.

The second alleged drinking episode was on December 6, 2004. Upon learning that the SCRAM tether was detecting alcohol, the defendant reported for a Breathalyzer, which showed a zero percent BAC. At the same time, the defendant's SCRAM tether showed a TAC of 0.025 percent.

The third alleged drinking episode was detected at 7:28 p.m. on December 14, 2004, and continued 12 hours, with TAC readings ranging from 0.02 to 0.04 percent. The defendant was in the hospital while the SCRAM tether detected alcohol, but the curve looked like one associated with a drinking episode.

Worth noting is that the defendant had worn at least two different SCRAM tethers; this was not a case of one malfunctioning unit. After evaluating all the alleged drinking episodes, the contradictory breath tests, and the defendant's hospitalization, Hlastala concluded that the SCRAM tether was not very reliable.

Recent Developments

Since the time of the hearing, AMS has attempted to acquire a history in Michigan and other states regarding *Daubert* through a study known as the Sakai Study.¹¹ Given that the sample size was only 24 people, the Sakai Study is not a ringing endorsement of the SCRAM tether, but it appears to hint at some degree of reliability. However, the study does not identify what constitutes the "standardized diet" that subjects were fed. As noted, it is known that certain foods (e.g., chocolate donuts, wheat bread, and sesame seeds) cause false positives. Whether any of these foods were included in the "diet" is unknown.

This study was paid for by AMS, which is cause for pause, if not concern. Considering the Sakai Study and comparing it to the admissions made by Hawthorne and the testimony of Dr. Hlastala, and considering that the defendant was hospitalized when the SCRAM tether detected positive readings, the court's decision would not have changed. The Sakai Study addressed the conversion factor with a limited study group, but the issue still remained concerning what food groups or environmental factors also affect

There is simply too great an analytical gap between the data and the opinion proffered.

the transdermal alcohol level measured by the SCRAM tether. The conversion factor was not the issue in the bond hearing. While the SCRAM tether was measuring transdermal alcohol diffused by the defendant, the court was concerned with the origin of that alcohol. AMS's after-the-fact attempts to rehabilitate its device in relation to *Daubert* are unsuccessful in the eyes of these writers.

Conclusion

It was clear to the court that the SCRAM tether worn by the defendant was operable, working as designed, and detecting alcohol of some kind on a transdermal level. The key question, however, was the source of that alcohol. In determining the source, the court exercised the gatekeeping duty incumbent upon it¹² and, in doing so, found that the SCRAM tether did not meet the requisite standards of "reliability"¹³ or "general acceptance"¹⁴ in the relevant scientific community imposed by the Michigan Supreme Court. In this case, as in *Gilbert v Daimler-Chrysler Corp.*, "there is simply too great an analytical gap between the data and the opinion proffered."¹⁵

The body of evidence supplied by the defendant made it clear that the readings by the SCRAM tether were not necessarily the result of prolonged drinking episodes. The data did not match the final conclusion, and without further research and foundation, the "analytical gap" warned of in *Gilbert* cannot be overcome. There is much more occurring within the body with regard to the discharge of alcohol through the skin than the court was previously aware of, and much more remains to be done, even with the availability of the Sakai Study. ♦



The Hon. Dennis N. Powers is a judge of the 52nd District Court—1st Division. He received his law degree from the Detroit College of Law in 1974, received A.B. and M.A. degrees from the University of Detroit, and completed off-campus courses at Harvard Business School and the Wharton School of Finance. Before his judicial appointment, Judge Powers served five years as a commissioner for Oakland County and is still active within his community.



Daniel Glad is a student at the University of Michigan Law School in Ann Arbor, Michigan. He expects to graduate with a J.D. in December 2006. Glad was a clerk in Judge Powers's chambers in the summer of 2005.

Footnotes

1. Many of the facts underlying the discussion in this article can be found in the transcripts of the bond revocation hearings, December 15 and 17, 2004, copies of which are in 52nd District Court files, Case No 04-003877-FY.
2. For a general introduction into the theory behind the SCRAM tether, see Anderson & Hlastala, *The kinetics of transdermal ethanol exchange*, 100 J Appl Physiol 649-655 (2006).
3. See MCR 6.106(D)(1).
4. See MCR 6.106(D)(2).
5. *Frye v United States*, 54 US App DC 46; 293 F 1013 (1923); *People v Davis*, 343 Mich 348; 72 NW2d 269 (1955).
6. 509 US 579; 113 S Ct 2786; 125 L Ed 2d 469 (1993).
7. See Ronald S. Longhofer, *Michigan adopts Daubert principles and evidence-based expert testimony. Revised MRE 702 & 703*, 83 Mich B J 34 (Oct 2004).
8. See the staff comment to the 2004 amendments to MRE 702, referring to *Daubert* and discussing the remaining differences in wording from FRE 702.
9. *Daubert*, supra at 593-594.
10. Hawthorne claimed that the SCRAM tether is currently the subject of a research project not connected with his firm, but the findings have not yet been published.
11. See J.T. Sakai et al, *Transdermal alcohol monitoring in a controlled setting*, 29 Alcoholism Clin Exp Res, Supp 86A (May 2005) (abstract), and J.T. Sakai et al, *Validity of transdermal alcohol monitoring: Fixed and self-regulated dosing*, 30 Alcoholism Clin Exp Res, 26 (Jan 2006).
12. See *Gilbert v Daimler-Chrysler Corp.*, 470 Mich 749, 782; 685 NW2d 391 (2004).
13. Id.
14. Id.
15. Id. at 783.