



# ***UNSCRAMBLING SCRAM***

***Donald J. Ramsell, JD***

***Gil Sapis, JD MSc.***

**AAFS 2018 Seattle, WA**

**February 22, 2018**

# SOURCES

- Patrick Barone – articles too numerous to list – also use of PowerPoint slides here
- Michael P. Hlastala – numerous articles and testimony
- *The Determination of Blood Alcohol Concentration by Transdermal Measurement* (Abstract), Robert Zettl, July 2002
- SCRAM PowerPoint 9-11-2002 Greater Littleton Youth Initiative
- *People v. Dorcent* 2010 NY Slip Op 20430 (NY 2010)
- *State v. Lemler* 2009 SD 86 (S.Ct. SD 2009)

# SOURCES

- *The SCRAM Tether as Seen Through the Eyes of Davis-Frye and Daubert*, Hon. Powers et al, Michigan Bar Journal 2006
- Marques et al, *Evaluating Transdermal Alcohol Measuring Devices*, NHTSA DOT HS 810 875 (2007)
- *Jennifer Oh Et Al V. Scram Of California, Inc, Et Al*, Case 2:17-cv-o5588-cbm-e, U.S. Dist. Ct., Central Dist. Of Calif., Filed Aug 3, 2017 - Class Action
- *SCRAM Calibration Process, Technical Overview*, Alcohol Monitoring Systems Inc. Littleton CO, Oct 10 2004
- [www.scramsystems.com](http://www.scramsystems.com) for images and additional literature

# SOURCES

- Alcohol Monitoring Ankle Bracelets: Junk Science Or Important Scientific Breakthrough? Barone, The Champion (2005) National Association of Criminal Defense Lawyers, Inc.,
- Predictors of Detection of Alcohol Use Episodes Using a Transdermal Alcohol Sensor, Barnett, *Exp Clin Psychopharmacol*, 2014 February; 22(1): 86-96
- Hon. Dennis Powers et.al. *The SCRAM Tether As Seen Through The Eyes Of Davis-Frye And Daubert*, Michigan Bar Journal June 2006 pp 35-38



# Unscrambling SCRAM

Our Goals for Today:

- Understand the Basic Science of SCRAM
- Understand the issues related to its admissibility and value in court proceedings
- Understand the limits of SCRAM: its strengths and its weaknesses

# POINTS IN THIS PRESENTATION

- SCRAM is primarily used as a court ordered compliance
  - Its purpose involves monitoring ethanol consumption;
  - It is a questionable application due to its limitations;
  - The verification process is considered speculative by some
  - Questionable science methodology for questionable results
- 
- Conclusion . . . Presumptive test at best – CONFIRMATORY TEST REQUIRED

# SCRAM BRACELET



Image from [www.scramsystems.com](http://www.scramsystems.com)

# Theory of Transdermal Alcohol Concentration

- The possibility of measuring alcohol through skin secretion was first suggested in a 1936 academic study.
- Prior to AMS, several other transdermal methods had been tested, including sweat patches and a competing and very similar device worn on the wrist manufactured by Gither, Inc.,

# Theory of Transdermal Alcohol Concentration

- Research performed by Dr. Robert M. Swift. In his 1993 editorial, Dr. Swift states that additional research was being conducted to better elucidate the clinical pharmacology of transcutaneous ethanol and its relation to BAC, and to test reliability, specificity and acceptance of the transdermal methodology in different individuals over a range of research and clinical applications.

# Theory of Transdermal Alcohol Concentration

- Barone: “While the [Swift] article published in 2000 addressed some of these issues it is clear that much research remains to be done relative to the overall efficacy of transdermal alcohol testing, as well as to its overall applicability in the non-clinical setting.”

# S.C.R.A.M.

- Secure**
- Continuous**
- Remote**
- Alcohol**
- Monitor**

Worn on Ankle





# While on Ankle – 3 Things Monitored



- **TAC** – “**T**ransdermal **A**lcohol **C**ontent.”
- **Skin Temperature.**
- **IR Distance** – distance of **SCRAM** unit from the wearer’s skin.

Each factor can be plotted  
on a single graph

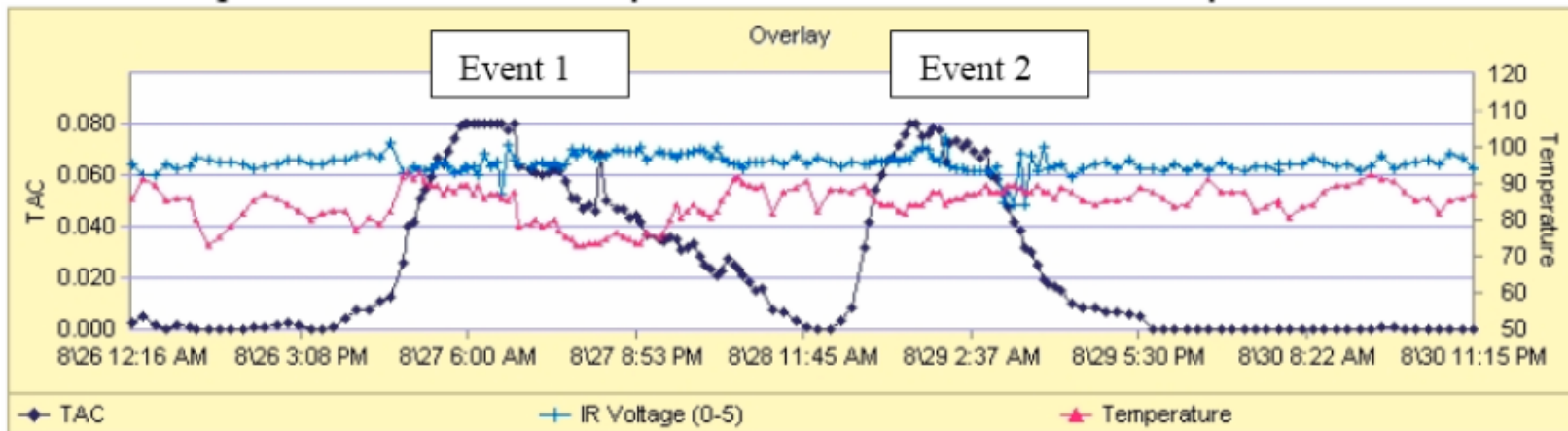


Figure 3. Sample SCRAM curves from an ethyl alcohol drinking subject.

# AMS - SCRAM

## INTRODUCTION TO SCRAM:

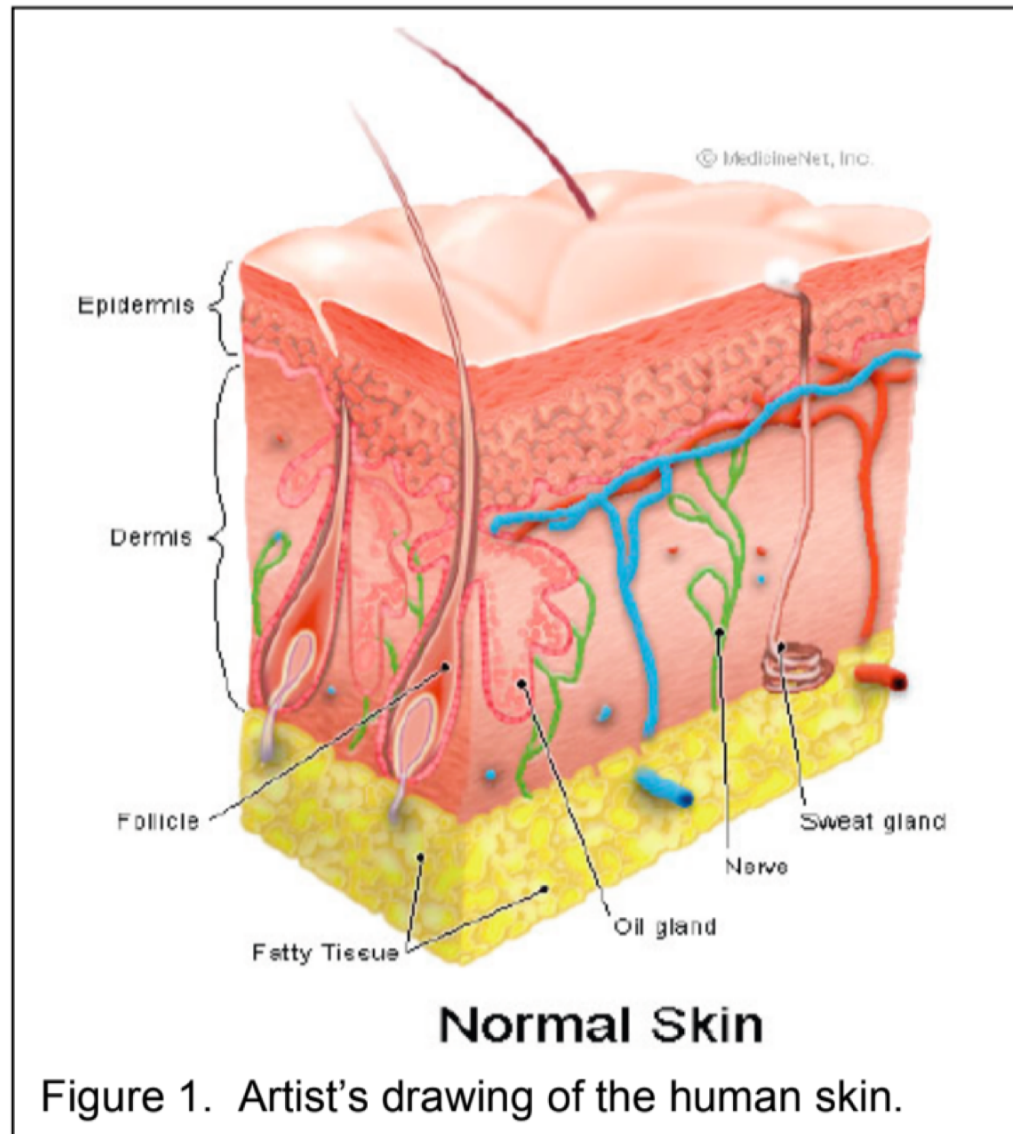
- Made by AMS (Alcohol Monitoring Systems).
- Began development in 1991.
- Corporate Office: Highlands Ranch CO.
- >14 Million in development costs.
- Introduced in 2003.
- Now in 44 states.

## TAC Readings

- Uses same technology as breath alcohol – the fuel cell (Draeger)
- Readings once every hour 24/7.
- If EtOH perceived: readings begin every ½ hour, and device begins “looking” for the modem.
- Downloaded information sent to SCRAMnet for interpretation.

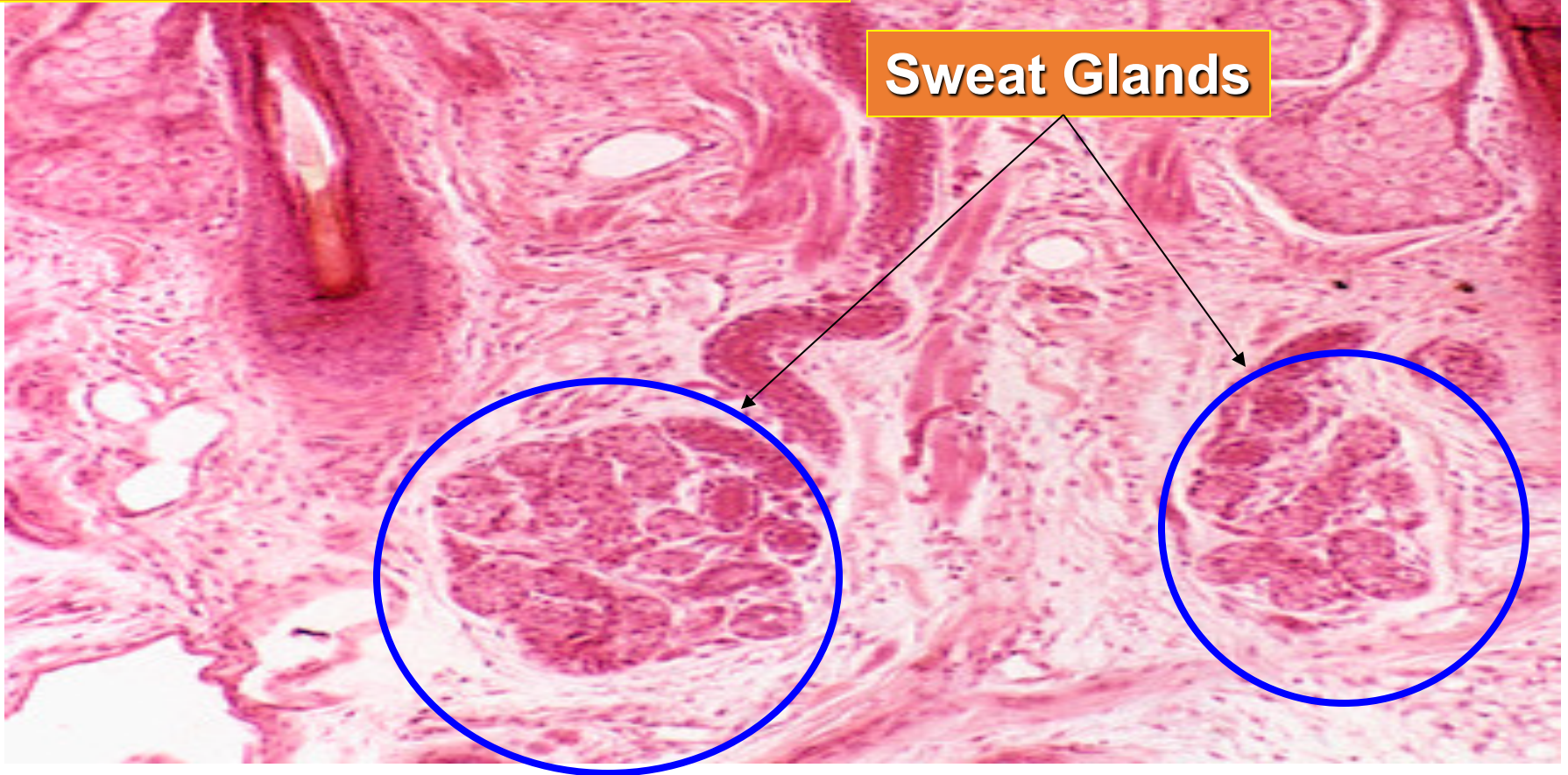
## TAC Readings

- Inventor Jeffrey Hawthorne in Michigan case stated that SCRAM is not, and was never designed to be, a quantitative device. (as reported by Hon. Dennis Powers in his “Tether” article)
- Hawthorne: too many uncontrollable factors, so SCRAM can only be used as a screening device.
- “The pharmacokinetics of transdermal alcohol in humans [are] not well understood”  
- Hawthorne



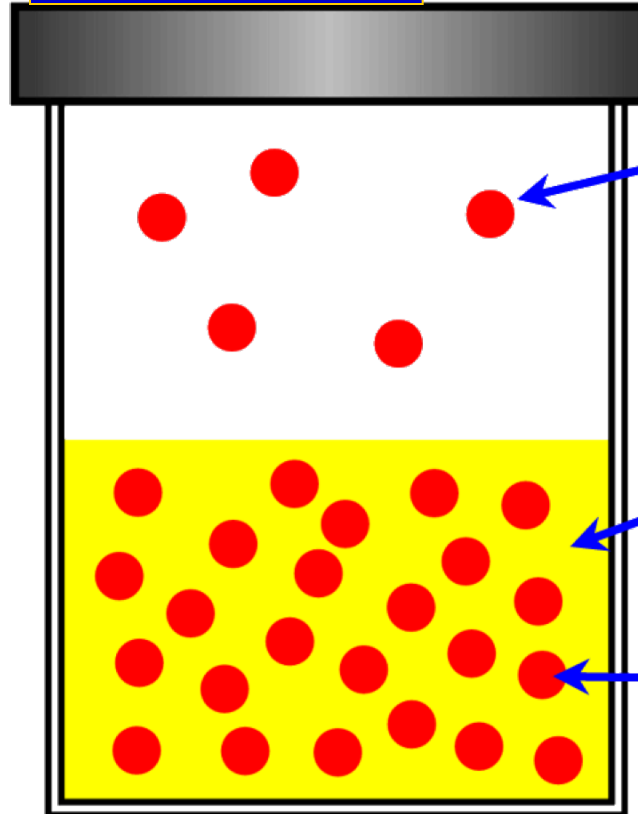


Alcohol in sweat is  
measured above  
Skin and converted to  
an assumed BAC





SCRAM Sensor



Vapor  
Pressure  
of  
Solute

Solvent

Solute

Henry's Law

# What Are “Blood/Sweat/Gas” Ratios?



- ***Correlation yes, BUT, there is NO well-established ratio between sweat alcohol and blood alcohol.***

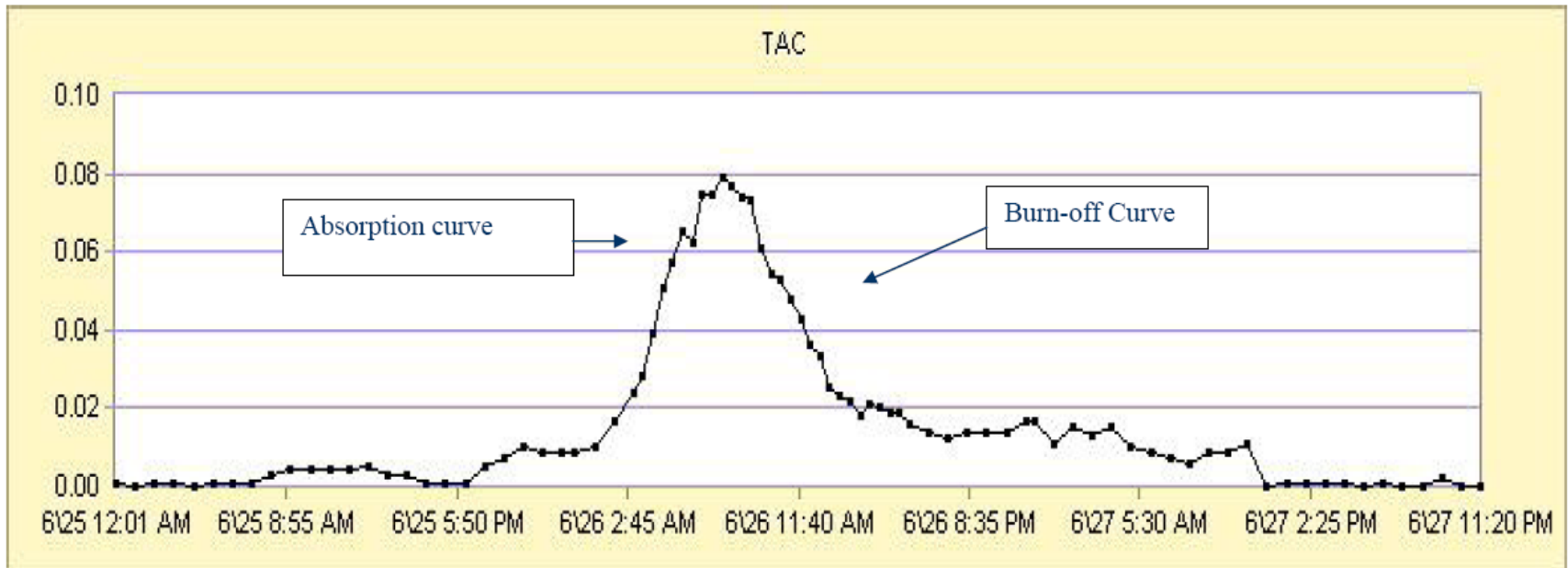
Because Worn Over Skin:

**Detects:**  
**“Endogenous”**  
**&**  
**“Exogenous”**  
**EtOH.**



# Drinking vs. Contamination

- Is based on the shape of the curve.
  - Rapid increase/decrease = contamination.
  - Gradual increase/decrease = drinking.



# Drinking vs. Contamination?

## **Confirmed Drinking:**

**Absorption rate  
less than .05%  
p/h, and;**

**Burn rate not  
greater than .15%  
p/h.**

# SCRAMnet = The Process

## The SCRAM System

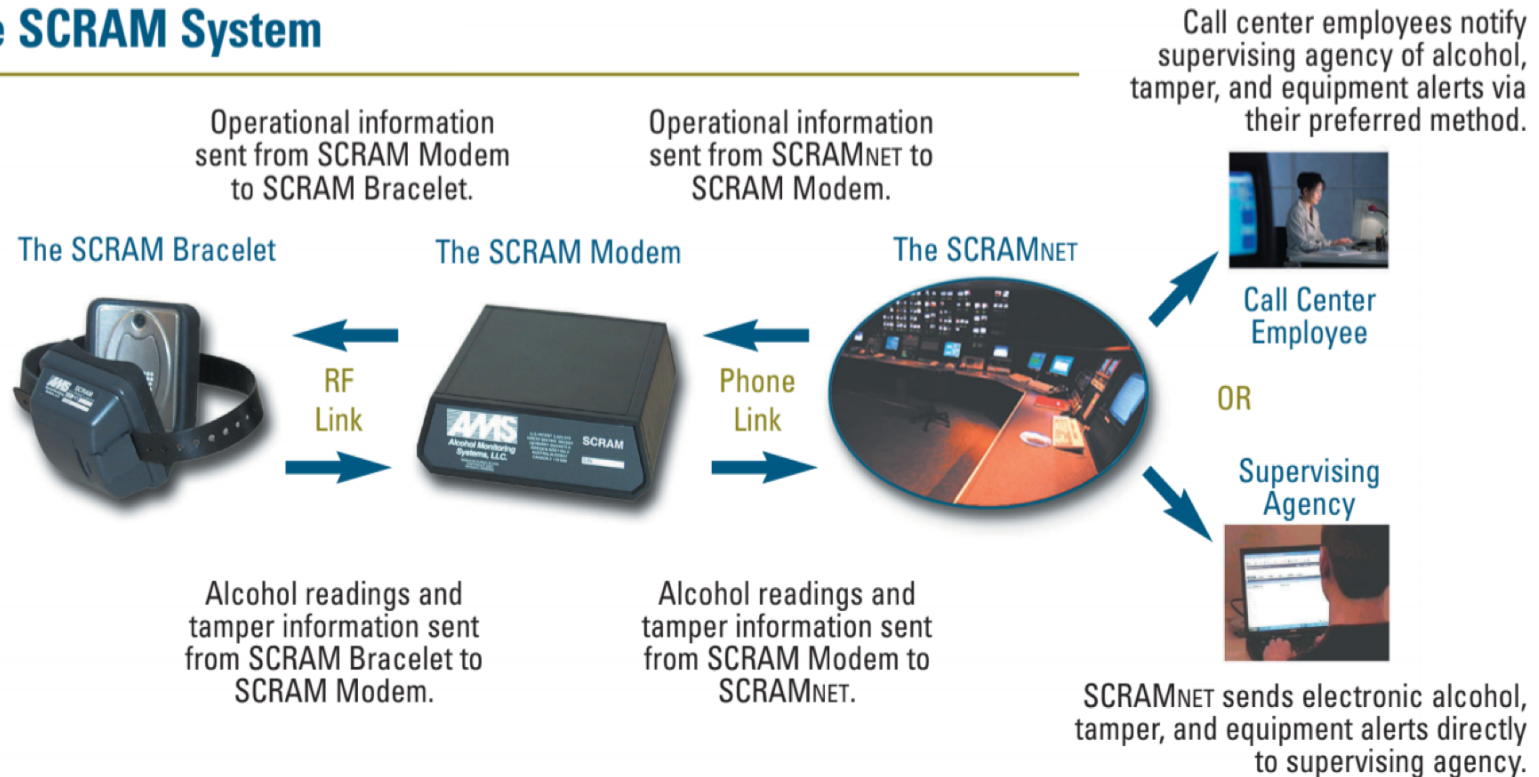


Image from [www.scramsystems.com](http://www.scramsystems.com)



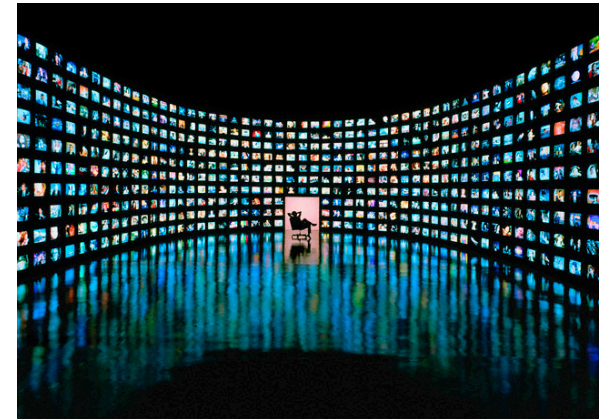
**SCRAM**



**MODEM**

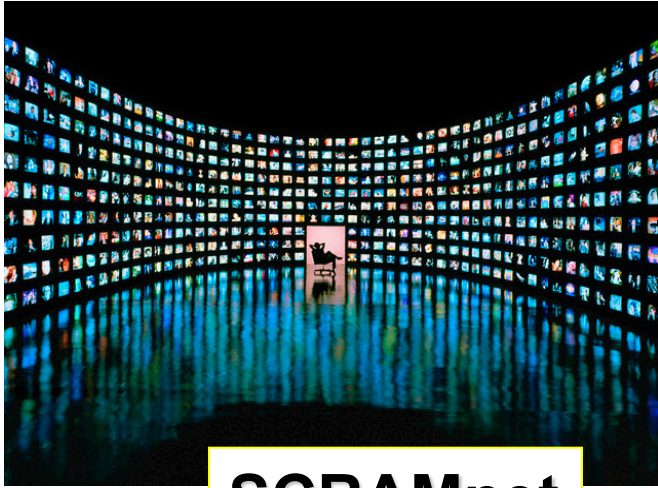


**AGENCY**



**SCRAMnet**





**SCRAMnet**



**Agency**



**Court Proceeding**



**Trained Witness**

# Confrontation Clause Issues

- Crawford v. Washington 541 U.S. 36 (2004) cross-examination is required to admit prior testimonial statements of witnesses who have since become unavailable.
- Melendez-Diaz v. Massachusetts, 557 U.S. 305 violation of the Sixth Amendment right of confrontation for a prosecutor to submit a chemical drug test report without the testimony of the person who performed the test. (2009)

# Confrontation Clause Issues

- *Bullcoming v. New Mexico*, 564 U.S. 647 (2011) second surrogate analyst could not testify about the testimonial statements in the forensic report of the certifying analyst under the Confrontation Clause.
- *Williams v. Illinois* 567 U.S. \_\_\_, 132 S. Ct. 610 (2012). The admission of expert testimony about the results of DNA testing performed by non-testifying analysts did not violate the Confrontation Clause.
- Mere Parroting is forbidden

## Other Issues

- The 'agency employee' may then question the accused drinker:
  - who conducts the questioning (sales representative),
  - format used,
  - biased/ incriminating questions,
  - where is list of questions used,
  - qualifications of interviewer/questioner

# TAC Issues with SCRAM

2009 Study Marques and McKnight *Field and Laboratory Alcohol Detection with 2 Types of Transdermal Devices* Alcoholism: Clinical and Experimental Research Vol.33 No.4

- – 2 Types of Transdermal Devices
  - WrisTAS
  - SCRAM

“Error can derive from the measuring device and from the alcohol signal itself”

# TAC Issues with SCRAM

- Results:
- “The sensitivity and accuracy of these devices was poorer than expected”
- SCRAM had apparent problems with water accumulation
- “Individual differences, gender differences, or state differences within individuals, in hydration, temperature, and other factors theoretically have a large effect on the transdermal alcohol gas.”

# TAC Issues with SCRAM

- Results:
- As a monitoring device for offenders dealing with abstinence the transdermal concept is valid.
- The overall true-positive rate for WrisTAS was 24%
- SCRAM correctly detected 57% across all BAC events with an another 22% detected, but as  $<0.02$  g/dl



# TAC Issues with SCRAM

- Results:
- Test was done on original SCRAM – there is now a SCRAM II and SCRAMx
- As a monitoring device for offenders dealing with abstinence the transdermal concept is valid.

# TAC Issues with SCRAM

Anderson and Hlastala 2006 study:

- TAC is effected by the thickness temperature and hydration state of the stratum corneum
- Authors concluded that TAC cannot be considered a quantitative estimate of BACs TAC can vary by as much as 2:1.

Anderson JC Hlastala MP (2006) *The Kinetics Of Transdermal Ethanol Exchange* J Appl Physiol 100:649-655

# TAC Issues with SCRAM

- SCRAM not on NHTSA's Conforming Products List of Evidential Breath Alcohol Measurement Devices
- SCRAM not on Conforming Products List of Screening Devices To Measure Alcohol in Bodily Fluids

# Use Issues with SCRAM

Screen Shot 2018-02-19 at 4.09.07 PM

Transportation.gov  
U.S. Department of Transportation

Search DOT site

About DOT Our Activities Areas of Focus

Drug and Alcohol Testing

Resources for Key Persons

Regulations and Interpretations

Guidance

Part 40 Federal Register Notices, Court Decisions, Legislation

FAQs

Public Interest Exclusions

Important Links

Documents and Forms

Videos, Posters, Brochures

News and Events

About Us

## Approved Alcohol Screening Devices

- [Current list of Approved Alcohol Screening Devices](#)

### Overview

Alcohol screening devices (ASD) and evidential breath testing (EBT) on the NHTSA conforming products lists (CPL) for non-evidential and evidential devices – respectively - are the only devices allowed to be used to conduct alcohol screening tests under 49 CFR Part 40.

You may use an ASD that is on the NHTSA CPL for DOT alcohol tests only if there are instructions for its use in this part. An ASD can be used only for screening tests for alcohol, and may not be used for confirmation tests.

Updated: Wednesday, March 1, 2017

### Related Links

- [Subscribe to/Read ODAPC List Serve Notices](#)

### Contact Us

**Office of Drug & Alcohol Policy & Compliance**  
1200 New Jersey Ave, SE  
W62-300  
Washington, DC 20590  
United States  
[ODAPCWebMail@dot.gov](mailto:ODAPCWebMail@dot.gov)

Phone: (202) 366-3784  
Alt: (800) 225-3784  
Fax: (202) 366-3897

### Tags

- [Alcohol Testing](#)

Copyright 2018 Ramsell and Sapir

36

# TAC Issues with SCRAM

- Notice of alleged violation/results not produced for---- hours, days, weeks -- what
- Delay in notice procedure impedes confirmatory testing and timely due process

# Use Issues with SCRAM

- **Current list of Approved Alcohol Screening Devices**

## Overview

Alcohol screening devices (ASD) and evidential breath testing (EBT) on the NHTSA conforming products lists (CPL) for non-evidential and evidential devices – respectively - are the only devices allowed to be used to conduct alcohol screening tests under 49 CFR Part 40.

You may use an ASD that is on the NHTSA CPL for DOT alcohol tests only if there are instructions for its use in this part. An ASD can be used only for screening tests for alcohol, and may not be used for confirmation tests.

Updated: Wednesday, March 1, 2017

# Use Issues with SCRAM

- **Current list of Approved Alcohol Screening Devices**

## Overview

Alcohol screening devices (ASD) and evidential breath testing (EBT) on the NHTSA conforming products lists (CPL) for non-evidential and evidential devices – respectively – are the only devices allowed to be used to conduct alcohol screening tests under 49 CFR Part 40.

You may use an ASD that is on the NHTSA CPL for DOT alcohol tests only if there are instructions for its use in this part. An ASD can be used only for screening tests for alcohol, and may not be used for confirmation tests.

Updated: Wednesday, March 1, 2017

# Calibration Issues

## *Technical Overview* by SCRAM

***There are no regular calibration and maintenance schedule for units***

Notes from Overview:

- Fuel Cell is manufactured by Draeger
- “this fuel cell is very reactive to ethanol molecules while remaining passive to other molecules in the atmosphere”
- Calibrated before use at 6 different temps
- “Each unit is fingerprinted and a reference table specific to each unit” is created for use in the field



# Calibration Issues

## *Technical Overview* by SCRAM

### Notes:

- Calibration at 0.000, 0.020, 0.050 and 0.080
- Unit/Cell is oven soaked for 2 hours
- Standards are then passed into the SCRAM units
- Resulting voltages are stored in the controlling computer.

# Calibration Issues

## *Technical Overview* by SCRAM

- Process repeated until all four sample levels have been introduced to the SCRAM units at the six different temperatures.

# Calibration Issues

## *Technical Overview* by SCRAM

- Data assembled into a reference table and downloaded.
- This reference table is unique to each serial numbered SCRAM unit, and is known as the characterization table.
- In daily operation the SCRAM unit will take observed temperature and voltage readings, perform a look-up in its characterization table, and produce an observed transdermal alcohol content (TAC) reading.

# Calibration Issues

## *Technical Overview* by SCRAM

- The final step in the calibration process is to perform a 'verification reading'.
- The result of this reading must be within plus or minus 20% of 0.05% BAC in order for the unit to pass the verification test.

# Court Issues with SCRAM

- “The method used to determine whether an alleged drinking event has occurred is subjective at best.” Barone, Hlastala Justice Delayed Is Justice Denied Law & Science Vol 21 No. 4
- Sweat/Blood Partition Ratio
- Non-Specificity for Ethanol
- Interfering substances on or about skin are well known

# Court Issues with SCRAM

- Calibration issues with units/fuel cells – not imposed by most courts or agencies
- Calibration is only to 20% of target value
- Unlike breath testing, no periodic accuracy checks using control reference samples
- Calibration log not made available to users
- No mention of whether the original reference samples are NIST traceable
- No reported uncertainty values

# Court Issues with SCRAM

- Lack of blank reference prior to sampling;
- Qualifications and competency of analysts;
- Daubert - Skin Variability / General Unreliability.
- Not as regulated as breath alcohol instruments (see Melendez-Diaz – Decision Made in Secret)
- Due Process/Delay in reporting obstructs a person from obtaining an independent test
- Some courts have accepted SCRAM under Frye/Daubert

# Discovery & SCRAM

- MUST obtain complete discovery, which at a minimum must include:
  - Four three-color graphs, one for each factor plus a composite graph.
  - Hour-to-hour /  $\frac{1}{2}$  hour reading print-outs.
  - copy of the written protocol used by AMS to distinguish between a “possible” violation and a “confirmed” violation.
  - Client’s report from AMS.



# Discovery & SCRAM

- Reference table and NIST Information
- Characterization Table unique to Unit
- Verification records for Unit
- Uncertainty Measurement for Unit

# CONCLUSION

- SCRAM is not considered reliable for quantifying a Blood Alcohol Result
- SCRAM is non-specific for normal consumption of ethanol
- At best, SCRAM results should be considered presumptive for a 'positive alcohol event' and must be followed by a confirmatory result.