Legislative Report

Minnesota oral fluid roadside testing report to the legislature

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Minnesota Department of Public Safety
Office of Traffic Safety
dps.mn.gov/divisions/ots

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Introduction

Impaired driving, specifically multiple-substance impaired driving, continues to be a serious danger on Minnesota roads. Advances in technology have helped law enforcement officers identify and screen for impairing substances at roadside. Manufacturers have developed instruments that can screen drivers for the presence of controlled and intoxicating substances using an oral fluid sample. Samples can be collected and tested at roadside; the screening is non-invasive; and the observed collection process limits contamination and tampering concerns.

The collection and testing at roadside help determine probable cause to arrest and obtain a search warrant for evidentiary blood or urine samples. This proven technology has been successfully implemented in many U.S. states as well as around the globe. Minnesota law enforcement officers would like to use this technology to help remove impaired drivers from the roadways.

Whenever new technology is introduced, it must be done with great care to establish sound legal precedent. Preliminary breath testing (PBT) instruments in Minnesota underwent a rigorous certification program to gain approval for law enforcement use by the Minnesota Legislature and the Minnesota Department of Public Safety (DPS) commissioner. To ensure the longstanding use of new roadside oral fluid testing technology, Minnesota followed a similarly rigorous certification program for oral fluid screening.

Professionals from the DPS Office of Traffic Safety (OTS), DWI Task Force, law enforcement, criminal defense attorneys, prosecutors and DPS Bureau of Criminal Apprehension (BCA) laboratory supervisors teamed up to create a Roadside Oral Fluid Testing Pilot Project Committee. The committee's goals were to:

- Test roadside oral fluid testing instruments.
- Create a standardized law enforcement training program.
- Gain legislative support to approve a pilot project.
- Gather data and statistics to substantiate each instrument's accuracy and reliability.
- Authorize the instrument's permanent use in Minnesota's rules and statutes.

The Cannabis Legalization Act, Minnesota Session Laws 2023, Chapter 63, Article 4, Section 49 granted approval to OTS to design, plan and implement a pilot project to study oral fluid roadside testing instruments. The instruments determine the presence of a controlled or intoxicating substance in individuals stopped or arrested for driving while impaired offenses.

The pilot program began in January 2024 and concluded on Aug. 31, 2024. The legislation required the DPS commissioner to submit by Feb.1, 2025, a report to the chairs and ranking minority members of the legislative committees with jurisdiction over public safety on the results of the pilot project. The report must include, at minimum, information on:

- The accuracy of the instruments when tested against laboratory results.
- How often participants were found to have controlled substances or intoxicating substances in their systems.
- How often there was comingling of controlled substances or intoxicating substances with alcohol.
- The types of controlled substances or intoxicating substances found in participants' systems, which types were most common and the number of participants in the project.

In addition, the report was to assess the practicality and reliability of using instruments in the field and to make recommendations for the future.

Device selection

The intent of the pilot project was to purchase different models of oral fluid screening instruments that met the specifications listed below for an evaluation of the instruments' testing capabilities.

Device specifications

- Portable handheld instrument for ease of use in the field.
- Rechargeable and fully automated instrument.
- On-screen instructions.
- Results within 10 minutes or less.
- A large operating temperature range or an on-board heater to ensure tests run at optimal temperature.
- Battery life capable of running up to 50 tests.
- Printer included with the instrument.
- Collection device separate from test cartridge.
- Collection device has a volume adequacy indicator.
- Capacity to retain at least 500 test records.
- Test records have unique identifiers for data tracking.
- Test data can be downloaded.
- Buffer solution integrated with test cartridge.
- Positive and negative quality control (QC) cartridges included with an instrument to verify the instrument is interpreting the results correctly.
- Minimum test panel to include amphetamines, methamphetamines, opiates, cocaine, benzodiazepines and cannabinoids at appropriate cutoff concentrations.
- Minimum cutoff concentrations, which produce a positive result at or lower than the concentrations listed below:

Drug class	**Cutoffs in ng/mL**
Amphetamines	50
Methamphetamines	50
Opiates	40
Cocaine	30
Benzodiazepines	20
Cannabinoids	25

Based on these specifications, the Abbott SoToxa™ Oral Fluid Mobile Test System and the Dräger DrugTest 5000 were selected for use.

Selection of law enforcement agencies for pilot

A memorandum was sent to law enforcement agencies across Minnesota in July 2023 asking for participation in the pilot project. Strong consideration was given to agencies with one or more dedicated Drug Recognition Evaluator (DRE) officers.

Fifty-seven DREs from 41 law enforcement agencies participated across 36 Minnesota counties. Instruments were placed in various Minnesota Toward Zero Deaths (TZD) regions: 14 in Northeast, 14 in West Central, 24 in East Central, 12 in Southwest, six in Northwest, 50 in Metro, two in South Central and 16 in the Southeast for a total of 138 instruments. Of the 138, 69 were the Abbott SoToxa™ and 69 were the Dräger DrugTest 5000.

Pilot program implementation

OTS conducted a training session on Jan. 5, 2024, for all DREs from agencies that agreed to participate in the pilot for the SoToxa™ instrument and on Feb. 23, 2024, for the Dräger DrugTest 5000 instrument. Officers were instructed to perform the roadside oral fluid test on drivers suspected of using drugs as close to the traffic stop as possible to prevent the metabolization of drugs from the body, but after the standardized field sobriety tests (SFST) were completed.

Officers were instructed to explain the pilot project to the motorist and ask if they were willing to voluntarily provide an oral fluid sample for testing. If the motorist voluntarily consented, the officer provided the driver with an oral fluid collector (swab) and asked the motorist to swab their mouth as instructed.

The oral fluid collectors contain a colored indicator to notify the officer when enough oral fluid for testing is collected. The officer would not learn the test results until after the subject was arrested and the arrest process was completed. None of the information gathered by the oral fluid instruments was used to form probable cause to arrest or to obtain a search warrant for an evidentiary blood or urine test.

If the motorist declined to provide an oral fluid sample, no test was completed but the refusal was documented. The choice not to participate did not factor in the officer's decision to arrest, and it was not used in the formation of probable cause to apply for a search warrant for an evidentiary blood or urine test.

Officers were instructed to alternate between the SoToxa™ and Dräger instruments for each arrest, and where practical, to use both devices on each driver. Sixty-one subjects consented to be tested by both instruments (side by side). Post-arrest, blood or urine samples were also collected for testing at the BCA laboratory to compare those results with the oral fluid test results.

Pilot program results

During the pilot program, 329 oral fluid tests were conducted on 268 individuals, 61 of whom consented to take two tests. There were 59 motorists who refused further testing. Of the 329 tests, 214 were tested by the Abbott SoToxa™ instrument and 115 were tested by the Dräger DrugTest 5000 instrument. A delay in receiving the Dräger instruments led to fewer tests being conducted with that system.

Positive drug results were found in 191 of the 214 (89.3 percent) SoToxa™ tests while drug results were found in 96 of the 115 (83.5 percent) Dräger tests. This contributed to positive drug results in 287 of 329 or 87.2 percent of tests overall.

Instrument	Number of tests	Times drugs found	% Times drugs found	Times drugs not found	% Times drugs not found
Dräger	115	96	83.5%	19	16.5%
SoToxa	214	191	89.3%	23	10.7%
Total	329	287	87.2%	42	12.8%

A breakdown of the drugs identified, as well as the percentage of times each was identified, is listed in the chart below. During 214 tests, the SoToxa™ instrument, on average, identified 1.7 drugs per test. During 115 tests, the Dräger DrugTest identified 1.6 drugs per test. Drugs most frequently detected during the 329 total tests were cannabinoids with tetrahydrocannabinol (THC), methamphetamines and amphetamines.

Drug	SoToxa		Dräger		Total	
	Instance of drug	% Times found	Instance of drug	% Times found	Drug found	% Times found
Amphetamine	107	50.0%	53	46.1%	160	48.6%
Benzodiazepine	4	1.9%	3	2.6%	7	2.1%
Cannabinoid	117	54.7%	60	52.2%	177	53.8%
Cocaine	25	11.7%	7	6.1%	32	9.7%
Methamphetamine	111	51.9%	57	49.6%	168	51.15%
Opiates	6	2.8%	4	3.5%	10	3.0%
Totals	370		184		554	168.4%
Avg. # drugs found per test	1.7		1.6		1.7	

In the 61 individuals who consented to be tested by both instruments, the SoToxa™ identified more drugs than the Dräger instrument in 13 cases. See the table below.

	Drugs							Drug DRE categories				
Instrument	**Amphetamine**	**Benzodiazepine**	**Cannabinoid**	**Cocaine**	**Methamphetamine**	**Opiates**	**# Oral fluid drugs**	**# Cannabis**	**# CNS Stimulants**	**# CNS Depressants**	**# Narcotic Analgesics**	**# Oral fluid drugs**
SoToxa	28	2	30	2	27	1	90	30	57	2	1	90
Dräger	23	2	24	2	25	1	77	24	50	2	1	77
SoToxa finds more drugs	**5**	**0**	**6**	**0**	**2**	**0**	**13**	**6**	**7**	**0**	**0**	**13**

Oral fluid number of tests grouped by number of drugs found

Of the 329 oral fluid tests conducted, 42 tests detected no drugs; 110 tests found one drug, and 177 or 62 percent of tests detected more than one drug. Ninety-five tests found two drugs; 77 found three drugs; three found four drugs; one found five drugs, and one found six drugs.

Statistic	Quantity
Total tests with >1 substance	177
Avg. number of tests with >1 substance	62%

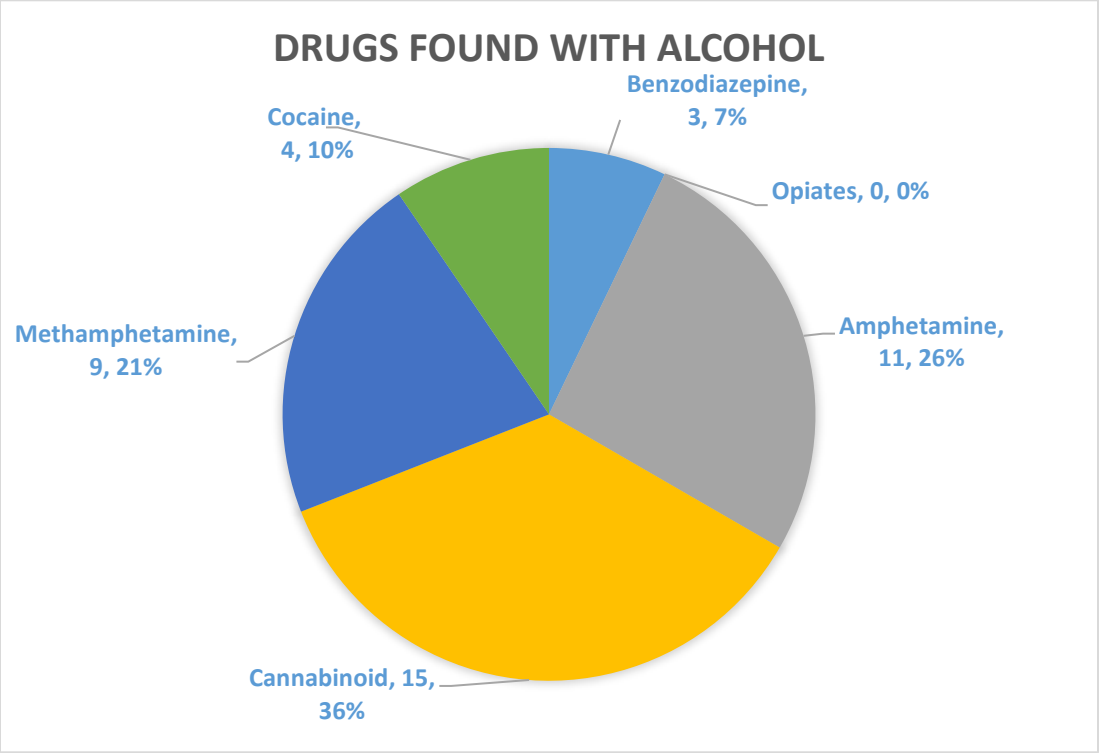
	Number of tests grouped by number of drugs found						
Instrument	1	2	3	4	5	6	**Grand total**
Dräger	34	36	26	0	0	0	96
SoToxa	76	59	51	3	1	1	191
Grand total	**110**	**95**	**77**	**3**	**1**	**1**	**287**
% test with	**38.3%**	**33.1%**	**26.8%**	**1.0%**	**0.3%**	**0.3%**	

Comingling of drugs with alcohol

During the pilot program, 244 individuals consented to a preliminary breath test (PBT). Alcohol was found in PBT testing 8.2 percent of the time. Drugs were also found 7.4 percent of the time when PBT tests were conducted.

There were 20 instances where drivers tested positive for alcohol, and of these 20 positive tests, 18 individuals also tested positive for drugs on the oral fluid instrument. When alcohol was detected, 90 percent of the time the driver also tested positive on an oral fluid instrument for one or more drugs.

The pie chart below shows the drugs that were detected in combination with alcohol. Some drivers tested positive for more than one drug.



# Drugs found with alcohol	# Oral fluid tests that found this # of drugs	Total # drugs across 20 alcohol cases
0	2	0
1	6	6
2	7	14
3	4	12
5	1	5
Grand total	**20**	**37**

Oral fluid results compared to blood or urine laboratory tests

In addition to oral fluid instrument testing, blood or urine samples were also collected from drivers. The BCA laboratory analyzed the samples using Immunoassay and Liquid Chromatography with Tandem Mass Spectrometry (LC-MS/MS) screening techniques. Twenty-one individuals refused to provide a blood or urine sample while 363 individuals complied with blood or urine testing.

One or more drugs were detected 808 times in blood or urine samples tested at the lab, while drugs were detected 554 times when using the oral fluid instruments. The reasons for this difference will vary. Some drugs, such as benzodiazepines, do not separate well into oral fluid but will be detected in blood or urine evidentiary testing. Another reason for this variance is that urine and blood testing will also detect more non-active drug metabolites. Finally, the BCA lab uses a much larger testing panel and will frequently detect drugs that the oral fluid instruments are not designed to detect.

The table below highlights these differences.

Drugs found by tester	Dräger	SoToxa	Grand total	Dräger lab match %	SoToxa lab match %	Oral fluid match %
Amphetamine – Oral Fluid	53	107	160			
Amphetamine - Lab	62	104	166	85.5%	102.9%	96.4%
Benzodiazepine – Oral Fluid	3	4	7			
Benzodiazepine - Lab	14	17	29	21.4%	23.5%	22.6%
Cannabinoid – Oral Fluid	60	117	177			
Cannabinoid - Lab	79	141	215	75.9%	83.0%	80.5%
Cocaine – Oral Fluid	7	25	32			
Cocaine - Lab	8	27	35	87.5%	92.6%	91.4%
Methamphetamine - Oral Fluid	57	111	168			
Methamphetamine - Lab	57	102	159	100.0%	108.8%	107.0%
Opiates – Oral Fluid	4	6	10			
Opiates - Lab	7	7	14	57.1%	85.7%	83.3%
Average				71.3%	82.8%	80.8%
Other drugs found by the lab but not found by SoToxa or Dräger instruments						
Barbiturates - Lab	0	0	0			
Buprenorphine - Lab	1	1	2			
Cyclobenzaprine - Lab	0	2	2			
Dextromethorphan -Lab	1	1	2			
Diphenhydramine - Lab	3	3	6			
Fentanyl - Lab	25	44	69			
Methadone - Lab	2	5	7			
Psilocin - Lab	0	1	1			

Oxycodone - Lab	0	0	0			
Trazodone - Lab	0	1	1			

Accuracy of oral fluid tests compared to blood or urine laboratory tests

The above table shows the number of times the listed drugs were found in the SoToxa™ and Dräger DrugTest 5000 instruments compared to the number of times these drugs were found in the BCA lab in blood or urine. There are instances when the lab found the drug and the oral fluid instruments did not detect them, and there are multiple reasons for the differences in results:

- The BCA lab may be picking up the inactive drug metabolite, whereas the oral fluid instruments are programmed primarily to detect the active drug compound.
- Differences can also be explained when the driver consented to the oral fluid test but refused the blood or urine test.
- Instances of false positives on the oral fluid test are possible where the instrument picks up a drug (such as a medication) that is cross-reacting and showing positive for amphetamine or methamphetamine. This would explain the lab match percentages that exceed a 100-percentage match.

Overall, the match rates all exceeded 82 percent except for benzodiazepines, which are known to not separate well in oral fluid and so are difficult to detect. In addition, there are many benzodiazepine drugs, and the oral fluid instruments are designed to only test for the most common benzodiazepines. The BCA lab panels are much broader and test for more drugs.

Accuracy of Drug Recognition Evaluator assessments compared to oral fluid tests

During the pilot program, DREs completed 229 evaluations on drivers in which the driver also consented to an oral fluid test. In 17 cases (eight Dräger, nine SoToxa™), the DRE did not detect impairment, but the oral fluid instruments detected one or more drugs. This can be explained by the instrument accurately detecting the drug(s) in the subject, but the drugs were not causing visible impairment at the time of testing.

This is to be expected because a positive oral fluid test is not an indicator of impairment, but rather an indication of recent drug use. A DRE evaluation is required to articulate the signs and symptoms of impairment.

Likewise, a negative oral fluid test is not evidence of non-impairment. The motorist may have ingested a drug or drugs that are not tested for by the oral fluid testing instrument, or the subject tested below the cutoff levels on the instrument yet still exhibited signs and symptoms of impairment. This was evidenced in the pilot program where 178 (67 Dräger, 111 SoToxa™) times the DRE detected impairment when the oral fluid result was negative. The table below reflects these results.

Values	Dräger	SoToxa	Grand total	Dräger match %	SoToxa match %	Oral fluid total match %
# Cannabis - DRE	39	70	109	153.8%	167.1%	162.4%
# Cannabis - Oral Fluid	60	117	177			
# CNS Stimulant - DRE	25	70	95	468.0%	347.1%	378.9%
# CNS Stimulant - Oral Fluid	117	243	360			
# CNS Depressant - DRE	1	6	7	300%	66.7%	100.0%
# CNS Depressant - Oral Fluid	3	4	7			
# Narcotic Analgesic - DRE	5	9	14	80.0%	66.7%	71.4%
# Narcotic Analgesic - Oral Fluid	4	6	10			

Practicality and reliability of oral fluid instruments

Thirty of the 57 participating DREs completed a user survey sent by DPS asking them to rate their experience with each oral fluid instrument during the pilot program. A scale of 1 to 5 or yes-no was used to assess responses, and we asked the same questions about each instrument.

1. When asked to rate their overall experience with the instrument:
   SoToxa™ — 79 percent rated their experience as either a 4 or 5.

   Dräger — 39 percent rated their experience as either a 4 or 5.

2. When asked to rate the size and portability of the instrument:
   SoToxa™ — 94 percent rated their experience as either a 4 or 5.

   Dräger — 3 percent rated their experience as either a 4 or 5.

3. When asked if the DRE considers the size and portability of the instrument to be acceptable:
   SoToxa™ — 93 percent said yes.

   Dräger — 7 percent said yes.

4. When asked if the DRE considers the storage of the instrument to be acceptable:
   SoToxa™ — 90 percent said yes.

   Dräger — 30 percent said yes.

5. When asked to rate the timeliness of sample collection:
   SoToxa™ — 64 percent rated their experience as either a 4 or 5.

   Dräger — 56 percent rated their experience as either a 4 or 5.

6. When asked to rate the timeliness of the analysis process:
   SoToxa™ — 70 percent rated their experience as either a 4 or 5.

   Dräger — 56 percent rated their experience as either a 4 or 5.

7. When asked which of the two instruments the DRE prefers:
   SoToxa™ — 83 percent

   Dräger — 17 percent

Summary

DPS thanks the Minnesota Legislature for providing resources to plan, implement and review the results of a pilot project to study oral fluid field screening instruments to determine the presence of controlled or intoxicating substances in individuals stopped or arrested for DWI offenses.

More than 50 percent of DREs from 41 agencies across 36 counties and all Toward Zero Deaths regions completed a survey on the practicality and reliability of the two instruments. Responses were mostly positive concerning the timeliness of the sample collection and analysis. In terms of practicality, respondents preferred the practicality of the Abbott SoToxa™ instrument to the Dräger DrugTest 5000 instrument.

Concerning accuracy, positive drug results were found in 287 of 329 (87.2 percent) oral fluid tests with the SoToxa™ instrument, detecting an average of 1.7 drugs per test. The Dräger DrugTest 5000 detected an average of 1.6 drugs per test. In the 61 individuals who consented to be tested by both devices, the SoToxa™ found more drugs than Dräger in 13 cases.

The most common drugs detected across all tests were cannabinoids (THC), methamphetamines and amphetamines. An alarming 62 percent of tests detected more than one drug in a single subject, confirming the dangers of multiple drug use on our roadways. Regarding the comingling of alcohol with drugs, 90 percent of those who tested positive for alcohol also tested positive for one or more drugs.

When comparing the oral fluid test results to the BCA blood or urine tests, the oral fluid instruments accurately detected the same substances that were found in the lab. Most match rates exceeded 82 percent. As expected, the BCA did detect more substances than the oral fluid instruments, due to the lab's expanded testing panels and lower cutoff thresholds.

Conclusion

The pilot test of advanced drug-detecting technology confirmed that a multiple-substance impaired driving crisis is occurring on Minnesota roadways. The pilot makes clear that we must adequately equip our law enforcement officers with every tool possible to assist them in removing dangerous drivers from our roadways.

Minnesota has taken great strides to train law enforcement officers in Standardized Field Sobriety Testing (SFST), Advanced Roadside Impaired Driving Enforcement (ARIDE), and Drug Recognition Evaluator (DRE) training. We need to provide our officers with additional tools to detect drug use that, when combined with their observations, allow them to develop probable cause to make proper arrests for impaired driving.

The pilot testing program revealed that while most officers preferred the SoToxa™ Mobile Testing System, both the SoToxa™ and the Dräger DrugTest 5000 instruments met stated requirements in their ease of use, reliability, accuracy and practicality.

Based on the pilot project results, we recommend legislators should approve both instruments as preliminary screening devices to assist officers in establishing probable cause for arrests in drug-impaired driving cases.