A Roadside Survey Protocol for Determining the Prevalence of Alcohol and Drug Use by Drivers

Prepared For

Canadian Council of Motor Transport Administrators
Standing Committee on Road Safety Research and Policies

Submitted by:

Paul Boase
Transport Canada
Tel: 613-993-4463
paul.boase@tc.gc.ca

In consultation with:
Douglas J. Beirness
Erin E. Beasley
Beirness and Associates
Tel: 613-820-5236
dbeirness@magma.ca

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A Roadside Survey Protocol for Determining the Prevalence of Alcohol and Drug Use by Drivers

SUMMARY

The purpose of this document is to outline a standard protocol for conducting a roadside survey to determine the prevalence of alcohol and drug use among drivers. A roadside survey is a major undertaking that requires considerable forethought and planning. This document provides an overview of many of the steps required to help ensure a successful project.

Roadside surveys of alcohol use among drivers have been used for many years to measure the prevalence of alcohol use among drivers, not only in Canada but around the world. The technique involves randomly selecting drivers from the traffic flow and asking them to provide a sample of breath for analysis of alcohol content. Whereas other measures of the drinking-driving problem rely on official reports of events that have come to attention of police (i.e., crashes and arrests), roadside surveys provide an estimate of the extent to which drivers in the general population have been drinking.

As concern about the drugs and driving problem has increased, there has been greater interest in learning more about the use of psychoactive substances by drivers. To this end, in 2008, the roadside alcohol survey protocol was expanded to include the collection of information about drug use among drivers (Beirness et al 2010, 2011). But drugs cannot be measured in breath samples and other media must be collected and analyzed to determine their use. The first survey in Canada to examine drug use was done in Quebec in 2000. Urine and oral fluid samples were collected from drivers as part of the roadside survey protocol (Dussault et al 2000).

The modifications to the roadside survey protocol to collect data on drug use involved examining existing methods and procedures for roadside alcohol surveys in Canada and elsewhere. From this review, the existing protocol was modified to include the collection of oral fluid samples to measure the extent of drug use among drivers. This protocol has now been used in BC three times, in 2008, 2010 and 2012. The resulting standardized protocol is a practical and workable method for collecting breath tests and oral fluid samples from a random sample of drivers in an area, region, or jurisdiction. It is important that a standardized protocol be utilized in these surveys to ensure comparability across time and/or jurisdictions. This document may form the foundation for a jurisdictional plan to conduct a roadside survey.
BACKGROUND

One of the first reported roadside breath testing surveys was conducted in Evanston Illinois over 70 years ago (Holcomb 1938). The first roadside breath testing survey in Canada was conducted in Toronto in 1951-52 (Lucas et al. 1955). Perhaps the most often cited survey of this type was conducted in Grand Rapids, Michigan as part of a case-control study during the early 1960s by Dr. Robert Borkenstein and colleagues (1964). This study was instrumental in establishing the increased risks associated with driving with elevated blood alcohol concentrations (BACs) and in setting per se limits for the legal BAC threshold.

By 1971, a total of 19 roadside surveys had been conducted in eight countries. The results of this research served to underscore the importance of this type of survey for determining the magnitude of the drinking-driving problem and for the evaluation of countermeasure strategies and programs. However, the use of different methodologies and analytic techniques rendered it difficult to compare the results among countries which is why a standardized protocol for Canadian jurisdictions is recommended.

In 1972, under the auspices of the Organization for Economic Cooperation and Development (OECD), an international group of scientists chaired by Dr. Carl Stroh of Canada was charged with the responsibility of developing a research protocol for the conduct of roadside breath testing surveys (Stroh 1974). The standard methodology was first used in a pilot roadside survey project conducted by Transport Canada in Alberta and New Brunswick (Transport Canada 1974). The success of the pilot project led to the 1974 National Roadside Survey of the BACs of the driving population (Smith et al. 1976).

Following the Canadian national roadside breath testing survey in 1974, province-wide surveys have been conducted periodically across Canada. Table 1 shows the year and province in which such surveys have been conducted. The comparability of the design and method across surveys has allowed researchers to examine trends in the prevalence of drinking and driving behaviour among Canadians as well as the BACs at which it occurs (Beirness et al. 1995).

In recent years, British Columbia conducted roadside breath testing surveys in selected municipalities in 1995 and 1998 as a means to evaluate the impact of an enhanced drinking-driving enforcement program (Beirness et al. 1997; 2000, 2007). Quebec conducted a large-scale roadside survey to determine alcohol use and added the collection of urine and oral fluid samples to assess drug use among drivers throughout the province (Dussault 2000). The RCMP (K Division), in collaboration with the Alberta Centre for Injury Control and Research (ACICR), completed a roadside breath testing survey in rural Alberta in 2001 (Belton et al. 2005). In 2008 and again in 2010 and 2012, roadside surveys were conducted in BC (Beirness et al 2010).

In the United States, roadside surveys have been conducted periodically to monitor the prevalence and extent of alcohol use by drivers. The first national roadside survey in the United States was conducted in 1973 (Wolfe 1974). National surveys in the United States were also completed in 1986 (Lund et al 1991) and 1996 (Voas et al. 1998). Most recently, a national alcohol and drug roadside survey was conducted in 2007 (Lacey et al 2009). At least two states
(Minnesota, North Carolina) have undertaken independent state-wide roadside surveys (Foss et al. 1993; Foss et al. 1997). The United States is planning another national survey in 2013.

Roadside surveys have also been conducted for many years in several parts of Europe (Germany, Sweden, Belgium, Netherlands, Finland, and the United Kingdom). Australia (Perth, New South Wales) and Africa (Kenya, South Africa) (see Jackson 2008). Although the general approach is similar to surveys conducted in North America, variations in procedures are common – e.g., days of the week, time of day, site selection, conducted at night. In countries where random laws (e.g., Australia) require drivers to provide a breath test when requested by a police officer, it is common for the survey to be conducted by enforcement personnel. As might be expected in this situation where refusal to provide a sample can have legal ramifications, response rates are very high.

Table 1
Province and year in which Roadside Breath Testing Surveys have been conducted

<table>
<thead>
<tr>
<th>Year</th>
<th>Jurisdictions</th>
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<tbody>
<tr>
<td>1979</td>
<td>ON</td>
</tr>
<tr>
<td>1981</td>
<td>SK</td>
</tr>
<tr>
<td>1987</td>
<td>SK</td>
</tr>
<tr>
<td>1988</td>
<td>NS</td>
</tr>
<tr>
<td>1991</td>
<td>QC</td>
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<td>1995</td>
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<td>1998</td>
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<td>1999</td>
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<td>2010</td>
<td>BC</td>
</tr>
<tr>
<td>2011</td>
<td>QC</td>
</tr>
<tr>
<td>2012</td>
<td>BC</td>
</tr>
</tbody>
</table>

1 3 Selected cities.
2 Collected over 2 years, included drugs and alcohol and daytime and nighttime sites.
3 Alberta survey was rural roads done by police and volunteers.
4 Includes drugs and alcohol.
5 5 Selected cities.
PURPOSE

The overall objective of this document is to describe a standard protocol for conducting a roadside survey to determine the prevalence of alcohol and drug use among nighttime drivers that allows direct comparisons across jurisdictions and over time. In addition, the document addresses many of the issues and questions that arise when a roadside survey is being considered and provides an overview of many of the steps required to help ensure a successful project.

CHECKSTOPS or Reduce Impaired Driving Everywhere (RIDE) versus ROADSIDE SURVEYS

The purpose of a roadside survey is to obtain an estimate of the prevalence of alcohol and drug use among a random sample of drivers on the road. Collecting these data from drivers at randomly selected locations throughout the targeted communities ensures a valid and reliable estimate of the overall prevalence of alcohol and drug use.

It is often suggested that alcohol and drug surveys could be done as part of police checkpoints. Having the police collect these data at CheckStops or RIDEs is a poor choice for collecting such scientific data because:

- CheckStops or RIDEs are not conducted at randomly selected locations. They typically occur at high profile locations to ensure they are visible to a large number of drivers and/or have a high probability of finding drinking drivers;
- Even if locations were randomly selected by the researchers, the police are unlikely to select drivers randomly to interview;
- The general public is unlikely to perceive an officer’s request for a breath sample as being voluntary. The law allows police officers to demand a breath sample when they have a reasonable suspicion that the driver has been drinking. Drivers are unlikely to comprehend the differences between a formal “demand” and a “request” for a voluntary sample. The consequences of refusing a demand and refusing a request are extremely different. From a research ethics perspective, the use of police officers to conduct surveys is ethically questionable;
- The alcohol screening devices used by the police register “pass, warn or fail”. Research requires greater precision (i.e., actual BAC) to better specify the extent of alcohol use.
- Most police officers would face a dilemma with a driver who provided a voluntary breath sample that registered over 80 mg/dL. They have evidence of a criminal offence but the evidence was obtained as part of a voluntary survey potentially without the requisite suspicion and would most likely be inadmissible in court.
- From previous discussions with police, they do not see their role as researchers. Their job is to identify impaired drivers and collect the evidence required to support a charge. In the time required to conduct an interview and obtain breath and oral
fluid samples, they could check many other drivers for possible alcohol or drug use.

- Should a police officer decide to proceed with charges for impaired driving (or any other offence), the police officer cannot continue to participate in the survey for the length of time required to document the offense. Therefore this would result in little or no further data collection at that site. The standard protocol emphasizes that the period of data collection at each site must be the same in order to ensure the validity of the analysis.

Can a survey be done downstream from police enforcement activity?
In North Carolina, an alcohol survey was conducted “downstream” from a police alcohol enforcement roadblock (Wells et al, 1997). Police set up a typical alcohol enforcement roadblock and checked driver’s licence, vehicle registration, and possible alcohol use. Once the officer finished these checks and no alcohol was suspected, the researchers invited selected vehicles to participate in a voluntary survey. In this type of situation, sampling drivers is considerably more complex, more personnel are required, and data coordination is complicated. In addition:

- “Downstream” surveys invariably find more drivers with elevated BACs than found by the police. This can cause embarrassment to the police and confusion among drivers.
- When the police take a driver to the station for further testing, he/she is lost to the survey for a lengthy period of time.
- “Downstream” surveys often lose a number of drinking drivers to enforcement – if the police identify a drinking driver and opt to lay charges, the data from that driver is often lost to the survey. This seriously compromises the validity of the estimates of alcohol use.
- “Downstream” surveys are logistically challenging. There must be sufficient space preceding the survey site to allow the police to conduct the enforcement operation. This limits the number of survey locations available.

In summary, enforcement and research have conflicting priorities. Both groups would have to make compromises to conduct a survey. The costs associated with this type of survey are greater, the logistics are more complicated, and there is a possibility that the validity of the research findings would be weakened.
SURVEY METHOD

The roadside survey methodology used throughout North America has evolved from the original research protocol developed and approved by the OECD in 1972. The sampling procedures remain the same but the survey methods have been streamlined and updated to take advantage of advancements in breath test technology.

Partnerships. Key partnerships include police services in regions where the survey will take place. Police presence is important to be able to manage traffic on the road and redirect vehicles into the study area. The participation of the police officer must be funded either through pay-duty or overtime, which will include a direct cost to the survey project or by using on-duty officers which involves an indirect cost to the police service. One challenge of using on-duty police officers is that it is more difficult to control the start and end times and if a situation arises the officer may have to leave. If that is the case the survey must shut down until an officer returns. This affects the standardization of the survey sites and the number of interviews that can be completed in the allotted time. It is also important that officers understand their contribution is to direct traffic into the site safely; however to meet ethical obligations they should not have direct contact with the drivers and they should select the next eligible vehicle once they have been informed that an interviewer is ready to begin. This generates essentially a random selection of vehicles that maximizes the representativeness of the sample of the drivers.

Sponsors. Driver participation can be increased by the offering of a small incentive available for drivers who complete the entire process. In recent surveys, this has consisted of providing the drivers with a $10 gas card if they complete both the breath and oral fluid sample. It is recommended that a sponsor be found to cover the costs of these incentives as a way to manage costs related to the survey. Without such a sponsor, either the incentive must be dropped which may negatively impact participation rates or are paid for by the project which increases the costs.

Site Selection. The selection of the sites is key to the validity of any conclusions drawn from the results and must be done through random assignment. Site selection requires the survey region to be specified in advance, (i.e. the boundary of a city). A numbered grid is then applied to a map of the region. In this protocol, 16 sites (4 per night for 4 nights (Wed thru Saturday) per region are surveyed per week, so 16 numbered sectors are selected randomly from the grid with replacement – a sector may be selected more than once. Once the grids to be surveyed are identified, all possible survey sites within the grid should be identified and numbered. Sites are then selected, without replacement, for use in the survey.

At this point the selected sites need to be evaluated to ensure it meets the requirements (see requirements for survey sites on page 8). If a site can’t be used for any reason, another random site is selected from within the grid to replace it. It is also critical that permission to use the site from property owners be obtained.

Interviewers. Interviewer selection is very important to a successful survey in terms of dealing with the demands of the tasks and being the public face of the survey to the driving public. Selecting for the appropriate skill set is important. Interviewers should be extraverted,
enjoy speaking to other people, work well in a team environment, be able to take criticism and complaints without getting upset, have a basic understanding of why adherence to the survey protocol is very important, be thorough and accurate in recording data, and be able to take direction.

The survey is conducted by a team of interviewers who have been specially trained in survey operations, interview techniques, and the use of the breath alcohol test and oral fluid collection equipment. In addition to four to five interviewers, a survey team includes a crew chief to supervise the site and address challenges, a police officer to stop and direct traffic into the site and count passing vehicles, and a traffic coordinator to direct traffic in the site. A supervisor is usually on site during the survey as well to communicate between teams and assist if it becomes busy. Each survey region has two teams working in series throughout the night.

Training of the interviewers typically takes place a week before the survey is conducted. If the training takes place too far in advance, some of the interviewers may find better opportunities and not complete the survey. The training consists of learning how to use the alcohol measurement devices, which are programmed to provide actual readings rather than just pass, warn, or fail, as well as the oral fluid collection kits, which need to be handled carefully so as not to contaminate the sample. After training, the interviewers undergo practice sessions where the data are not used in the analysis. Often this is done with the trainees taking turns driving and testing and then a live site with real drivers. This practice is done to familiarize them with actual operating conditions and to be able to address questions before data collection begins. Training should be conducted by a person who has experience with the equipment and the operation of these types of surveys.

Survey Operations. The survey takes place at four sites each survey night in each geographic region being sampled. Interviews are conducted with drivers randomly selected from the traffic stream at pre-selected sites on Wednesday through Saturday nights between the hours of 21:00 and 03:00. Interviews are conducted at each site for 90 minutes. Restricting the time at each site allows for greater geographic representation and prevents drivers from either avoiding the site or repeatedly driving past the site in an attempt to be selected to obtain incentives. Two survey teams alternate between sites such that while one team is moving to a new location, the other team is busy conducting the survey at another. Table 2 graphically shows the schedule for the two teams in one region.

Roadside alcohol and drug surveys are typically done in May-June for a number of reasons. The weather has usually improved so that drivers will be more likely to leave their windows open for a period of time and the interviewers will be comfortable. The breath testing equipment must be kept at a warm temperature to function properly, so weather is a concern. If the survey is done later in the summer, the results may reflect tourists rather than local drivers, which may impact the results.
Survey sites are usually set up in an area off the travelled roadway such as in a parking lot. The sites must be selected in advance to ensure sufficient travel flow past the site during the survey times, the appropriateness of the site in terms of lighting and ingress and egress for vehicles and to seek advance approval and permission from the property owner to use the site and potentially leave a few vehicles on the site until the next day. This affords a greater degree of safety for the survey team and drivers than would be the case if interviews were conducted on the side of the road. This approach also permits several interviews to be conducted simultaneously. A typical survey site layout is illustrated in Figure 1.

When an interviewer is ready to begin an interview, the traffic coordinator signals the police officer to select the very next eligible vehicle (i.e., non-commercial light duty vehicle) from the traffic flow and direct it into the survey site. A survey of large trucks and other commercial vehicles would require a different protocol and sampling plan and are not included in the sample for this survey. It is essential that the police officer select the next vehicle that can be stopped safely to ensure a pseudo-random selection of vehicles from the traffic stream.

The primary function of the police officer is to assist the survey crew by directing vehicles into the survey site. They do not stop the vehicle on the roadway and speak to the driver to explain the survey. This can create unnecessary traffic delays and hazards and be seen to impact the voluntary nature of the survey. The officer must also count all the vehicles passing the site during the survey period. These data are necessary to weight the data properly for analysis.

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**Table 2**

<table>
<thead>
<tr>
<th>Time</th>
<th>Team 1</th>
<th>Team 2</th>
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<tbody>
<tr>
<td>21:00-22:30</td>
<td>Survey</td>
<td>Survey</td>
</tr>
<tr>
<td>22:30-00:00</td>
<td>Travel</td>
<td>Travel</td>
</tr>
<tr>
<td>00:00-01:30</td>
<td>Survey</td>
<td>Survey</td>
</tr>
<tr>
<td>01:30-03:00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Figure 1**

Roadside Survey Site Layout
The traffic coordinator then directs the driver to an empty bay and the interviewer first greets the driver, outlines the general nature of the survey and hands the driver a card that explains the details of the survey (see Appendix A). After the driver has agreed to participate, the interviewer ensures that the driver understands that the interview is voluntary and confidential. The interview typically includes a short series of questions concerning attitudes, opinions, and knowledge about drinking and driving. The purpose of the questions is not only to gather pertinent information about drivers and their opinions about impaired driving issues but also to provide a brief opportunity for the driver to become comfortable with the interviewer, to allow the driver to feel that they are contributing, and to facilitate the transition to providing a breath sample. A sample roadside questionnaire is included as Appendix B.

The interview concludes with the driver voluntarily providing a breath sample into a small, hand-held breath testing device (e.g., Intoxilyzer 400D, available through Transport Canada). It is accurate to within ± 5 mg%. Hence, readings below 5 mg% are considered to be zero. All instruments are calibrated using a standard of 50 mg% sample prior to use in the field.

To collect a breath sample, the interviewer unwraps a new mouthpiece and places it on the Intoxilyzer. The driver is instructed to blow firmly and steadily into the mouthpiece until they are instructed to stop. The device provides an auditory signal to indicate whether or not an adequate sample of breath has been collected. Some drivers will attempt to provide an incomplete sample and interviewers must be taught how to recognize and address this issue, typically by engaging their Crew Chief. Within a few seconds, the device provides a digital display of the driver’s BAC.

In an alcohol only survey, when the interview and breath test have been completed, drivers with a BAC below the provincial administrative limit are thanked for their cooperation and reminded to drive safely when leaving the survey site.

Drivers with a BAC in excess of the administrative limit for the jurisdiction, for example 50 mg % in BC, are asked to speak with the Crew Chief who engages the driver in a conversation for a few minutes prior to administering a second breath test with a different device. This interval helps to ensure that any mouth alcohol that might possibly have contaminated the first reading will have dissipated. The purpose of the second breath test is to confirm the result of the first test and to demonstrate to the individual that they should not be driving. Alternative (complimentary) transportation home is provided by taxi or volunteers. If appropriate, a non-impaired passenger is allowed to take over behind the wheel. No person with a BAC over the provincial administrative limit for that driver’s status is allowed to drive away from the survey site.

In a survey that only collects breath tests, the entire interview requires approximately three to four minutes to complete.

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1 BAC is reported as mg alcohol per 100 ml blood, commonly abbreviated mg%.

2 When used by the police, the instruments are programmed to provide a digital display up to 49 mg%, and then display an “A” to indicate BACs between 50 and 99 mg%, and “F” for BACs over 100 mg%. A BAC in excess of 80 mg% is a criminal offence in Canada.

3 On the rare occasion that a drinking driver is reluctant to accept alternative transportation and/or threatens to drive away, the Crew Chief may ask the police officer to speak with the driver. This invariably resolves the situation.
DRUGS AND DRIVING

Following three decades of progress on the alcohol-crash problem, safety advocates, policy makers, legislators, and enforcement agencies have begun to express greater concern about the use of drugs by drivers. Although the misuse of drugs has long been considered a major social problem, the acute and devastating consequences of driving while under the influence of drugs has only recently come to the forefront as a public health and safety issue.

There is an ever-increasing body of scientific literature documenting the impairing effects of drugs and the elevated risk of traffic crash involvement following drug use (e.g., Beirness et al. 2006, Boase et al., 2004). Epidemiological studies of drug use among fatally injured drivers in Canada indicate that drugs, often in combination with alcohol, are detected in over 30% of fatally injured drivers (e.g., Beasley et al 2012, Palmer et al 2007, Brault et al. 2004, Cimbura et al. 1982, Mercer and Jeffery 1995).

Public opinion surveys indicate that about 17% of Canadian drivers report having driven within two hours of using a potentially impairing drug, including over the counter, prescription, or illicit (Beirness et al. 2003). In the same survey, it was found that 1.5% of drivers reported driving at some time during the past year within two hours of using marijuana. In the 2004 Road Safety Monitor (Beirness 2004), this increased to 2.1% and in the 2006 survey (Vanlaar et al. 2006) it increased again to 2.4%. This increasing trend has been found in other surveys, (e.g., Adlaf 2003). An analysis of data from the Canadian Addiction Survey found that 4.8% of drivers in Canada admitted driving with two hours of using cannabis at least once in the past year – a sharp increase from the 2.3% of Canadians who reported doing so on the National Alcohol and Drug Survey in 1989. Among those aged 16 to 18, 20.6% reported having driven after using cannabis, slightly higher than the 19.6% who reported driving after alcohol use (Beirness et al 2006b). Such findings suggest that the drugs and driving problem is by no means insignificant and may be increasing.

However interesting and informative they may be, public opinion surveys can only provide information on self-reported driving after alcohol or drug use. The primary advantage of roadside surveys is the collection of objective, physical evidence of alcohol and drug use by drivers. Unfortunately, objective information about the use of drugs by drivers has been difficult to obtain. Whereas alcohol can be easily measured in breath samples, the measurement of drugs presents a greater challenge. In recent years, however, oral fluid has been regarded as a convenient and unobtrusive means to assess drug use. More importantly, drugs detected in oral fluid are closely related to recent drug use and active drug effects – including the impairment of driving performance. The relative ease with which oral fluid samples can be collected at roadside make it a logical choice for use to assess the prevalence of drug use among drivers.
A PROTOCOL FOR DRUG TESTING

At one level, expanding a roadside alcohol survey to include drugs merely involves the addition of a drug test into the protocol. However, in reality it is not quite so simple. There are numerous issues to be considered. These are outlined below.

**Sample medium.** Whereas breath has been the sample medium of choice for alcohol testing in both surveys and enforcement, breath cannot be used to assess drug use among drivers. The choices are urine, blood, and oral fluid. Each has its strengths and limitations.

Urine has long been used as a medium for drug testing. Although not generally considered to be as intrusive as blood sampling, participants require a private and sanitary place to provide the sample and many people are reluctant to volunteer. In the Quebec study, just under half of all drivers agreed to provide a urine sample. The major drawback of urine as a sample medium, however, is that levels of substances detected in urine do not necessarily represent levels of active drugs and, in some cases, may reflect inactive drug metabolites that have no effect on driver behaviour. Of particular interest in this context are cannabis metabolites, which can be detected in urine up to several weeks after use.

Blood is the medium of choice for detecting and measuring drug levels. Drug levels in blood reflect pharmacologically active substances most likely associated with observed levels of behavioural and cognitive impairment. The major limitation is the intrusiveness involved in obtaining a blood sample. A qualified phlebotomist must be employed to collect samples in a safe and healthy manner. Besides issues of liability surrounding the drawing of the blood sample, drivers are often reluctant to provide a sample of blood, especially at the side of the road. Laboratory testing of blood samples is expensive but generally provides the most valid evidence of drug use. In the recent U.S. National Roadside Alcohol and Drug Survey, drivers were offered $50 to provide a blood sample. Even with the incentive, less than half of drivers agreed (Lacey et al. 2009). Almost 80% of drivers provided oral fluid and about 40% volunteered a blood sample. Initial comparison of the toxicology results indicated that the drugs detected in oral fluid samples were corroborated by the analysis of the blood samples, providing a high degree in confidence in the results of oral fluid drug tests.

Oral fluid is becoming the medium of choice for quick, unobtrusive, and accurate screening and testing of psychoactive substances. Oral fluid can be collected while the driver remains in the vehicle by means of an absorbent pad attached to a plastic stick placed under the tongue or between the teeth and cheek for a few minutes. Drugs detected in oral fluid are better correlated with active drug levels in the blood than is the case with urine. The major limitation of oral fluid is limited transfer of some drugs to oral fluid – e.g., benzodiazepines do not transfer well.

The amount of fluid collected can also be a limiting factor. Some people have difficulty producing a sufficient volume of oral fluid in a brief period of time. A minimum of 1ml of fluid is required for testing. Rather than relying simply on the passage of a set period of time to gather an oral fluid sample, some collection devices provide a visual display that indicates when sufficient fluid has been collected.
Adding the collection of oral fluid samples to the procedure increases the amount of time required to complete each interview. Hence, rather than the three to four minutes required for alcohol surveys, interviews that seek to obtain samples to test for both alcohol and drugs will require an average of seven to eight minutes. This will reduce the number of interviews that can be collected in the allotted 90 minutes at each site and reduce the overall sample size. It is anticipated that in contrast to the 50+ interviews that are typically completed at each site collecting only breath samples, the additional requirement of collecting oral fluid samples results in an average of 30 to 35 interviews per site, or a 30% reduction in sample size. It may be possible to add another bay at the site to increase the number of interviews, but this will require a larger site, increase costs. As well the traffic flow past the site would have to be sufficient to keep all the bays busy during the 90 minutes.

**Collection and analysis of oral fluid.** The Quantisal® oral fluid collection kit was selected to gather samples to test for the presence of drugs. The device consists of a cellulose pad on a plastic stick. The device collects a 1ml sample of oral fluid. A major advantage of this collection device is that it provides a visual display to indicate when a sufficient sample has been obtained. Completed samples are sealed in separate vials containing a small volume of buffer fluid and placed on ice in a cooler on site.

The oral fluid samples are sent the following day by courier to a certified lab for analysis for commonly found drugs of interest. Samples are initially screened in the lab for cannabis, cocaine, opiates, amphetamines, methamphetamine, and benzodiazepines using enzyme immunoassay technology. Samples with a positive screen are confirmed by gas chromatography/mass spectrometry (GC/MS). The detection thresholds for each substance are listed in Table 3. Results are reported as either positive or negative without quantification – i.e., the amount of substance was not determined. Hence, it is not possible to make judgments about the possible extent of impairment among drug-positive cases. It is possible to quantify a level of a specific drug, but that increases the cost of the analysis and may be limited by the amount of fluid collected. The type and level of analysis needs to be arranged with the laboratory in advance of the study.

**Table 3: Drug Detection Thresholds**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Detection Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphetamines</td>
<td>25 ng*/ml</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>10 ng/ml</td>
</tr>
<tr>
<td>Cannabis</td>
<td>2 ng/ml</td>
</tr>
<tr>
<td>Cocaine</td>
<td>4 ng/ml</td>
</tr>
<tr>
<td>Methamphetamine</td>
<td>25 ng/ml</td>
</tr>
<tr>
<td>Opiates</td>
<td>10 ng/ml</td>
</tr>
</tbody>
</table>

*nanograms
Refusal rates. In alcohol surveys, response rates are extremely high with over 90% of drivers providing a breath sample. Drivers may be more reluctant to take the extra time required to provide a sample of oral fluid. To help alleviate this situation, other surveys have provided incentives valued at $10 for an oral fluid sample. This generally produces response rates in the range of 75-80%. It is recommended that a sponsor be found to provide a gift card to drivers who complete the full survey. In the BC pilot survey drivers were provided with a coupon for $10 worth of gasoline.

Although it is often thought that drivers who have been drinking or using drugs may be the most reluctant to provide samples, this is not necessarily the case. Drivers may refuse for a variety of reasons, the most common of which is that they are in a hurry. Others state that they are uncomfortable about having a foreign object in the mouth, they are afraid of germs, or they are concerned that DNA could be collected. In any event, interviewers need to be aware of any obvious signs or symptoms that might indicate alcohol or drug use among those who refuse and alert the Crew Chief to assess the situation.

Inserting drug test into the procedure. Ensuring a high response rate may also depend on the sequence of questions and tests. Most people are at least familiar with the concept of breath testing; therefore requesting something familiar might facilitate cooperation with the unfamiliar procedure of providing an oral fluid sample.

Because the oral fluid sample will be physically separated from the questionnaire after it is collected, there needs to be a matching numbered label placed on the questionnaire and the oral fluid vial. The lab must send results with the number from the label so they can be linked back to the questionnaire. It takes considerable resources to collect the interview, breath and oral fluid samples and it is important that these links be made correctly.

Driver interview. The interview in a drug survey is essentially the same as that in an alcohol survey. A few short questions are asked to allow drivers the opportunity to voice their opinions on impaired driving issues. In this case, questions about drug use and driving are appropriate.

A second self-completed questionnaire is administered while the oral fluid is being collected to gather some opinion and drug use data and also to occupy the driver during the 2 to 3 minutes required to collect the oral fluid sample (See Appendix C).

Dates and times of the survey. Roadside alcohol surveys have typically been conducted during nighttime hours in the latter part of the week. This timing generally corresponds with the most common times of drinking and the known frequency of alcohol-related collisions. In the absence of further information about drug-impaired driver collisions, the most parsimonious approach is to use the same days and times for an alcohol – survey among drivers – i.e., Wednesday through Saturday nights from 21:00 through 03:00.

The above model has worked well for collecting information on alcohol use by drivers. It is possible that drug use by drivers follows a different pattern and/or drug use patterns vary by substance type. Hence, future surveys should give consideration to collecting data during
daytime hours and on other days of the week. In BC in 2012, a pilot test of daytime sites was undertaken as an adjunct to the night-time survey.

**Dealing with drug impaired drivers.** In alcohol surveys, drivers who have a BAC in excess of the jurisdictional limit are provided with safe, alternative transportation home. This is facilitated by the fact that the results of breath alcohol tests are available within a very brief period of time at roadside. The same is not true of oral fluid tests for drugs. These must be sent to the lab for subsequent analysis and the results are not available at roadside. Hence, decisions about whether a driver was adversely affected by drugs should be made on the basis of obvious signs and symptoms of impairment. In the absence of an objective indicator of drug impairment, such decisions would have to be made with extreme caution.

It is advisable to prearrange how impaired drivers will be dealt with. If a taxi service or an impaired driver car delivery service is to be used to take impaired drivers home it is necessary to set up accounts and procedures with these services in advance. It is also necessary to ensure that the site can accommodate some vehicles being left until the next day.

**Equipment.** Currently, Intoxilyzer 400Ds are provided for use by Transport Canada. These devices must be calibrated in advance and tested throughout the study. New mouthpieces must be ordered based on the expected sample size anticipated in the study. For more information on these devices please contact Mr. Paul Boase (paul.boase@tc.gc.ca).

The oral fluid collection is done using an oral fluid collection kit and the results are analyzed in a laboratory. Often, it is less expensive to buy the analysis with the kits. Oral fluid or saliva drug screening and testing can provide both quantitative and qualitative information on the drug status of an individual. Using a simple collection device like the Quantisal® offers the most flexibility in a testing environment. The device collects 1 mL +/- 10% of oral fluid, has an easy to read saturation indicator, has high extraction efficiency, a buffer stabilizes drugs for transport and has no artificial stimulants added to the collection sponge. This is the device that was used in the NHTSA and BC surveys and it is recommended that the same type of device be used in all projects to reduce confounding of the results that may occur if different devices are used.

**Data Analysis.** The analysis of these types of data are somewhat complex. The data need to weighted by the total number of passing vehicles to reflect the relative contributions of each site. This is the data element the police officer collects at the time of the survey. All regions being surveyed are not the same in terms of driver and population density, gender breakdowns and perhaps other important factors. In order to make the data the most representative for the entire jurisdiction it is important the sites and vehicles be randomly selected and the data be weighted appropriately. The selection of the weighing methodology is very important in terms of the validity of the results.
CONCLUSIONS

Roadside alcohol and drug surveys provide a wealth of information about the prevalence of alcohol and drug use among the general population of drivers who have not come to the attention of police through crash involvement or arrest. Surveys of this nature offer an opportunity to examine the extent of this risky behaviour, the circumstances under which it occurs, and the characteristics of those who are involved. The information is of tremendous value in the development and implementation of prevention, intervention, and enforcement programs. In addition, roadside surveys can be utilized to help evaluate the impact of countermeasure programs.

A roadside survey is a major effort that requires considerable forethought, planning, negotiations with key stakeholders and partners, and the development of a detailed protocol for the survey. It is an intensive effort that requires a tremendous amount of preparation. The key to a successful survey is planning and several months are required to ensure all the various elements are in place before a single driver is interviewed. Where possible, jurisdictions should consider enlisting the assistance of experts with experience completing these types of surveys.

It is important to note that these surveys are conducted as part of a research project and are not attached to police enforcement undertakings. The driver is asked to voluntarily participate in the study with the understanding that if they are in excess of an administrative or legal limit for alcohol or have signs and symptoms of drug impairment, they will be provided with a place to park their vehicle and be given a complementary safe ride home, typically by taxi. Alternatively, a non-impaired driver would be allowed to remove the vehicle from the site. Drivers need to be assured that their participation and the information they provide (including alcohol and drug test results) are confidential and anonymous. This process is key in collecting the necessary data to accurately estimate alcohol and drug use in the general public.

This document outlines a protocol for the conduct of a nighttime roadside survey to collect data on the use of alcohol and drugs among drivers that can be compared directly across jurisdictions and times. The procedures have been tried and tested in the field and found to be sound and valid. Those considering conducting a roadside alcohol and drug survey are urged to contact Mr. Paul Boase at Transport Canada (paul.boase@tc.gc.ca) for further information.

In 2012 in BC, the methodology was pilot tested in a daytime survey. The survey seemed to function properly using the same methodology with high participation rates for breath testing and oral fluid samples. One key challenge is that survey sites are more difficult to find as many of the eligible parking lots are in use during the day and the owners will not consent to their use.
BIBLIOGRAPHY


ALCOHOL & DRUG DRIVING SURVEY

Please help in our effort to improve road safety.
A few minutes tonight will help save lives tomorrow!

We are asking for your help in a voluntary driver safety survey that deals with alcohol, drugs and driving. Your vehicle was selected completely at random for this survey -- you are not suspected of any traffic violation.

This survey takes about 5 or 6 minutes to complete. If you choose to participate, a researcher will ask you a few questions and will also ask you to provide a breath sample to measure the amount of alcohol in your system. You are not suspected of drinking and driving—this information is requested from all drivers. If the breath test should happen to show that you have had too much to drink to drive safely, you will be asked to let a non-impaired passenger drive, or we will provide you with a safe ride home. You will also be asked to provide a sample of oral fluid (saliva). These samples will be sent to a laboratory to test for the presence of drugs. The collection of oral fluid takes about 3 minutes.

Should you agree to provide a sample, we will give you a coupon for $10 worth of gasoline. Your answers to the questions and the results of your breath test and the oral fluid test will be anonymous and will be kept by the researchers. No identifying information will be kept in the data file.

This research is supported by the enter sponsors names here, and your local police. Any questions you have about this survey can be directed to the Project Director, enter project resource persons here. If you’d like further information on alcohol and drugs, or if you feel you need assistance or support with these issues, please contact: enter substance abuse resource name and contact info here.
Appendix B

Roadside Interview Questionnaire
Roadside Interview - 2012

ID: _____

Time: _____

<table>
<thead>
<tr>
<th>Driver sex: M □ F□</th>
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</thead>
<tbody>
<tr>
<td>Vehicle type: Car □ Van □ Minivan □</td>
</tr>
<tr>
<td>Pickup □ SUV □ Motorcycle □</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupant Configuration:</th>
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</thead>
<tbody>
<tr>
<td>1. Drive only</td>
</tr>
<tr>
<td>2. Family (with kids)</td>
</tr>
<tr>
<td>3. 1 psgr, diff. sex</td>
</tr>
<tr>
<td>4. 1 psgr, same sex</td>
</tr>
<tr>
<td>5. Group, diff. sex</td>
</tr>
<tr>
<td>6. Group, same sex</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Seat Belt Use:</th>
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</thead>
<tbody>
<tr>
<td>Driver Yes ____ No___</td>
</tr>
<tr>
<td>Pass Yes____ No___</td>
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</tbody>
</table>

1a. Where are you coming from?
2. Home  5. Bar/pub/nightclub

1b. How long ago did you leave there? _______ minutes

1c. Where are you going to?
2. Home  5. Bar/pub/nightclub

2. In what year were you born? ______
2a. Do you have an "L" or "N" licence? Yes____ No___

3. How likely do you think it is, that if a person drives after drinking too much, they will be stopped by the police?
[where 1 = not at all likely 7 = extremely likely ] ______

4. How likely do you think it is, that if a person drives after using drugs, they will be stopped by the police?
[where 1 = not at all likely 7 = extremely likely ] ______

5. Are you aware that in the fall of 2010, B.C. increased the severity of roadside sanctions, such as license suspension and vehicle impoundment, for drinking drivers who are over .05 BAC?
Yes____ No___
Now I have a question about alcohol.

6. Have you had anything to drink in the last 12 hours?
   2 = No
   1 = Yes □ How long ago did you finish your last drink?
   _____ hrs. _____ min.

7. Where did you do most of your drinking tonight?
   1. Bar    2. Restaurant    3. Own home
   4. Friend/relative’s house
   5. Other __________________________________________

8. Who were you drinking with?
   5. Other __________________________________________

REFUSED: Interview/ BAC / Saliva/ Questionnaire
   1. Language    2. In a hurry    3. Not interested
   4. Civil rights    5. Fear of prosecution
   6. Other ______________________________

BAC: ______

Place Matching Oral Fluid Sticker Here
Appendix C

Alcohol and Drug Survey
Alcohol and Drug Questionnaire 2012

These questions are for research purposes only. If you don't want to answer a particular question, just leave it blank. This will take just a few minutes to complete.

Please mark the response that best reflects your answer.

1. Are you aware that in B.C. a person can face roadside sanctions (including driving prohibitions and vehicle impoundment) for driving with a blood alcohol concentration (BAC) over .05?
   YES ____ (Go to Question #2)
   NO ____ (Go to Question #4)

2. Has this legislation changed your drinking behaviour?
   YES ____ NO, I've never used to drive after drinking ___ NO, I haven't changed my behaviour ___
   How has your behaviour changed? (Check all that apply.)
   - I use a designated driver ___
   - I stay overnight ___
   - I call a taxi if I am drinking ___
   - I use public transportation ___
   - I drink at home ___
   - I don't drink if I am driving ___
   - I drink less if I am driving ___

3. Do you think this legislation will make the roads safer? YES ____ NO ____

4. I have a good understanding of what a BAC of .05 is.
   YES ____ NO ____

5. Have you been stopped by a police check point in the last 2 years?
   YES ____ NO ____

6. Have you heard of B.C.'s Responsible Driver Program for drinking drivers?
   YES ____ NO ____

7. Have you heard of B.C.'s Ignition Interlock Program for drinking drivers?
   YES ____ NO ____

8. Are you a driver in the Graduated Licensing Program (a driver with an L or N sticker)?
   NO ____ (Continue with Question 9)
   YES ____ Are you aware that you must have 0 BAC whenever you drive? YES ____ NO ____

9. To what extent do you agree that the police should be able to require drivers to provide a breath test to measure alcohol at any time, even without suspicion? (Circle the number please)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>(Completely Disagree)</td>
<td>(Neutral)</td>
<td>(Completely Agree)</td>
<td></td>
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10. To what extent do you agree that drivers should be required to submit to a drug test if the police suspect the driver is under the influence of drugs?

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<th>7</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(Completely Disagree)</td>
<td>(Neutral)</td>
<td>(Completely Agree)</td>
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11. To what extent do you agree with mandatory alcohol education programs for drinking drivers?

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<th>4</th>
<th>5</th>
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<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Completely Disagree)</td>
<td>(Neutral)</td>
<td>(Completely Agree)</td>
<td></td>
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</table>
12. To what extent would it be an inconvenience for you if your license was suspended for 90 days?

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<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>(Not an inconvenience)</td>
<td>Neutral</td>
<td></td>
<td>Complete inconvenience</td>
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</table>

13. To what extent would it be an inconvenience for you if your vehicle was impounded for 30 days?

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<td>1</td>
<td>2</td>
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<td>5</td>
</tr>
<tr>
<td>(Not an inconvenience)</td>
<td>Neutral</td>
<td></td>
<td>Complete inconvenience</td>
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</tr>
</tbody>
</table>

14. In the past 12 months, how often did you have a drink containing alcohol?

☐ Never  ☐ Monthly or less  ☐ 2-4 times/month  ☐ 2-3 times/week  ☐ 4 or more times/week

*If Never, skip ahead to question #17 please.*

15. In the past 12 months, on those days that you drank, how many drinks did you usually have? __________

16. How often in the past 12 months have you had 4 or more drinks on one occasion?

☐ Daily  ☐ 2 to 5 times a week  ☐ Once a week  ☐ 2 to 3 times a month  ☐ Once a month

☐ Less than once a month  ☐ Never  ☐ Don't know

17. Please indicate (with an x) when you last used any of the following medications/drugs:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Over 12 months ago</th>
<th>Within past 12 months</th>
<th>Within past 30 days</th>
<th>Tonight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough/cold Medicines</td>
<td></td>
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<td></td>
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<tr>
<td>Energy Drinks (e.g., Red Bull)</td>
<td></td>
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<tr>
<td>Energy Drinks and Alcohol</td>
<td></td>
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<tr>
<td>Amphetamines (Ritalin, Adderall, etc.)</td>
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<tr>
<td>Muscle Relaxants (Robaxine, Robacid)</td>
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<tr>
<td>Anti-depressants (Prozac, Calexa, etc.)</td>
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<tr>
<td>Marijuana/Hashish</td>
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<tr>
<td>Cocaine (crack or coke)</td>
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<tr>
<td>Ecstasy</td>
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<tr>
<td>Sedatives (e.g., Valium,)</td>
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<tr>
<td>Methamphetamine</td>
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<tr>
<td>Heroin, methadone</td>
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<tr>
<td>Pain medications, (T25, T35, Oxycodeine, Percocet, Demerol)</td>
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Beirness & Associates, Inc.