

## *Drug Checking*

# Operational Technician Manual *Version 2*



## **Authors**

Karen McCrae, Samuel Tobias,  
and Chelsea Stunden of the British  
Columbia Centre on Substance Use

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## 1.0 Glossary of Acronyms and Other Frequently Used Terms

**Amnesty bin:** a disposal bin where visitors can dispose of unwanted drugs

**ANKORS:** AIDS Network Kootenay Outreach and Support Society

**ATR:** attenuated total reflectance: measurement technique that directs light through a crystal to measure the amount of light absorbed in a sample.

**BCCSU:** British Columbia Centre on Substance Use

**Benzodiazepine immunoassay strip:** Also referred to as benzodiazepine test strip (BTS)

**DCBC:** Drug Checking BC database

**EDC:** electronic data capture

**FTIR:** Fourier-transform infrared (spectroscopy)

**Fentanyl immunoassay strip:** also referred to as fentanyl test strip (FTS)

**GC-MS:** gas chromatography-mass spectrometry

**LSD:** lysergic acid diethylamide, also known as “acid”

**OPS:** Overdose Prevention Site

**PQ:** performance qualification

**PWUD:** people who use drugs

**qNMR:** quantitative nuclear magnetic resonance

**SCS:** Supervised Consumption Site

**SWGDRUG:** Scientific Working Group for the Analysis of Seized Drugs

## 2.0 Introduction

### 2.1 About the BCCSU

The British Columbia Centre on Substance Use (BCCSU) is a provincially networked organization with a mandate to develop, implement, and evaluate evidence-based approaches of harm reduction practices and treatments toward substance use and addiction. The BCCSU's vision is to transform substance use policies and care in British Columbia by translating research into education and evidence-based care guidance. By supporting the collaborative development of policies, guidelines and standards, the BCCSU seeks to improve the integration of best practices and care across the continuum of substance use, thereby serving all British Columbians.

The BCCSU seeks to achieve these goals through the integrated activities of its three core functions:

**Research**—Leading an innovative multidisciplinary program of research, monitoring, evaluation and quality improvement activities to guide health system improvements in the area of substance use.

**Education and Training**—Strengthening addiction medicine education activities across disciplines, academic institutions and health authorities, and training the next generation of interdisciplinary leaders in addiction medicine.

**Clinical Care Guidance**—Developing and helping implement evidence-based clinical practice guidelines, treatment pathways and other practice support documents.

### 2.2 About Drug Checking

British Columbia (BC) is in the midst of the most serious drug overdose crisis in its history. In 2020, 1,728 individuals died of an illicit drug overdose (nearly double from the previous year).<sup>1</sup> The overdose crisis is largely attributable to the emergence of highly potent, illegally manufactured synthetic opioids, which has created a toxic illegal drug supply.<sup>2</sup> In 2020, fentanyl was detected in 86% of all illicit drug overdose deaths, up from 30% five years earlier, in 2015.<sup>1</sup> Benzodiazepines are a psychoactive drug that are also increasing in the illicit BC drug supply: detection rates showed an increase from 15% of opioid samples testing positive in July of 2020 to 53% of samples in October 2021.<sup>1</sup> This influx of highly toxic substances into the

illegal drug supply necessitates the incorporation of all possible harm reduction measures into a comprehensive, multi-sectoral strategy to prevent overdose deaths.<sup>2</sup>

Drug checking is a harm reduction service that allows individuals to anonymously submit drug samples for analysis and to receive individualized and fact-based consultation regarding their samples. Drug checking can be conducted using a range of technologies and in a variety of settings. While it was first piloted in community-based settings in California in the 1960s and early 1970s,<sup>3</sup> it was not until the early 1990s that it became established as a strategy to reduce harm associated with novel psychoactive substances in party settings in Europe.<sup>3</sup> Drug checking services have now been established across Western Europe<sup>3,4</sup> and at sites in Australia,<sup>5</sup> the United States,<sup>6</sup> and Canada.<sup>8-12</sup>

The overarching goal of drug checking is to provide information to people who use drugs (PWUD) about the contents of the drugs they intend to consume and to empower individuals to make informed decisions regarding substance use. Drug checking services offer one of the only means of providing consumer safety in the context of an unregulated street drug supply.

## 2.3 History of Drug Checking in British Columbia

Drug checking first emerged in BC in the late 1990s as an informal, peer-based service in the electronic dance music scene. Although the informal colorimetric reagent testing of “ecstasy” pills was initially met with staunch opposition from local law enforcement, the BC Ministry of Health released a policy document in 2005 that recognized drug checking as an integral harm reduction strategy for PWUD.<sup>13</sup>

The longest running drug checking service in the province has been provided by the AIDS Network Kootenay Outreach and Support Society (ANKORS), which has offered on-site drug checking at the large, multi-day music festival Shambhala every August since 2003. Other drug checking pilots have also emerged in recent years that has led to the further expansion of drug checking services in BC. In 2016, a project evaluated the use of fentanyl immunoassay strips at Insite supervised consumption site<sup>23</sup> and now fentanyl test strips are used across BC in all the regional health authorities, including some sites that offer them for people to take away and use at home. In Victoria, the Vancouver Island Drug Checking Project (<https://substance.uvic.ca>) a research initiative out of the University of Victoria, started offering drug checking services in 2018. This project uses different technologies such as infrared absorption spectroscopy, Raman spectroscopy, gas chromatography-mass

spectrometry, and immunoassay strips and is evaluating their application in community settings.<sup>15</sup> In 2021, the project introduced a new technology to their community based drug checking service, a paper-spray mass spectrometer to help assess low concentration substances.<sup>16</sup> Get Your Drugs Tested in Vancouver, a community drug checking service that started in 2019, is the first drug checking service to offer the option to mail- in samples for testing. It receives samples from all over Canada.

Prior to 2016, organizations in Canada were required to obtain a federal exemption under Section 56 of the Controlled Drugs and Substances Act to operate drug checking services. However, as of 2016, the BC government issued a Ministerial Order (No.M488) under the Emergency Health Act which permitted point-of-care drug checking to operate as an overdose prevention service. As a result, in order to set up a drug checking service, the Health Service Delivery Area Medical Health Office must provide written designation of the site as an overdose prevention site. This greatly expanded opportunities to provide drug checking in BC. In 2021, Health Canada issued a class exemption to the Section 56 of the Controlled Drugs and Substances Act that gave the provinces and territories the ability to establish services to address urgent public health needs as it applied to the dual health emergencies of the overdose crisis and the COVID-19 pandemic. In BC, the provincial government created the BC Distributed Drug Checking designation to improve access to drug checking services. Under this designation, drug checking services can transport and store samples for the purpose of drug checking, meaning samples can be collected from multiple locations and delivered to one testing site, improving access for rural and remote areas, and for people who do not access supervised injection sites or overdose prevention sites.<sup>2</sup>

In October 2017, the BCCSU partnered with regional health authorities, local community agencies, and various levels of government to expand the availability of drug checking services in BC. This program was initially implemented in partnership with the Vancouver Coastal Health Authority at Insite supervised consumption site and has since been expanded to sites in Fraser Health, Interior Health, and Island Health. This program pairs the use of Fourier-transform infrared (FTIR) spectrometers with fentanyl and benzodiazepine immunoassay strips to rapidly and accurately analyze substances at point-of-care. The program is designed to be a low-barrier, consumer safety-oriented service for PWUD. In addition to point-of-care drug checking services, various locations across BC have been finding novel ways to improve access to drug checking services. Some sites implemented a drop-off drug checking model where service users drop off a sample for testing at a convenient time and the drug is checked during regular service hours. Service users get results via a phone call or come in and pick up results later. With additional changes to regulations regarding drug checking, more options for services to collect samples at one site and test them at another may also help expand services to more communities. These different types of service models

will help expand the capacity to monitor the drug supply in more communities and help communicate risks to the public. For guidance on implementing drug checking services in B.C., an implementation guide can be found on the BCCSU website (<https://drugcheckingbc.ca/resources/manuals-and-guidelines/>).

## 2.4 About this Manual

This manual offers basic instruction on the drug checking procedures, protocols, and methods used by the BCCSU drug checking program and is intended to supplement (not substitute) in-person training.

# 3.0 Primary Drug Checking Technologies

## 3.1 Fourier-Transform Infrared Spectroscopy

Fourier-transform infrared (FTIR) spectroscopy is an established chemical analytical technique commonly used in forensic chemistry as well as the food and pharmaceutical industries. FTIR spectroscopy works by shining a wide spectrum of light, in the infrared wavelength range, onto a sample and measuring the amount of infrared radiation absorbed. Since each compound has a unique absorption behaviour, the data collected can be used to mathematically model the sample's unique spectrum and match it to absorption profiles found within reference library databases.<sup>13,17</sup> Spectra are defined as characteristic measures of absorption as a function of electromagnetic wavelength.

The BCCSU uses a Bruker ALPHA-II or ALPHA FTIR spectrometer equipped with the Platinum attenuated total reflectance (ATR) module (which has a Diamond ATR crystal), operated with OPUS software. The ATR module directs light through the crystal to measure the amount of light absorbed in a sample. OPUS is a computer program used for measuring an unknown substance's absorbance spectrum and matching it to spectra stored in a reference library. Reference libraries are a collection of spectra collected from pure, laboratory-tested substances.

Drug checking services in BC that use the Bruker FTIR utilize three primary reference libraries. These libraries contain common drugs and adulterants typically found in the unregulated drug supply in BC. Please refer to Appendix F for further information.

Although the Bruker ALPHA FTIR spectrometer can rapidly and accurately identify a wide range of compounds present in a sample, it can only detect substances that are present in



proportions above approximately 5%.<sup>18</sup> It should be noted that some substances, such as fentanyl and its analogues, can produce serious toxicity below this level. This is a key limitation of the FTIR and is the reason why test strips are used in combination with the FTIR to help detect fentanyl and benzodiazepines that usually occur in concentrations lower than 5%.

## 3.2 Fentanyl Test Strips

Fentanyl test strips are a one-step immunoassay that utilize an antibody that is selective for fentanyl and some closely related compounds.<sup>19</sup> The BCCSU drug checking program uses BTNX Rapid Response™ fentanyl immunoassay strips, originally designed for the detection of fentanyl in urine samples.

Immunoassay strips are able to detect trace amounts of fentanyl and fentanyl metabolites with a detection limit of 20 nanograms/mL, but the detection limit is variable depending on which analogue is being detected.<sup>20</sup> They provide binary results (presence/absence) and do not provide information about other compounds that may be present in a drug sample. Table 1 shows a cross reactivity list of fentanyl analogues for the BTNX test strips.

*Fentanyl Analogue Cross Reactivity List*

Carfentanil	Butryl Fentanyl
p-Fluoro Fentanyl	Acetyl Fentanyl
Fentanyl	Furanyl Fentanyl
Valeryl Fentanyl	Ocfentanil
3-Methyl Fentanil	Remifentanil
Sufentanil	Norfentanyl

**Table 1.** Fentanyl analogue cross-reactivity list for BTNX strips<sup>17</sup>

## 3.3 Benzodiazepine Test Strips

Benzodiazepine test strips are a one-step immunoassay that use an antibody that is selective for benzodiazepines.<sup>19</sup> The BCCSU drug checking project uses BTNX Rapid Response™ benzodiazepine immunoassay strips, originally designed for detection of benzodiazepines in urine samples.

Like the fentanyl strips, which target fentanyl and some of its analogues, the benzodiazepine test strips are non-specific because they target a broad range of drugs within the benzodiazepine class. The detection limit of these strips is 300ng/mL but that is variable depending on the particular drug being detected.<sup>20</sup> Like fentanyl test strips, they provide binary results (presence/absence), meaning they cannot determine the concentration or the type of benzodiazepine present in the sample. Table 2 shows a cross-reactivity list of benzodiazepines for the BTNX test strips.

***Benzodiazepines Cross Reactivity List***




Oxazepam	Clorazepate	Lorazepam	Nordiazepam
Alprazolam	Desalkflurazepam	Lormetazepam	Prazepam
Bromazepam	Diazepam	Medazepam	Temazepam
Chrodiazepoxide	Estazolam	Midazolam	Triazolam
Clobazam	Flunitrazepam	Nitrozepam	
Clonazepam	Flurazepam	Norchlordiazepoxide	

***Table 2. Benzodiazepine analogue cross-reactivity list for BTNX strip<sup>18</sup>***  
*Note that evaluation by the BCCSU has shown that this list is not exhaustive.*

A report conducted by the BCCSU and the Provincial Toxicology Centre found that benzodiazepine test strips were successful in identifying novel benzodiazepines such as flualprazolam and flubromazolam, and the thienodiazepine etizolam.<sup>21</sup> However, these drugs do not dissolve well in water, so it was noted that vigorous agitation by shaking or vortexing the solution in a closed microcentrifuge tube was needed.

## **3.4 Comparison between FTIR Spectrometry and Immunoassay Strips**

In 2017, the BCCSU released a report reviewing technologies with applicability to drug checking programs.<sup>13</sup> The following table includes findings from the report, updated with current knowledge produced by the BCCSU Drug Checking Project.

	<b>Fourier-Transform Infrared Spectroscopy</b> 	<b>Fentanyl Immunoassay Strip</b> 	<b>Benzodiazepine Immunoassay Strip</b> 
<b>Size and Portability</b>	Compact and portable Mobile and stationary use	Compact and portable Mobile and stationary use	Compact and portable Mobile and stationary use
<b>Processing Time</b>	Fast processing time (usually under 5 minutes, up to 10 minutes for complex mixtures) Suitable for high traffic situations	Fast processing time (under 1 minute) Suitable for high traffic situations	Fast processing time (under 2 minutes) Suitable for high traffic situations
<b>Scope of Detection</b>	<p>Detects a wide range of compounds, including cutting and buffing agents</p> <p>Does not identify compounds that have not been entered into the reference library</p> <p>May not distinguish between drugs with similar chemical structures (e.g., fentanyl analogues) at low concentrations</p>	<p>Detects the presence or absence of fentanyl and some fentanyl analogues only (see <a href="#">table 1</a>)</p> <p>Does not provide any information on quantity or relative proportion of drug or drug class present in a sample</p> <p>False positives or false negatives are possible, depending on the substance and method used</p>	<p>Detects the presence or absence of benzodiazepines only</p> <p>Cannot determine concentration or the type of benzodiazepine present in the sample</p> <p>False positives or false negatives are possible, depending on the substance and method used</p>
<b>Training Required</b>	<p>Results are relatively easy to interpret using OPUS software</p> <p>Staff must be trained to use instrument, software, and reference libraries</p>	Results are easy to interpret	Results are easy to interpret
<b>Sample Preparation</b>	<p>Minimal-to-no sample preparation required</p> <p>Requires approximately 5 mg of sample</p> <p>Non-destructive - sample can be returned to service user or used for further testing</p>	<p>Minimal-to-no sample preparation required</p> <p>Requires approximately 1-2mg of sample</p> <p>Destructive - sample cannot be returned to service user in original form or used for further point-of-care testing</p>	<p>Some sample preparation required</p> <p>Requires approximately 1-2mg of sample</p> <p>Requires a plastic centrifuge tube and water to prepare sample for testing</p> <p>Destructive – sample cannot be returned to service user in original form or used for further point-of-care testing</p>
<b>Reliability of Result</b>	<p>Provides percentage estimates of the components within a substance (including buffing and cutting agents)</p> <p>Provides rough proportions but requires testing with more advanced technologies to confirm</p>	<p>Provides a binary result (positive or negative for fentanyl), but limited ability to detect all fentanyl analogues</p> <p>Compounds known to cause false positives include methamphetamine, MDMA, lidocaine, and diphenhydramine</p>	<p>Provides a binary result (positive or negative for benzodiazepine)</p> <p>May miss etizolam (a benzodiazepine derivative) even if the recommended procedure is followed</p>
<b>Limit of Detection</b>	Limitations in detection of substances present in low concentrations (less than 5% <sup>17</sup> )	Highly sensitive (detection limit of 20 nanograms/ml for fentanyl) <sup>19</sup> but lower for other analogues	False negatives are possible, especially with etizolam

**Table 3.** Comparison between fentanyl test strips and FTIR spectrometry.<sup>7,13</sup>

## 4.0 Drug Checking Technician Training Process

The BCCSU Drug Checking Project has developed an online training with resources to support new drug checking technician trainees in their journey of becoming drug checking technicians in British Columbia. To receive a certification in BC, a trainee must complete:

1. 7-part webinar series available online (<https://drugcheckingbc.ca/training/>).
2. Minimum of 30 hours of hands-on training, shadowing with an experienced technician.
3. Practical test.

This technician training is intended to provide standardized training on the operation of the Bruker ALPHA II FTIRs in combination with test strips and how these technologies are used in the context of the unregulated drug supply in BC. Standardized approaches to drug checking are important to maintain consistency of drug checking results across sites and ensure results entered into the drug checking database are accurate and reliable.

Other aspects of training are also important for technicians to learn: for example, relaying results to service users, overdose response training, chemistry basics, and how to engage with service users about safer use and harm reduction strategies. More training resources are being developed and will continue to grow as the field of drug checking evolves. For more training materials please visit:

- BCCSU Drug Checking Project - <https://drugcheckingbc.ca>
- The Drug Resource and Education Project - <https://dredproject.ca>
- The Vancouver Island Drug Checking Project's Community of Substance - <https://communityofsubstance.org>

### 4.1 BCCSU Drug Checking Webinar Series

The BCCSU Drug Checking Webinar Series is the first step of the drug checking technician training process. Over the course of seven videos, the series describes the basics of drug checking using an FTIR in combination with test strips. The webinars are available to anyone who wishes to gain a foundational knowledge of drug checking with these technologies and focuses on delivering such services in community settings. The learning outcomes upon completing the webinar series are:

- How drug checking supports harm reduction
- How to use fentanyl immunoassay strips
- How to operate an FTIR spectrometer and the basics of sample analysis
- The benefits and limitations of these drug checking technologies
- What data are collected from drug checking and how to enter it into the database

To register and learn more about the BCCSU Drug Checking Webinar Series, visit:  
<https://drugcheckingbc.ca/training>

## 4.2 Hands-on Shadowing Training

Shadowing, or the act of learning drug checking through on-the-job training, is the best way to quickly and effectively build the skills needed to successfully provide drug checking services. After completing the webinar portion of training, trainee technicians can continue their learning by shadowing with experienced technicians. Shadowing allows trainees to see what drug checking is like on-site while learning how to operate the technologies, and how to interact with people accessing the service.

In BC, trainees must have a sponsoring organization with a supervising technician to oversee the practical training component.\* Trainees are required to complete a minimum of 30 hours of hands-on shadowing to complete their practicum component. Please note, 30 hours is the recommended number of hours; however, the supervising technician and/or trainee may determine if more time is needed. The supervising technician assess when the trainee is ready to take the final exam.

The BCCSU has created a framework for supervising technicians to guide how to structure the shadowing hours for trainees. The framework is broken out into four phases, each progressively more hands-on for the trainee and covers key learning milestones for each stage. To download the shadowing guide, please visit: <https://drugcheckingbc.ca/resources/community-resources/>.

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\* Trainees are responsible for arranging hands on training and/or organizations are responsible for providing hands-on training for trainees as needed. BCCSU does not arrange practicums for trainees.

## 4.3 Drug Checking Practical Test

The practical test is the last step in the certification process. The practical test ensures that a drug checking technician is able to properly identify components in a given sample and that they understand the key concepts of drug checking.

There are two parts to the practical test. The first part requires the trainee to analyze five spectra and accurately identify components. The second part requires the trainee to respond to three short answer questions about drug checking and giving harm reduction messaging with drug checking results. Upon completing the practical test, the BCCSU will assess whether or not the trainee needs additional shadowing hours or is ready to perform drug checks independently.

# 5.0 Drug Checking Site Setup

Drug checking takes place in various settings and locations across the province, including supervised consumption sites/overdose prevention sites, music festivals, and events.

## 5.1 General Site Setup at Supervised Consumption and Overdose Prevention Sites

Drug checking takes place at community partner sites with regional health authority approval. When setting up the drug checking equipment, it is critical to work respectfully and collaboratively with site staff to ensure minimal disruption to ongoing site activities.

If possible, the drug checking services should be set up in an easily accessible location that provides some degree of confidentiality and privacy to service users. Where possible, information about the drug checking service should be displayed at the site to ensure community members are aware of the services offered and the hours of operation should be prominently displayed. A laminated copy of the BCCSU's disclaimer (see [Appendix A](#)) must be displayed at all times and the technician is required to review key points with the service user prior to drug checks. This disclaimer provides relevant information on the limitations of FTIR and fentanyl test strips as well as basic harm reduction guidance and information. Such information is important to help service users make informed choices about tested substances.

## 5.1 Supplies and Equipment Checklist

Health authorities, technicians, and site staff to are responsible to ensure that sites have all required supplies. Drug checking technicians are responsible for communicating when site-specific supplies are low to supervisors responsible for ordering supplies. If a health authority is providing supplies, contact the responsible person to inform them supplies are low. Allow for enough time for supplies to be ordered and ensure you have enough supplies to last until they are delivered. Check expiry dates on test strips to make sure they do not expire.

### Drug checking supplies and materials:

- FTIR spectrometer and laptop
- Stainless steel chemistry spatula
- Paper medicine cups
- BTNX fentanyl test strips
- BTNX benzodiazepine test strips
- Microcentrifuge (Eppendorf) tube
- Water bottle with clean water
- Alcohol wipe
- Kimwipes™ or lintfree wipes
- Laminated disclaimer sheet
- Notepad and pen
- Results slips

### Personal Protective Equipment:

- Nitrile or polyurethane gloves
- Eye protection (safety glasses) (recommended)
- COVID-specific equipment (mask, faceshield)

### Other equipment or supplies:

- Power bar and stable power source
- Portable Internet connection (5 GB/month)
- Extension cord
- Desk lamp
- Table/workspace (3' minimum) & chair

# 6.0 Drug Checking Procedures

When a service user approaches the drug checking service, the following sections recommend a three phased approach to conducting a drug check: (6.1) pre-check; (6.2) analysis; and, (6.3) post-check. Detailed steps for measurement and analysis are in Section 6.2, below.

## 6.1 Pre-check

Explain the point-of-care drug checking procedures (FTIR spectrometer, fentanyl test strips, and benzodiazepine test strips) and limitations using the example script below. **Remember, unless the service user refuses one test, both will be used in every situation.** During the pre-check phase, ask what the expected drug is and if the service user has tried any of this sample yet. If they have, ask if it felt as expected or if there were any unexpected or negative feelings. A well-performed pre-check phase can provide you with information to help inform the steps in the following phases, so ask questions of the service user to gather as much information as you can.

*Hi, I'm [name], the drug checking technician. I am going to use three different technologies to check your drugs today. The FTIR will tell me up to 4 different components within your drug. The FTIR has a limit of detection of about 5% and cannot detect substances not present in our reference libraries. I will also use the fentanyl and benzodiazepine test strip to tell me if there is any fentanyl or benzodiazepines present. You will get most of your sample back, but I will need a few grains for the fentanyl and benzodiazepine tests. The three tests should take approximately 5-10 minutes per sample to complete.*

*Do you have any questions?*

*How many drugs are you wanting to check today?*

*What did you purchase this sample as?*

*Have you tried this sample yet?*

*(If they have tried the sample already):*

*Was it okay or did you experience any negative reaction to this sample?*



**Note:** The service user may want to test multiple substances. You may want to ask the service user to only take out one substance at a time to ensure that sample IDs are not confused. This will also assist in reducing clutter at your workstation and will reduce the possibility of contamination.

### **Expected Drug**

*There are often many different names or slang terms used to refer to a particular drug. In some cases, the same name is always used to refer to the same drug (e.g., in BC, side/jib refers to methamphetamine, up/powder refers to cocaine), and in other cases, different drugs can be referred to by the same name (e.g., in BC, speed can refer to multiple stimulants, including methamphetamine, amphetamine, and methylphenidate). In particular, the slang term down can refer to heroin, fentanyl, a mix of heroin and fentanyl, or an unspecified opioid.*

**To accurately assess the service user's expectation of their sample prior to drug checking, it is important to always ask for clarification whenever any slang terms are used.**

#### **Example:**

*Technician: what did you purchase this as?*

*Service User: down*

*Technician: do you know if it's supposed to be heroin or fentanyl?*

*Service User: it should be fentanyl*

*When recording the expected drug, it is important to capture that the service user originally expected the substance to be down, but, after being prompted, specified fentanyl. In the EDC system, this should be recorded as "Fentanyl". If the service user is unable to be more specific, it should be recorded as "Down (unknown opioid)".*

## **6.2 Analysis**

1. Conduct the FTIR, fentanyl, and benzodiazepine strip tests (see [sections 9.0 – 11.3](#) below for further details). Follow the steps in Section 9.0 to measure and analyze the spectrum file to determine the components of the drug sample. It can be helpful to keep track of your thoughts on a scrap piece of paper as you work. Try not to speak your thought process out loud, but instead conduct the analysis and come to your conclusion before sharing your results, to avoid confusing or misleading information for the service user.

2. Whenever possible, substances that are difficult to discern through the drug checking analysis or those that are recommended for public health alerts should be sent for confirmatory testing with advanced laboratory technologies (see [Confirmatory Testing in Section 12.0](#)).
3. When you find substances that may have wider public health implications (e.g., substances that could result in unusual or high numbers of overdoses), it is your responsibility to notify the designated person at the relevant health authority. Don't forget to inform other community drug checking site staff verbally in case the substance presents again (see [Recommending Alerts in Section 14.0](#)). Each health authority has a specific alerting protocol; refer to the designated person for more details.

## 6.3 Post-check

1. Explain the results of the FTIR and test strip analyses to the service user along with harm reduction information. Explain the practical significance (such as risk of toxicity) of any contaminants and/or adulterants detected. Do not worry about discussing the details of the analysis process, as this is unnecessary and has the potential to cause confusion and worry. However, always be prepared to explain things clearly and simply in case someone has questions when explaining the results. For basic harm reduction messaging, see [Section 13.0 below](#). If the service user asks questions that you are unable to answer, refer them to more experienced harm reduction and/or clinical onsite staff.
2. Ask the service user if they have any questions or would like more information or resources for staying safe.
3. Document results in the EDC system or on the Data Reporting Sheet (see [Appendix D](#)) and if applicable, on a drug checking slip, used to provide results to the service user (see [Appendix B](#)).
  - a. In supervised consumption site (SCS) and overdose prevention site (OPS) settings, advise service users to provide this slip to consumption room staff if they plan on using the substance on site.
  - b. If for any reason, the DCBC server is offline, please use the offline data recording sheet in lieu of the online data reporting sheet (see [Appendix E](#)).

## 6.4 Safe Substance Handling and Disposal

When conducting drug checks, drug checking technicians must wear gloves (nitrile or polyurethane) and hands should be washed before and after administering services. Gloves should be changed on regular basis (every 30 to 60 minutes), whenever they come into contact with a substance, or if they tear. Always remove gloves and wash hands before touching your face, touching doorknobs, using the washroom, eating, drinking, or leaving the drug checking area.<sup>22</sup> The use of protective glasses is recommended but not required.

The FTIR spectrometer and spatula should be cleaned using a minimum of three alcohol swabs and a dry Kimwipe™ following each drug check, even if conducting multiple drug checks on the same “batch” or for the same person. This practice is important to prevent transfer between samples and prepare the spectrometer for new readings.

Items contaminated with drug residue (e.g., baggies, paper flaps) can be disposed of in the garbage. If the amount is more than residue (i.e., collectable or usable), it should be disposed of in an amnesty bin or tamper-proof sharps container at the site. Any amount larger than a single dose of the particular drug should be given to site staff to be disposed of in accordance with site policy (e.g., disposal safe). For further information on disposal, please refer to the procedures posted on the BCCSU website (<https://drugcheckingbc.ca/resources/manuals-and-guidelines/>).

- If the service user wishes the drug checking technician to dispose of their sample, the drug checking technician should do so immediately and in front of the service user. If the service user wishes to dispose of their substance, they should be directed on how to do so.
- **Do not** dispose of drugs in the garbage, in a sink, or by flushing down the toilet. This increases the risk of theft, puts others at risk, and might be environmentally harmful.
- Test strips, stir sticks, alcohol swabs, and any other drug checking materials can be disposed of in a standard garbage bin. At SCS/OPS settings, drug checking waste can be disposed of in the biohazards bin at the end of the day.

# 7.0 Inputting Data

Across BC, certified technicians are responsible for reporting all results for every drug check administered. After each sample is tested, results are input to a provincial data repository called DCBC hosts all drug checking data from the inception the project.

Every month, drug checking data throughout BC is collated into a report which is shared among external partners and the public. Other uses for the data include research projects, public health reporting, and publishing on the BCCSU DrugSense Dashboard (<https://drugcheckingbc.ca/dashboard/>).

Drug checking provides timely information about local street drug markets in BC, and it is essential to track data in a consistent way in order to analyze and aggregate results and trends. Information is collected in the electronic data capture system or the Data Reporting Sheet (see [Appendix D](#)). If for any reason the database is unavailable, having the data reporting sheet can be a useful backup plan to ensure all relevant information is captured. Information tracked for every sample includes:

<b>Pre- or post-consumption:</b>	Has the drug checking service user consumed any of the drug? If the check is post-use, were there any adverse effects?
<b>Expected drug:</b>	What did the service user purchase their substance as, or what were they told it was?
<b>Colour and texture:</b>	What does the sample look like? Descriptions of appearance should follow the BCCSU's Guidelines for Identifying Colours and Textures.
<b>Disposal:</b>	Did the service user dispose of the sample onsite after receiving their results?
<b>Confirmatory:</b>	Was any of this sample saved for confirmatory testing?
<b>Alert Recommended:</b>	Does the technician believe this sample warrants an alert?
<b>Results:</b>	What were the results of the drug check? Be sure to include immunoassay strip results if conducted.
<b>Comments:</b>	Is there anything notable about the sample that could be important to capture? Some examples can include: If and why the sample spectrum required secondary review by a senior drug checking technician If and why a certain testing method was declined If and why multiple testing iterations were completed on the same sample The reasoning for why an alert is recommended. Any other notable observations regarding the sample

For any further information regarding the drug checking database (DCBC), please refer to the BCCSU website for the DCBC comprehensive manual: <https://drugcheckingbc.ca/resources/manuals-and-guidelines/>.

## 8.0 FTIR Procedures

### 8.1 FTIR Spectrometer Setup

The Bruker ALPHA FTIR spectrometer has two components: the “sampling module” (smaller component) and the “spectrometer module” (larger component). Each component comes packaged separately in a plastic bag in the FTIR carrying case (**Figure 1**).

**Note:** The two modules should be positioned so that the most weight sits at the bottom of the case (the handle is on top).

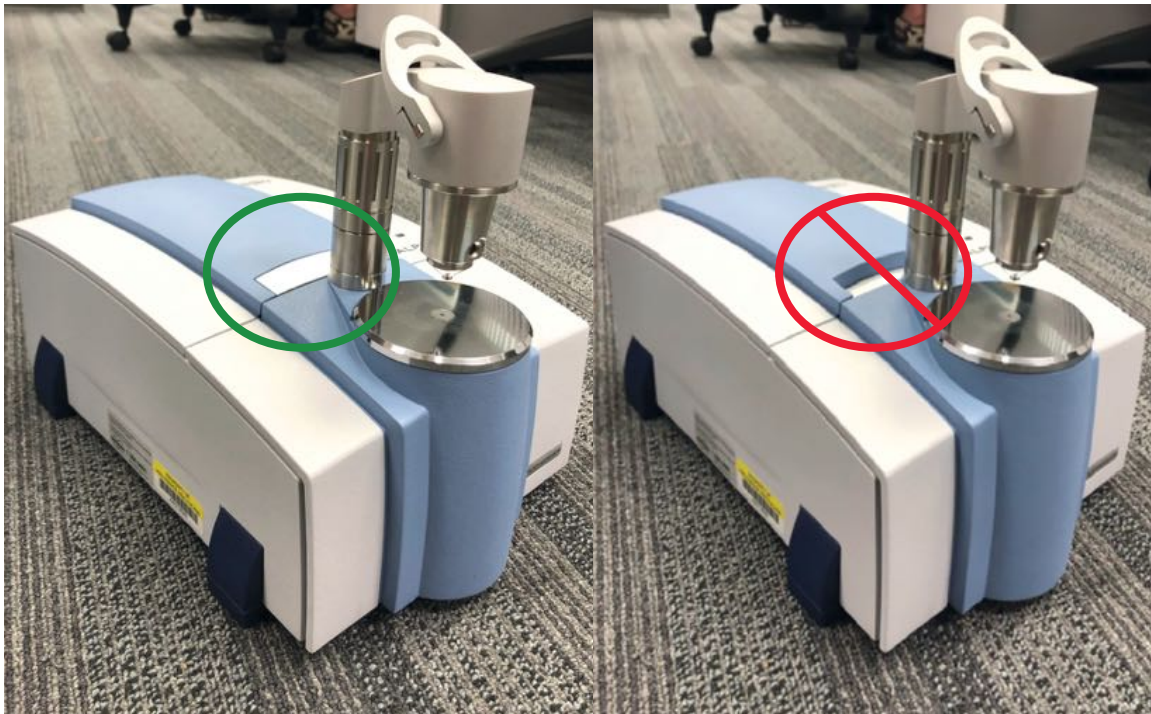


**Figure 1.** The ‘sampling module’ (left) and ‘spectrometer module’ (right) packaged in the Bruker carrying case for transport.

## 8.2 FTIR Start up Procedures

1. Remove the spectrometer module from its bag and place it on the table. Use care to not touch any of the interior components of the device.
2. Remove the sampling module from its bag. Using the side rails on the spectrometer module, slide the sampling module into place. Open the latch by firmly pressing the silver rectangular button located on top of the spectrometer module.

When the sampling module is in the proper position, you will hear a click as the rectangular button becomes level with the spectrometer module (Figure 2, left). If the rectangular button is not level with the spectrometer module (i.e., the rectangular button does not fully raise), press firmly down on the rectangular button and try again (Figure 2 right).



*Figure 2. When the Sampling Module is properly secure, the rectangular button will be level with the spectrometer module (left).*

3. Insert the power supply cable to the power port on the back of the spectrometer module (Figure 3). Be sure to connect the device to a reliable power source. **Any disruption in the power supply will cause the spectrometer to restart.**





**Figure 3.** FTIR ethernet port (left) and power port (right).

4. Once the FTIR is plugged in, a warm-up phase lasting approximately 10 minutes will begin. If the spectrometer is unplugged in the middle of testing a sample, the spectrometer will automatically restart, and the warm-up phase will repeat. If this happens, inform the service user of the delay and ask if they would like to come back later. Record this interruption in the notes section of the EDC system or the data collection form (see [Appendix C](#)). Whenever the warm-up phase is happening, ensure the sensor is clean and dry (see [step 7](#)).
5. Connect the laptop to the spectrometer by inserting the network cable into the back of the spectrometer module, and the ethernet port on the laptop. Open the OPUS program (DrugID Wizard) on the laptop desktop by clicking this icon:



**Figure 4.** OPUS Drug ID Wizard

A small window will pop up. The default username and password are the same for all spectrometers and are set up when the spectrometer is delivered and installed by Bruker. The password is 'OPUS'



**Figure 5.** Username and Password Window

A second window will then open. Click OK to close it.

6. Once logged into the system, a countdown will be visible in the task bar (the bottommost border of the OPUS window). When a task is running, the bar will be green.



**Figure 6.** The green taskbar can be seen in the bottom of the window

7. After the warm-up phase is complete, the spectrometer will run a 'performance test.' **Do not touch the diamond ATR crystal during the performance test.** If the diamond ATR crystal is touched, the performance test will fail and a Performance Qualification (PQ) test will have to be performed. The PQ test takes an additional ten minutes to evaluate the performance and function of the spectrometer and is intended to be performed once a week or when the spectrometer is moved between sites.

**Note:** The Operational Qualification (OQ) test is used to check the current state of the instrument performance. OQ tests are intended to be performed after major repairs, exchange of optical components that influence instrument performance, and during annual maintenance. Bruker staff will complete this test when performing these tasks.



8. When the warm up and validation is complete, the status light in the bottom right corner of the OPUS window will turn green, as will the light on the top of the spectrometer module. The FTIR is now ready to begin a drug check.



*Figure 7. OPUS Button Green Light*

## 8.3 Storage and Transport

The FTIR is a sensitive (and expensive) device, and while it is portable, is not intended to be moved a lot, and does not tolerate being bumped or dropped. The following instructions are intended to help ensure longevity of the device and avoid need for costly repairs. FTIR spectrometers are stored in the Bruker hard case when not in use and for transport to and from the site. Ideally, minimal movement for spectrometers is preferred, as they are incredibly sensitive devices and too much movement has the potential for damage. Even when packing and unpacking the spectrometer from its case, use the utmost care. FTIRs are also valuable optical devices and may be a target for theft. For this reason, **FTIRs must be monitored at all times at testing sites**. When offsite, drug checking technicians are responsible for storing the FTIR in a secure location. Drug checking organizations should design protocols for safe care, storage and transport to ensure security of the device.

### FTIR Care

- Ensure the workspace is clean before setting up the FTIR.
- Do not eat or drink near the FTIR.
- Leave the FTIR plugged in when not in use for short periods.
- Keep the sample platter clean with regular wipes after each test.

### FTIR Transportation

- Store the FTIR in a carry case when not in use. A wheeled case can be used for even ground, but pick up case on any uneven ground.
- Exercise caution when taking the instrument apart. Do not touch the inside of the instrument, in particular, the circular lenses/mirrors and holes in the centre.

- Minimize any time the instrument is apart and in open air to avoid any contaminants.
- Keep all relevant cords and materials together when transporting.

Proper care and handling of the spectrometer will ensure its longevity and help avoid costly servicing. Broken parts cost upwards of \$5,000 to replace, and that’s before costs of shipping to the United States or Germany for repair.

## 9.0 FTIR Sample Analysis

The following steps outline the measurement and analysis of drug samples needed for the second phase of the drug check (see [Section 6.2](#)). Ensure the first, or pre-check phase, is completed before starting the following steps.

### 9.1 Measuring Spectra with the OPUS Software

1. Before each sample is tested, a background scan must be conducted. Ensure that the diamond ATR crystal is clean and click the large “Measure Background” button on the left-hand side of the window.



**Figure 8.** Measure Background Button

The task bar will turn green and display the progress of the background scan.

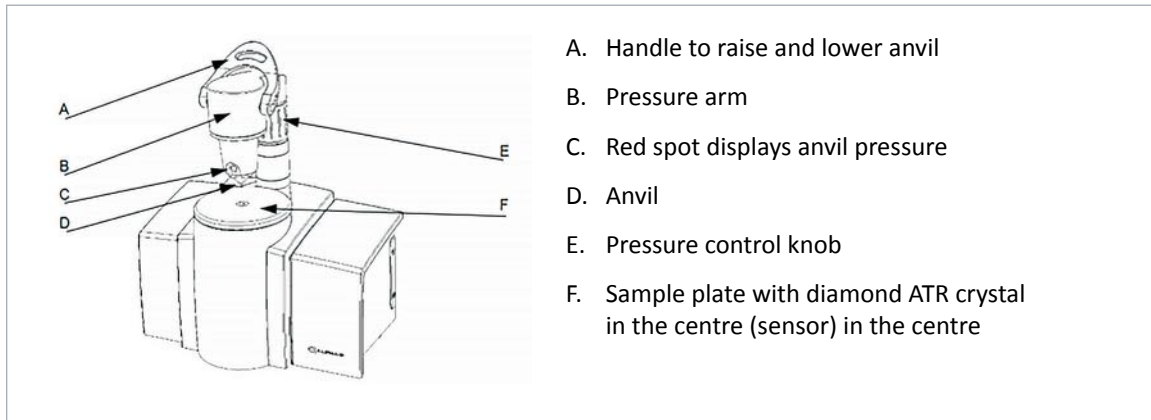


**Figure 9.** Progress Bar for Background Scan

A background scan consists of 24 measurements of the empty diamond ATR crystal and is used as a comparison when the sample is loaded onto the ATR crystal (Figure

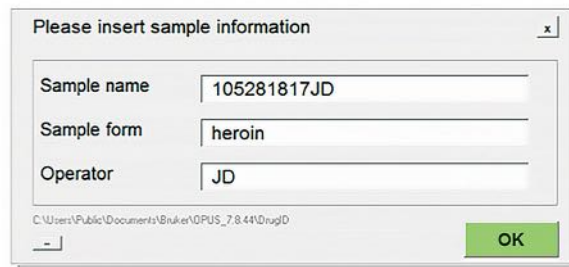
10, Point F). This scan will take approximately 30 seconds. Once this procedure is complete, the large button on the left will change to “Measure Sample”.

**Note:** In SCS/OPS settings where fentanyl is prevalent in drug checking samples and often present at amounts near the detection limit of the spectrometer, 24 scans is recommended to improve the signal-to-noise ratio of measured spectra. In settings where recreational drugs are being checked, 8 scans is considered sufficient to determine major components of drug checking samples.



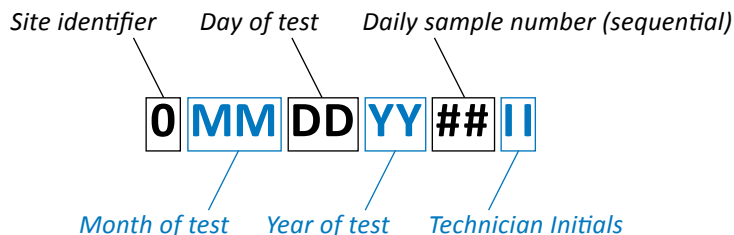
**Important: DO NOT** put the sample onto the ATR crystal while the background is running. If this happens, the task bar will reject the background scan. To stop a background scan from running, right click on the green task bar and click “Stop Task”. Clean the sample surfaces (diamond ATR crystal and anvil) and re-run the background measurement.

2. Click “Measure Sample”. You will be prompted to enter information about the sample you are running. You will notice on this screen that field will appear that is auto-populated with information about the last measured sample.
3. Enter the sample information. This will determine the name the spectrum file will be saved under and attach metadata that will be included with the file.



**Figure 11.** Sample Information Box

Generate a unique sample ID for each sample using the following format:

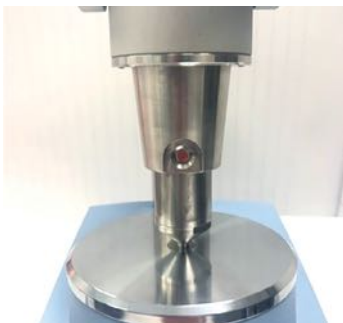


Doing so will ensure that no two drug samples or spectrum files will have matching names. The spectrum file name should not contain spaces or periods, but underscores ( `_` ) can be used if necessary. Click OK.

4. The new window displays a live reading of the sample. You can now load the sample onto the diamond ATR crystal using a stainless-steel spatula. Place a small amount of substance (approximately 5mg, roughly corresponding to the size of half a match head) onto the diamond ATR crystal. Ensure the sample is optimally positioned on the diamond ATR crystal using a stainless-steel chemistry spatula or similar tool.
5. Lower the anvil and watch the signal appear on screen. To maximize the signal and get a stronger result, it is best to fully cover the sensor (ATR crystal) with the sample. Depending on how much sample was provided to you by the service user, you may have excess – this is OK. It is helpful to view the blank live view before loading the sample to ensure the background scan was conducted successfully.

**Note:** if the software begins reading the sample immediately and skips the live preview screen, you will need to enable the setting in measurement parameters settings. This is often the case in new installations of OPUS.

6. Take note of where the red dot sits in the viewing window of the anvil head. The optimal location of the red dot is in the centre of the viewing window when the anvil makes first contact with the diamond crystal – the dot should remain in, or very near, that position.

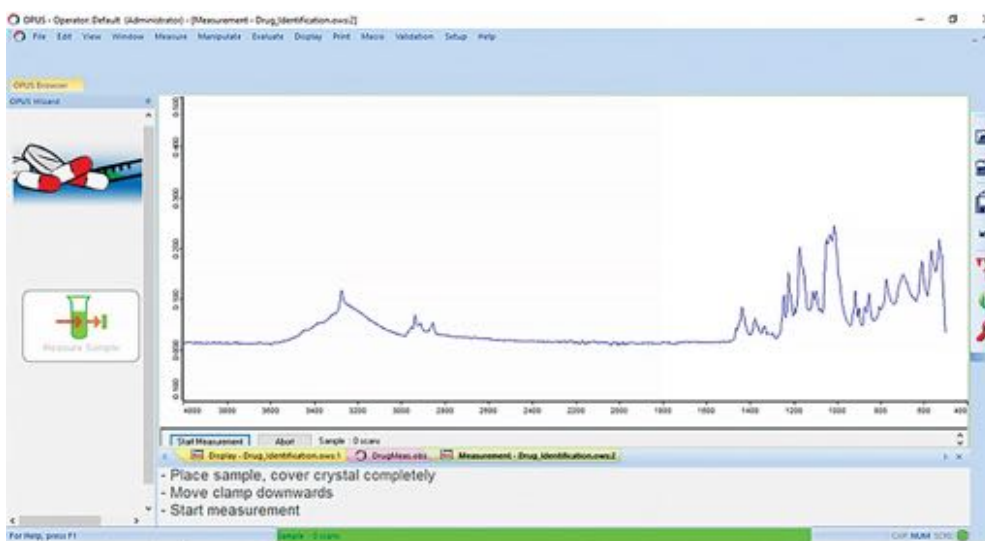


**Figure 12.** Red dot on FTIR pressure head

**Note:** With powders, especially fine-textured powders, it may be difficult to get a signal. If you cannot get an acceptable signal, you may need to ask the service user for more powder. If you need to ask for more powder, remind the service user that they will get their sample back.

If the sample is very chunky and hard, crush the chunk to smaller particles or powder so that the anvil will not have any trouble applying pressure to the sample and the sample will not slip away from the pressure anvil. A sudden slip of a chunk while under pressure can cause a collision of the pressure anvil with the diamond crystal, which can damage the crystal and result in expensive repairs. Do not use the anvil when the substance is soft or paste-like; instead, spread the substance on the crystal to keep the anvil clean.

7. Take note of the peak heights by looking at the scale on the left. Try to get the signal as high as possible, ideally over 0.300. If it is under 0.200, readjust the sample on the sensor and try again.
8. When you have maximized the signal for the sample, click “Start Measurement”. The signal will disappear off the screen but the task bar will turn green — this shows the progress of the scan. The reading will take the same amount of time as the background scan, about 30 seconds. When the reading is finished, OPUS will automatically open the spectrum into the window and run a spectrum search with the last-used parameters.



**Figure 13.** Example of Peak Heights

## 9.2 Performing a Spectrum Search

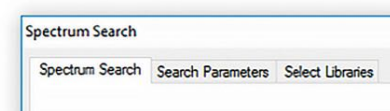
A spectrum search is a function in OPUS that detects the components of an unknown spectrum. OPUS will match the unknown spectrum you generated to reference spectra in selected libraries. Libraries are made up of hundreds of spectra of pharmaceuticals, street drugs, common adulterants, and other substances.

1. After a spectrum is generated, OPUS will usually run a Spectrum Search automatically. It is good practice to close the window of this first, automatic search as it can use old settings. To run a new search, click “Evaluate” > “Spectrum Search”. You can also use the shortcut button in the toolbox on the right-hand side. The icon is a magnifying glass.



*Figure 14. Magnifying glass icon for spectrum search*

2. Once this search is performed, a window will open with three tabs:



*Figure 15. Window for Spectrum Search, Parameters, and Library*

- **Spectrum Search:** In this tab, you can select which sections of the spectrum to use for the search. To start, ensure that “Use file limits” is selected. This setting uses the entire measured spectrum.
  - **Search Parameters:** In this tab, you can select the search algorithm to use. When performing basic analysis, use Spectrum Correlation, Vector Normalization, 1<sup>st</sup> Derivative.
  - **Select Libraries:** In this tab, you can select the reference libraries for the spectrum search. **If it is your first time running a drug sample, ensure that the SWGDRUG, TICTAC ATR-FTIR, and BCCSU libraries are selected at a minimum.**
3. After selecting the relevant options, select “Search Library”.
    - The spectral matches will be listed by descending Hit Quality (1000 represents a perfect fit. “Hit Quality” refers to OPUS’ prediction of what the substance is based on in comparison to reference spectra found within selected libraries. It is not a measure of purity.

- Samples that contain more than one component are referred to as **mixtures**. Mixtures must be analyzed by subtracting the individual spectral components until there are no residual peaks present (i.e., it has returned to the baseline measurement from the background scan).
- To subtract components, right-click and select “Auto-Subtract” > “New Search”. This subtracts the selected reference spectrum from the measured spectrum, thereby revealing the peaks in the measured spectrum not accounted for by the first reference hit. Note that it may be necessary to perform more than one subtraction (with different reference spectra) to best identify all of the components in a mixture.

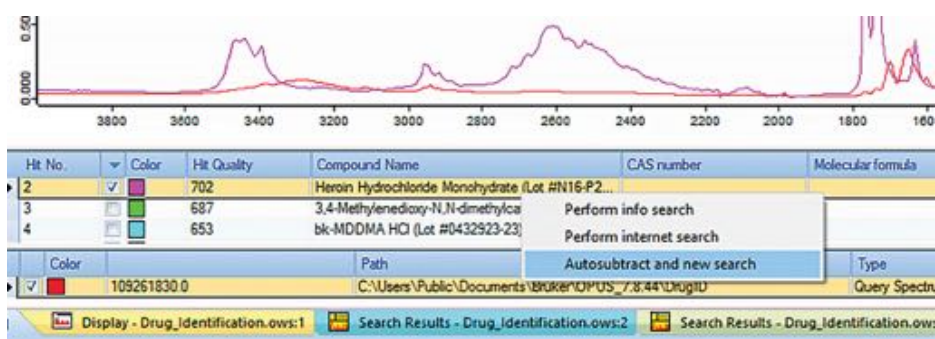


Figure 16. Instructions for how to Auto-Subtract

- If there is a section of the subtracted spectrum with a large dip or another subtraction issue, you can use the “Spectrum Search” tab of the “Spectrum Search” function window to restrict the search area, excluding that region. Right-click to add or remove new regions and drag the width to fit accordingly.

**Note:** If there are peaks remaining that you think could be more than noise (i.e., they could be a signal from an unknown compound), yet do not match any existing hits, try using different libraries. The PHARMA libraries are very large and therefore slow to run but do contain substances that are not accounted for in the smaller libraries.

- You can control which window you are viewing by using the tabs at the bottom. Use the ‘x’ button on the right side to close the present window.

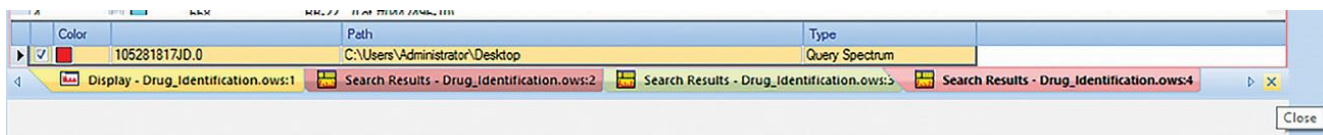


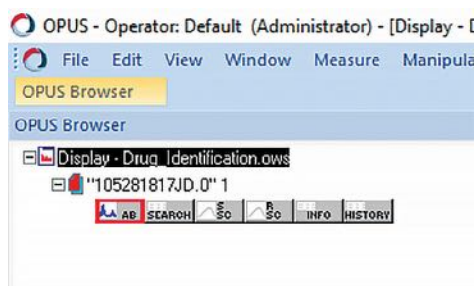
Figure 17. Instructions for how to close present windows

4. When the interpretation is complete, unload the spectrum from OPUS by clicking “File” > “Unload All Files”, or use the shortcut on the toolbox to the right.



**Figure 18.** Shortcut to unload all files

- You can view which files are loaded into OPUS by viewing the OPUS Browser. Hover your cursor over OPUS Browser in the top left of the OPUS window, below the taskbar.



**Figure 19.** Instructions for how to view uploaded files

- When you perform subtractions and spectrum searches, the new subtracted spectrum will be loaded into the OPUS browser. To perform a spectrum search on a specific spectrum, ensure the correct one is highlighted in the OPUS Browser (i.e., the AB block). This is important if you have multiple spectra open in the same window.
5. After unloading the spectra from OPUS, the software is ready to measure a new sample. Click the large button on the left-hand side of the screen that reads “Next Sample”.
  6. Thoroughly clean the FTIR sample surfaces, particularly the diamond ATR crystal and pressure anvil, by wiping both with alcohol swabs and drying them with a clean tissue. After a minimum of 3 alcohol swabs are used, use a clean Kimwipe® or tissue to dry the sample tray. This procedure ensures no carry-over of trace amounts of substances tested and prepares the spectrometer for the next sample.



## 9.3 How to Recover a Spectrum After Saving a Subtraction

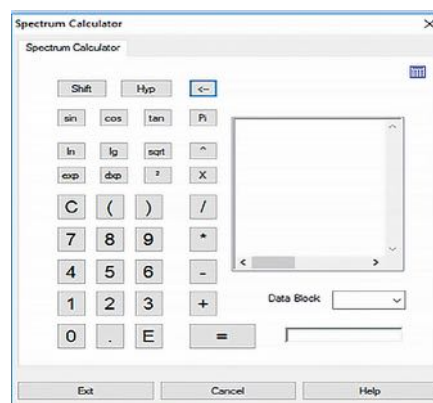
When performing a subtraction analysis in OPUS, it is important to discard changes when closing windows or unloading files to ensure that the original measurement is saved rather than an edited spectrum. See below for an example spectrum saved after a subtraction.



**Figure 20.** A subtraction result saved instead of the original spectrum measurement

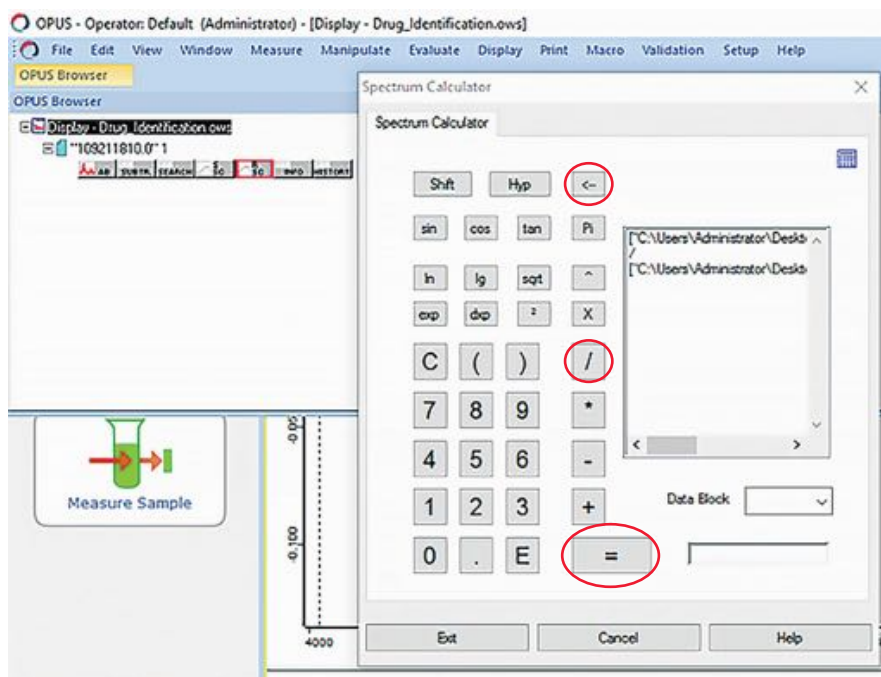
In the above figure, the AB Block of the file was replaced by the subtraction result. To recover the original, the AB Block must be regenerated. It is possible to regenerate the AB Block from the “Reference (RSC)” and “Sample Single Channel (SSC)” blocks, using the following steps.

1. With the file loaded into OPUS, open the “Spectrum Calculator” from the “Manipulate” menu in the toolbar.



**Figure 21.** Spectrum Calculator

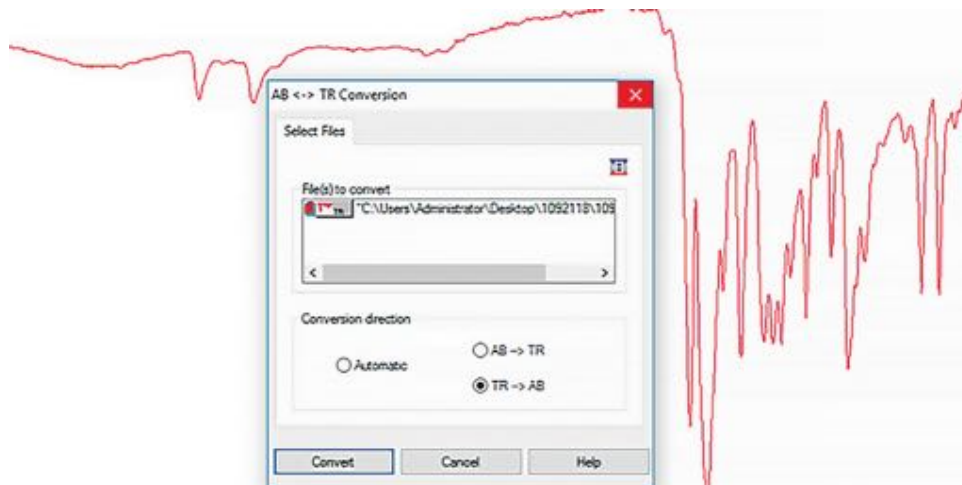
2. Clear the input window by clicking the “←” button.
3. Drag the SSC Block from the OPUS Browser into the input window. Select “divide” ( / ), then drag the RSC Block from the OPUS Browser into the input window.
4. Click “equals” ( = ).



**Figure 22.** Spectrum calculator with relevant buttons highlighted

This calculation generates a transmission spectrum block. For drug checking, we deal with absorbance spectra, which is the inverse of transmission. To convert from transmission to absorbance:

1. Select the TR Block in the OPUS browser.
2. In the “Manipulate” menu in the toolbar, open “AB <-> TR Conversion”.



**Figure 23.** AB <-> TR Conversion window

3. Select “Automatic”.
4. Click “Convert”.

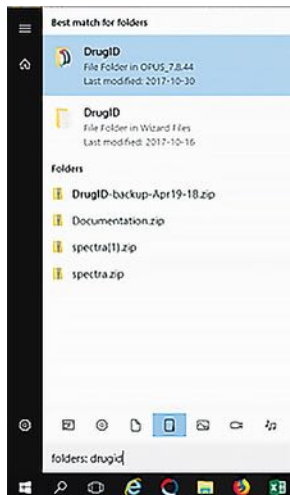
You can now save the corrected file under the original file name. Select “Save” in OPUS. Remember that to perform analysis, the AB Block in OPUS Browser must be selected.

## 9.4 How to export the spectrum files for sharing and safe data storage

It is important to back-up the saved OPUS spectrum files to ensure there is a second copy in case of computer failure, damage, or theft, and to allow for quality checking procedures.

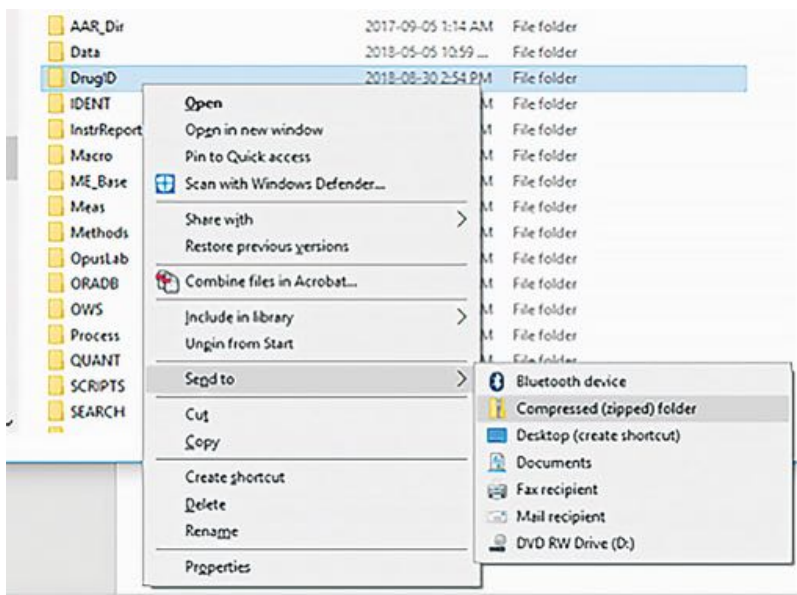
When a sample is measured in OPUS, the spectrum file is automatically saved in a computer folder called *DrugID* located within the OPUS file directory (**C:\Users\Public\Documents\Bruker\OPUS\_#.#.##\DrugID**). To open this folder, follow the procedures below:

1. Click the “Windows” (Start) button
2. Type the name of the folder you are searching for, i.e., “DrugID”
3. In the result search window, select the option called, “Find results in folders”
4. Click “DrugID” to open the folder.



**Figure 24.** Instruction for how to open DrugID Folder

To share the contents of the DrugID folder, select all the files you would like to share and copy them to a new folder. Compress (zip) the new folder into a single file. To do this, right-click on the file folder you wish to share and select “Send-to” > “Compressed (zipped)” folder. Save the zipped folder in a secure location for long-term data storage.



**Figure 25.** Instructions for how to share DrugID Folder

## 9.5 Performing a Performance Qualification (PQ) Test

The performance qualification (PQ) test is used to validate and calibrate the spectrometer before normal use. It is recommended to be performed at the start of a shift whenever the spectrometer has been moved to a new environment, and at a maximum, once a week. The PQ test can be thought of as a way to calibrate the spectrometer to its environment: the temperature and humidity of the surrounding air. In outdoor environments, sometimes the PQ test needs to be performed multiple times a day, for example, if the temperature drops after sunset, or the humidity greatly increases after a rainfall.

The PQ test is generally set to expire once a week. When it expires, the OPUS status light in the bottom right-hand corner of the screen (figure 7) (and the LED on the spectrometer) will turn yellow. The following steps to perform a PQ test can be done whether or not the PQ test has expired.

1. To initiate a PQ test, click on the status light in the bottom right-hand corner of OPUS (figure 7). It will be yellow if the test has expired, green if it has not, or red if it has recently failed.
2. In the resulting pop-up window, select the box where the connected module is visible. It will be coloured-in/darker than the other boxes (figure 26).

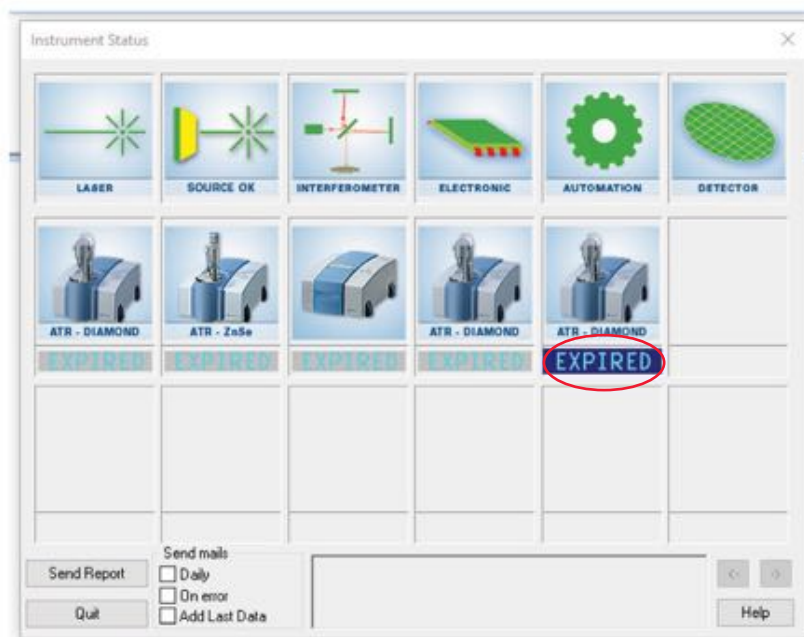
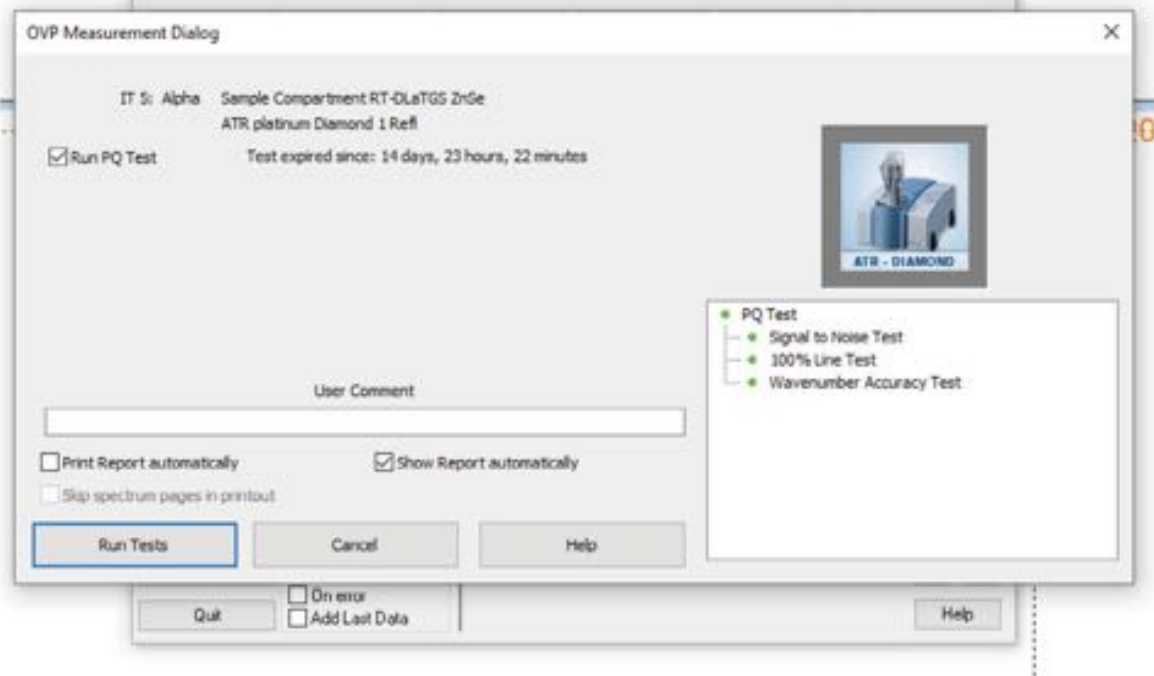


Figure 26. Opus pop-up window

3. In the next window there will be checkboxes with options to run different tests. If the PQ test is expired, it will prompt you to perform it and tell you how long it has been expired for (figure 27). Select the PQ checkbox and click “Run Tests.”



**Figure 27.** OVP Measurement Dialog Box for running a PQ test.

4. The PQ test will run and takes approximately 8 minutes.
5. Avoid running the OQ test as that is to be performed annually or after a major service.

When running a PQ test, the ATR crystal sensor must remain clean for the entirety of the test. Ensure that no sample or cleaning material touches the sensor while the test is running (it may help to put an upside-down sample cup over the sensor to remind you). Try to also avoid bumping the table or moving the spectrometer while the PQ test is occurring. The progress of the test will appear in the green status bar in the bottom of the OPUS window (figure 9).

The PQ test may fail for multiple reasons: a sample was loaded while the test was taking place, the spectrometer was moved during the testing, the humidity is too high (see [Section 9.6](#)) or there a critical failure with the spectrometer (for example, the ATR crystal is broken). When the PQ test fails, the status light will turn red. If a PQ test fails, the first step is to clean the ATR crystal sensor well with alcohol pads and dry it thoroughly. Then repeat the PQ test a second time. If it fails a second time, check the humidity of the interior of the spectrometer (Section 9.6). If the humidity is in range, contact Bruker Support (see [Section 10](#)).

## 9.6 Checking the Humidity and Changing the Spectrometer Desiccant

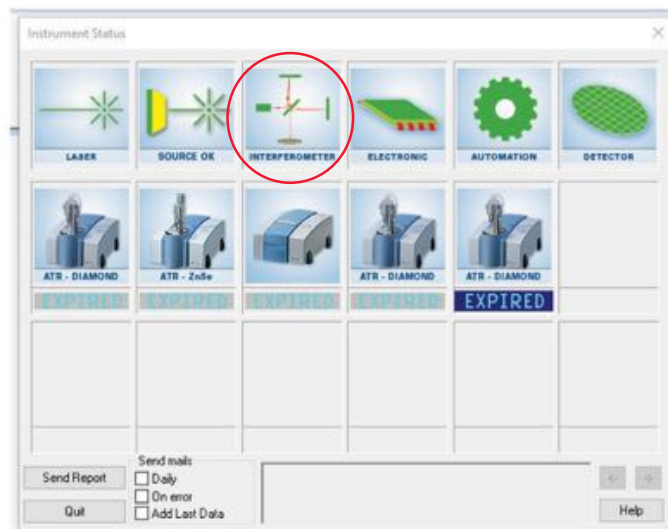
The humidity of the internal workings of the spectrometer needs to be in a specific range for optimal performance. For that reason, the spectrometer itself contains set of silica desiccant pouches inside the spectrometer module to keep the humidity in check. Generally, after 8 months to a year, or after a shorter period of time if the spectrometer is used in a humid environment, the desiccant pouches will become saturated and the humidity inside the spectrometer will rise above an acceptable level. This will cause PQ tests to begin failing (see [Section 9.5](#)). Additionally, if the humidity becomes too high, the status light will turn yellow and give a warning that the humidity is out of range. In that case, proceed immediately to changing the desiccant as outlined below.

### How to check spectrometer humidity

**There are two ways to check the humidity of the spectrometer:** by checking the levels when connected to a computer via OPUS, and opening the back to check the desiccant pouches. Start with checking via OPUS to avoid opening the spectrometer unnecessarily.

#### Checking humidity of spectrometer with OPUS:

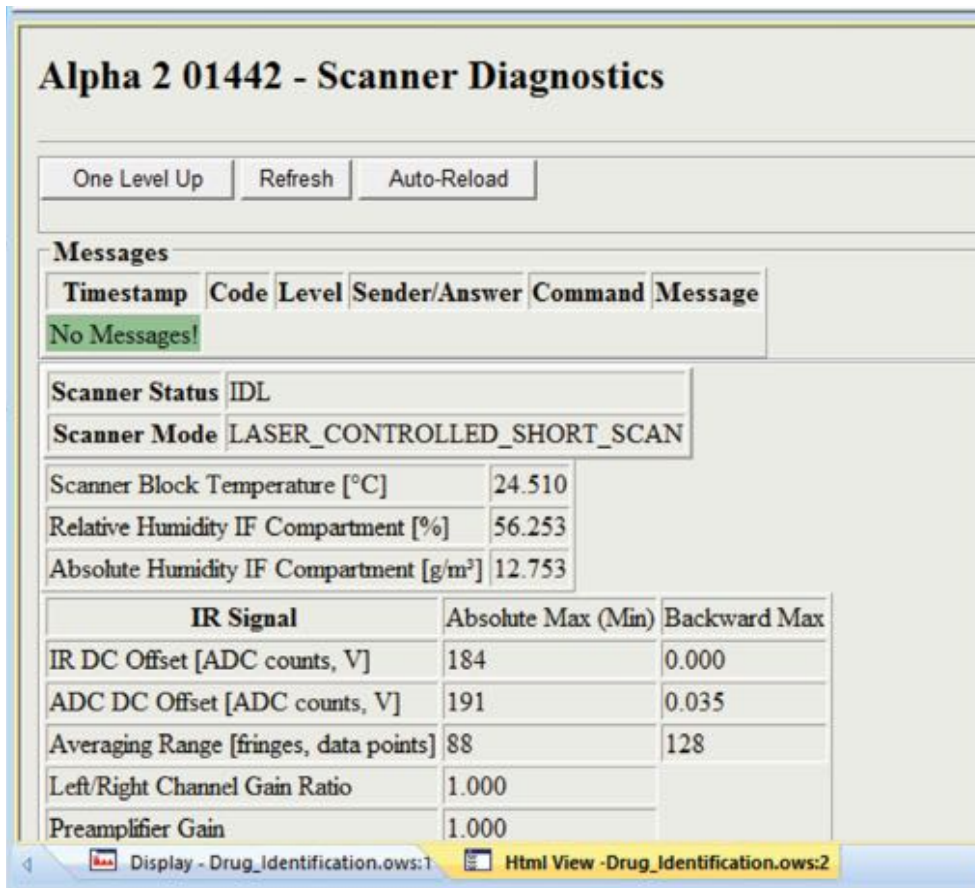
1. To check the humidity level inside the spectrometer, when OPUS is connected to the spectrometer, click the status light in the bottom right-hand corner of the screen.
2. In the resulting pop-up window, select “Interferometer” and then select “Service Info.”



**Figure 28.** Instrument status window for selection of Interferometer then Service info.



This page will contain a lot of information about the current status of the spectrometer including the temperature and humidity. Check the “Relative Humidity” number. The number may vary but aim for it to be below 40. It is best to check the humidity when the spectrometer is warm as lower temperatures increase the relative humidity. This may even be the reason why the PQ test is failing—if you can, try to run a PQ test after the spectrometer has been plugged-in and warmed up for at least 30 minutes. If the relative humidity stays above 40, it may be time to change the desiccant.



**Figure 29.** Scanner Diagnostics.

Checking humidity of spectrometer from the status of the desiccant bags (and change them if necessary):

1. Turn off the spectrometer by unplugging it from the wall and removing the power cord from the back.
2. On the back of the spectrometer, a metal plate is held in place by four screws. Loosen the four screws to remove the plate. The specialized Torx screwdriver will have come with the spectrometer.



3. After removing the metal plate, with clean hands or tweezers, remove the desiccant pouches from the cavity.
4. There may be a colour indicator on the pouches. If it indicates the humidity is too high, replace the pouches with a new set.
5. Close the spectrometer and screw the metal plate back into place.
6. Re-insert the power cord and plug it in. Leave the spectrometer running for as long as possible to dry out the internals, at least 2 hours is ideal.

New desiccant pouches can be purchased from Bruker, but old ones can be reused after drying. Baking the pouches in a low oven can dry out the silica reset the desiccant.

## 10.0 FTIR Support Information

### Resources for FTIR support:

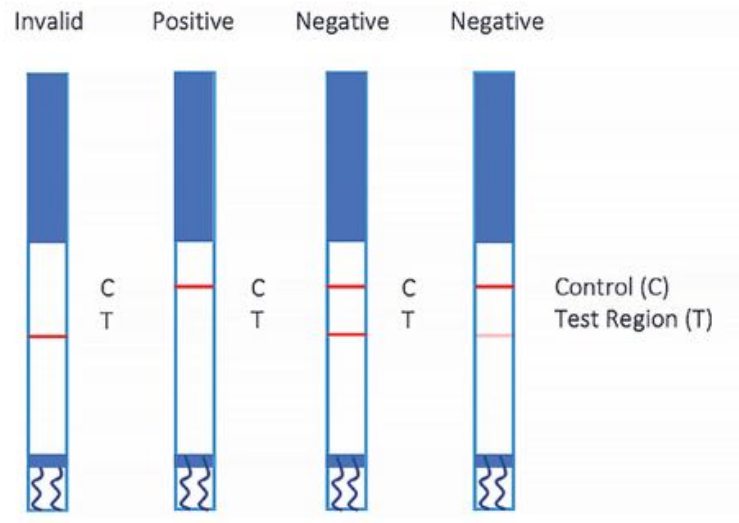
1. Whenever possible, the first point of contact should be another drug checking technician within your organization or another technician via the drug checking technician Slack workspace.
2. If a technician is unable to assist, email Bruker Support at [service.bopt.ca@bruker.com](mailto:service.bopt.ca@bruker.com). For more urgent service, call the Bruker Service Engineer.
3. If you are unable to connect with Bruker Support via email, contact your Regional Sales Manager.
4. If you are unable to connect with the Bruker support line, call the Bruker Optics North America Service Hotline at **1-987-439-9899 ext. 2**.

# 11.0 Immunoassay Strips

## 11.1 Fentanyl Test Strips Procedure

1. Add approximately 30 mL (1 ounce) of tap water to a paper cup containing approximately 1 mg of sample and swirl until dissolved. **It is important that no more than 1 mg of sample is used for the fentanyl test. Larger amounts may cause false positive results, especially with crystal meth and MDMA.**
2. Remove the BTNX Rapid Response™ Fentanyl immunoassay strip from the pouch and visually check for any obvious defects. If the package is ripped or torn, discard the test strip.
3. Holding the strip from the solid blue end, dip the white end of the strip into the liquid in the sample cup, taking care not to dip beyond the blue line as this may interfere with the results. When the liquid wicks up the strip to the top of the white portion, (typically about 10-15 seconds), remove the strip from the sample cup and place on a non-absorbent surface or across the top of the cup
4. Visually examine the strip under bright, direct lighting in order to avoid missing fainter bands. The result can normally be read off the strip immediately, but if colour is slow to develop, you may need to wait up to two minutes for well-defined bands to appear.
  - The upper band (control line) must always appear, or else the test is invalid and must be repeated (Figure 30).
  - The second (lower) band will often be lighter in colour than the upper (control) band. This is expected and does not indicate a positive test. Any second band, even if faint, is a negative test result. If there is any doubt in interpretation, repeat the test. It is safer to repeat the test than to be unsure.
  - Do not read/record/interpret results more than 10 minutes after the test has been performed, as a second band may appear even in a positive sample. The result is no longer valid after 10 minutes.

One coloured band (top only) = Fentanyl Positive  
Two Colour Bands = Fentanyl Negative



**Figure 30.** Invalid, positive, and negative fentanyl test strips.

5. The sample cup and all discarded substances should be handled and disposed of in accordance with existing site disposal procedures (see [Safe Handling and Storage in Section 8.3](#)).
6. Regardless of test results, all service users have the option to securely dispose of their substance before leaving the testing area in a site-provided amnesty bin, DeterraÔ pouch or kitty litter (See [Disposal](#) for more information). Record all witnessed substance disposals. Never dispose of drug samples in the regular garbage.

**Note:** Fentanyl test strips must be kept in a dry location at room temperature (2-30°C; 36-86°F). Test strips are sensitive to humidity and must be used immediately after being opened.<sup>20</sup>

## 11.2 Benzodiazepine Test Strip (BTS) Procedure

Benzodiazepine (benzo) test strips can identify the presence of benzodiazepines in drug samples, but the strips may not return accurate results if used incorrectly. We recommend the following procedure to get the most accurate results possible.

1. Add one grain of sample (about 2 mg) to the plastic tube. We use 2mL tubes with lids.



**Figure 31.** 2mL Microcentrifuge Tubes

2. Fill the tube with water, leaving enough space to close the lid.
3. Close the tube.
4. Shake for 30 seconds to make the drugs dissolve.

Benzos do not dissolve easily in water, therefore shaking the solution helps the drug dissolve.

5. Dip the benzo test strip in the water taking care not to dip too deep (less than 2 cm)
6. Wait 2 full minutes before reading the results. 1 line = positive; 2 lines = negative
7. Pour the contents of the tube into a small paper cup and dilute with 20 mL of water to then conduct the fentanyl test strip.

\*When conducting both a benzodiazepine and fentanyl test strip, the same water can be used for testing. Simply dilute the water further after testing the benzodiazepine test strip to then use a fentanyl strip.

For a video demonstration, please visit: <https://www.youtube.com/watch?v=fxkMYLAfb70>.

## 11.3 BTS limitations and other considerations

- Benzo strips take longer to work than fentanyl strips. Wait a full 2 minutes to ensure the lines have time to properly develop.
- If no tube is available to agitate sample in water, use only a small splash of water (2–5 mL) in the cup and swirl for 30 seconds or stir with a clean tool for 30 seconds. Be careful though, as the result may not be as accurate as if it was shaken.
- To save time, do the fentanyl check while waiting the 2 minutes for the benzo test.
- Benzo test lines can be very faint so read the strip results under bright light. Any second line, no matter how faint, means the test is negative.

- Benzo test strips cannot determine concentration or what type of benzo is present in the sample.
- Benzo test strips have been shown to detect etizolam, but can miss it, resulting in a false negative result.

## 11.4 LSD Immunoassay Strip

Lysergic acid diethylamide, commonly known as LSD or acid, is a strong psychedelic. LSD has a very small dose, around 100 µg, which is invisible to the naked eye. For this reason, LSD is most often placed onto colourful blotter paper (tabs) that are used for dosing. Due to the small dosage combined with the paper medium, FTIR drug checking is not suited to testing LSD blotters. Although not formally evaluated, LSD urinary immunoassay strips can be effective in checking for the presence of LSD. Of note, LSD test strips cannot determine how much LSD is present.

## 11.5 LSD Test Strip Recommended Procedure

- Use clean, fine scissors to cut off a small portion of blotter paper (approximately one eighth (1/8) of the tab)
- Place the corner of blotter paper into a small tube or cup and add approximately 2-5 mL of water (LSD test strips should be used with less water than used with fentanyl test strips).
- Allow the sample to sit for 2 minutes to saturate the paper and allow the LSD to enter the solution, swirl to mix
- Hold the strip in the water, ensuring the water level stays below the horizontal blue line
- Wait until water flows up the strip, then lay the strip down on a flat surface
- Results are displayed the same as fentanyl test strips (1 line = positive; 2 lines = negative)

25i-NBOMe (“N-bomb”), sometimes sold as LSD, will not trigger the LSD test strips and will return a negative result. There is little evidence about the pharmacology of N-bomb drugs, but they can be fatal at high doses. There is no possibility of fatal overdose with only LSD. However, it is important to provide appropriate messaging of potential adverse events, while conducting LSD test strips.

## 12.0 Confirmatory Testing

To implement drug checking services, confirmatory testing has been shown to be a vital element. Confirmatory testing with laboratory-based, gold standard technologies, allows for point-of-care drug checking to further refine, while also expanding surveillance abilities by using highly sensitive technologies. The highly sensitive technologies in confirmatory laboratories can detect trace amounts of substances as well as provide quantification information that is not possible with FTIR and test strip technologies.

Please refer to the confirmatory testing standard of practice guideline on the BCCSU website: <https://drugcheckingbc.ca/resources/manuals-and-guidelines/>

## 13.0 Harm Reduction Messaging

The BCCSU drug checking program provides a key opportunity to connect with people who use drugs and provide them with valuable and potentially life-saving harm reduction information. These conversations can occur during the few minutes while substances are being checked or while providing drug checking results back to service users.

It is critical for the drug checking technician to be familiar with some of the more common drug interactions and be able to provide detailed information on the results of the drug check and potential harms. The drug resource and education project have a great list of resources for learning more in depth about drugs, the link to this can be found here: <https://dredproject.ca/helpful-links>.

**The disclaimer (see [Appendix A](#)) provides some harm reduction messaging, including:**

1. Don't use alone
2. Know the signs of overdose and call 911 if you think someone needs help
3. Start with a small amount
4. Carry naloxone and know how to use it

5. Avoid mixing substances (especially alcohol with opioids and other depressants), which increases your risk of overdose
6. Use where help is available, if possible, like an overdose prevention site

#### Additional harm reduction tips may include:

1. Drink lots of water and stay hydrated (but don't drink too much!)
2. Use slowly
3. Locate medical services (and the sanctuary, at festivals) before using
4. Visit an overdose prevention site to obtain safer consumption materials (e.g., sterile syringes, needles, straws)

When discussing harm reduction, it is important to choose your language carefully to ensure that you are not coming across as paternal, shaming, or denigrating. For example, **avoid** using language like, "You should...", "You need to...", "I need you to listen...". To help people feel safe to talk with you, it is **more effective** to use disarming language or to ask clear questions, such as: "Other folks have found these tools can help," or "Are you going to be with people today?"

For further resources on verbal de-escalation, here are two links: [https://www.dbsalliance.org/pdfs/UnderstandingAgitation/Understanding\\_Agitation\\_Poster.pdf](https://www.dbsalliance.org/pdfs/UnderstandingAgitation/Understanding_Agitation_Poster.pdf) and <https://www.crisisprevention.com/en-CA/Blog/De-escalation-Tips>.

Sometimes people may ask you a question you don't know how to answer. If you do not know or are not sure, check with other SCS/OPS staff on site that may have more information about harm reduction resources and/or to debrief on incidents that can arise. For further information, the Drug Resource and Education Project is another excellent site for drug checking: <https://dredproject.ca>.

## 14.0 Drug Checking Alerts

When drug checking technicians encounter samples that are suspected to be unusually dangerous and that might have wider public health implications (e.g., substances that could result in unusual or high numbers of overdoses), it is the responsibility of technicians to inform public health so that an alert might be broadcast to the public.

When a technician identifies a sample, they have concerns about, the technician will send an email to their contact at their regional health authority with the information about the sample. It is then up to the Health Authority to make the decision about whether or not to issue an alert regarding that sample. Because each health authority has a slightly different procedure for processing drug alerts, it is important to talk with your regional health authority contact and understand the process.

When determining if a drug alert is warranted, public health officials will consider the following:

- Potential to affect public health widely versus an individual circumstance that contributed to an unexpected result
- Potential for cross-contamination by the individual or during the drug checking procedure that may result in unexpected drug found in a sample
- The harms and risks associated with a substance or concentration of the substance on human health
- Trends of a substance over time
- Unique outliers with considerable potential to harm
- Any anecdotal evidence provided by the person who checked the sample about effects or concerns about the drug

Technicians need to provide enough information for public health to make a reasonable assessment. For this reason, a standardized form was created to help ensure all information is included when sent to the representative at the health authority. See [Figure 32](#) below as an example of this form with a photo.



**Drug Checking Alerts Form**

Date:	Location/Site:
Expected Substance	
FTIR Spectrometer Result	
Test Strip Result	Fentanyl: Benzodiazepine:
Colour & Texture	
Area Purchased	
Sent for Confirmatory Testing	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not available at this location
Reason for Alerting	
Notes (including picture if available):	

\*Please submit this form to all parties on the drug checking alerts contact list via email.



**Figure 32.** Alert form template and photo.

Drug checking services may also want to send out their own notifications regarding a drug of concern. In this case, there are some considerations around wording and thinking about ways to share information on social media. There are some resources to help guide accurate and effective messaging.

Please refer to the drug checking alerts and the drug alerts messaging guidelines on the BCCSU website for specific procedures for recommending an alert: <https://drugcheckingbc.ca/resources/manuals-and-guidelines/>

# Appendices

## Appendix A. Drug Checking Disclaimer

### DRUG CHECKING

#### FTIR SPECTROMETER + FENTANYL TEST STRIPS

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**Drugs may not be what you think!**

Even if you know your source, your drugs may contain unexpected and dangerous substances

Drug checking can help **reduce risk** by providing information about what is actually in a substance, allowing you to make **better-informed decisions**

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<p><b>What we <u>can</u> tell you about your sample:</b></p> <p><i>With the FTIR:</i></p> <ul style="list-style-type: none"><li>• Up to 3-4 different components in a mixture and approximate proportions</li><li>• Other drugs and cutting agents that may be mixed in or used as filler</li></ul> <p><i>With the strips:</i></p> <ul style="list-style-type: none"><li>• Whether your sample contains fentanyl and some fentanyl analogues</li><li>• <b>Note:</b> strips only test for fentanyl within the sample provided. Fentanyl may still be present in the remainder of the drug batch. Strips may occasionally report a negative result when fentanyl or an analogue is present</li></ul>	<p><b>What we <u>cannot</u> tell you about your sample:</b></p> <ul style="list-style-type: none"><li>• The FTIR cannot detect substances present in small amounts (less than about 5%)</li><li>• Specific quantities or the exact percentage in a mixture</li><li>• New or rare substances we don't have in our reference database</li><li>• We cannot reliably distinguish between specific substances with similar chemical make-up (e.g., 2C-family, fentanyl analogues)</li></ul>
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**Checking your drugs cannot guarantee that a drug is safe to use**

**The FTIR and the strips may occasionally miss fentanyl, fentanyl analogues, or other dangerous substances**

**Even after checking your drugs, we recommend you:**

<p><b>Never use alone</b></p> <ul style="list-style-type: none"><li>• Know the signs of overdose and call medical aid if you think someone needs help</li><li>• Start with a small amount</li><li>• Carry and know how to use naloxone</li></ul>	<ul style="list-style-type: none"><li>• Avoid mixing substances (especially alcohol with depressants) which increases your risk of overdose</li><li>• Use where help is available whenever possible, like at an overdose prevention site</li></ul>
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# Appendix B. Drug Checking Result Slips

<p>Date _____</p> <p>Appearance _____</p> <div data-bbox="237 464 751 730"><p><u>FTIR Results</u></p>     </div> <div data-bbox="237 747 751 894"><p><u>Test Strips</u></p><table border="1"><tr><td>Fentanyl</td><td>+</td><td>-</td></tr><tr><td>Benzodiazepine</td><td>+</td><td>-</td></tr></table></div> <p><i>All provincial results are available at <a href="https://drugcheckingbc.ca/results/">https://drugcheckingbc.ca/results/</a></i></p> <p><i>Results recorded above are only applicable when given to you directly by a drug checking technician at the point of service.</i></p> <p><i>We encourage you to get your drugs checked yourself</i></p> 	Fentanyl	+	-	Benzodiazepine	+	-	<p>For hours and locations check out our website! <a href="http://drugcheckingbc.ca">http://drugcheckingbc.ca</a></p> <p>For information on Vancouver Coastal Health: <a href="http://www.vch.ca/drugchecking">http://www.vch.ca/drugchecking</a></p> <p><b>Checking your drugs cannot guarantee that a drug is safe to use. Even after checking your drugs, we recommend you:</b></p> <ul style="list-style-type: none"><li>• Have a buddy</li><li>• Start low, go slow</li><li>• Have an overdose plan</li><li>• Carry naloxone</li><li>• Use one drug at a time</li><li>• Be aware of your health &amp; tolerance</li></ul>
Fentanyl	+	-					
Benzodiazepine	+	-					

# Appendix C. Logging Samples for Confirmatory Testing Template

CONFIRMATORY TESTING LOG					
DATE DD/MM/YYYY	TIME	SAMPLE ID	TECHNICIAN NAME	RUNNING TOTAL OF SAMPLES	SENT TO LAB DATE

# Appendix D. DCBC Database Data Reporting Sheet

**Sample** Delete Sample **Save** Save And Create Another

Sample#  Sample ID: **A1QWF2HMDMU7** FTIR

Checking pre or post use?  Pre-Use  Post-Use  N/A

Expected Drug:

Colour:  Texture:

Was expected drug present?  Yes  No  N/A

Alert Recommended:

Did technician advise disposal?

Saved for Confirmation:

Flag for review:

Comments:

Embed Strip:  Positive Negative Invalid

Swab Strip:  Positive Negative Invalid

LSD Strip:  Positive Negative Invalid

Spectrum File:  **Add File**

# Appendix E. Offline Data Reporting Sheet

Drug Checking Results: DCBC Offline Logging Form  FRONTIER COLLEGE  
UNIVERSITY OF  
SOUTHWALES

WST	SPECTRUM ID	EXPECTED DRUG	CLOUR & TEXTURE	PRE-OR-POST-CONSUMPTION	FTIR 1	FTIR 2	FTIR 3	FTIR 4/FTIR 5	FTIR & BUNDLING	NOTE (FLAG, ALERT, CONFIRMATORY, DISPOSAL, N)
				PRE-POST					F	
				PRE-POST					B	
				PRE-POST					F	
				PRE-POST					B	
				PRE-POST					F	
				PRE-POST					B	
				PRE-POST					F	
				PRE-POST					B	
				PRE-POST					F	
				PRE-POST					B	
				PRE-POST					F	
				PRE-POST					B	
				PRE-POST					F	
				PRE-POST					B	

Date: \_\_\_\_\_ Technician Name: \_\_\_\_\_ Site: \_\_\_\_\_

## Appendix F. Common Drug Checking Service Libraries

Drug checking services in BC that use the Bruker FTIR utilize three primary reference libraries. These libraries contain common drugs and adulterants typically found in the unregulated drug supply in BC\*:

- **SWGDRUG**: consists of 624 spectra
  - A free, open-source library of drugs and adulterants Sporadic update schedule (less than once a year).  
Details are available at <https://swgdrug.org/ir.htm>
- **TICTAC**: consists of 548 spectra
  - A costly, copyright protected library available solely from Bruker. Contains an updated selection of drugs, NPS, and adulterants. Updated annually with annual associated costs. Details are available from the Bruker representative.
- **BCCSU FTIR-ATR**: consists of 101 spectra

A free, open-source library of drugs and adulterants based on samples submitted for drug checking in BC. Updated every few months and sent to distribution list. Details are available at [www.drugcheckingbc.ca/resources/drug-checking-library/](http://www.drugcheckingbc.ca/resources/drug-checking-library/).

An alternative library is also used as needed:

- **ATR-LIB-PHARMA+**: consists of 4 sub-libraries of 10,105 total spectra
  - A costly, copyright protected library available solely from Bruker. Contains an extensive selection of pharmaceutical and non-pharmaceutical drugs. Not updated. No annual fee, only an up-front purchase price.

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\* Number of entries as of 2020 for all of the libraries. These numbers are for reference, but may change as libraries grow over time.

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## BC Centre on Substance Use (BCCSU)

400-1045 Howe St, Phone: (778) 945-7616  
Vancouver, BC Fax: (604) 428-5183  
V6Z 2A9 Canada Email: [inquiries@bccsu.ubc.ca](mailto:inquiries@bccsu.ubc.ca)

*For media enquiries or to set up an interview with someone from the BCCSU, please contact Kevin Hollett, Communications Lead, at [kevin.hollett@bccsu.ubc.ca](mailto:kevin.hollett@bccsu.ubc.ca) or (778) 918-1537.*

[www.bccsu.ca](http://www.bccsu.ca)

If you would like more information about drug checking services in BC, please visit:

[www.drugcheckingbc.ca](http://www.drugcheckingbc.ca)

or email [drugchecking@bccsu.ubc.ca](mailto:drugchecking@bccsu.ubc.ca)