Fentanyl Remediation

Guidance for Remediators, Regulatory Agencies and Professionals

Alberta

Alberta Health, Government of Alberta

June, 2020

Fentanyl Remediation: Guidance for Remediators, Regulatory Agencies and Professionals

ISBN 978-1-4601-4632-3

Prepared by Stantec Consulting Ltd. for the Government of Alberta

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Acknowledgements

This Guidance was developed by Stantec Consulting Ltd. for the Government of Alberta.

A multitude of stakeholders and subject matter experts provided input, insight and helpful suggestions to improve this guidance document.

Sincere appreciation is extended to the following individuals and organizations:

- Brent Olynyk of Trauma Scene Bio Services Inc.
- Chris Andrews of Canadian Decon Solutions
- Curtis Flude of DF Technical and Consulting Services Ltd.
- Daria Romanish and Team of Alberta Health Services
- Deena Hinshaw, Dean Blue and Annette Flaherty, Office of the Chief Medical Officer of Health, Alberta Health
- Dean May of Mayken HazMat Solutions
- Diane Radnoff and Team, Alberta Ministry of Labour and Immigration
- Elvira Glanville of Northview Apartment REIT
- Geraldine Sawyer of the Department of Indigenous Services Canada
- Guy Pilon of the City of Edmonton Police Service
- Ian Mendes of EFI Global
- Katie Garvey of General Dynamics Information Technology
- Matthew Meiners of Bureau Veritas
- Merry Turtiak and Environmental Health Team, Alberta Health
- Mike Wiebe of Rapid Response Industrial Group
- Suzanne Wilde, Michele Kutz, Rob Robinson and Team of Stantec Consulting Ltd.

While all of those listed above did contribute to the review of this document, it does not imply that all stakeholders are in agreement with all aspects.

Preface

Fentanyl Remediation: Guidance for Remediators, Regulatory Agencies and Professionals (Guidance) has been prepared to assist agencies and professionals needing to manage risks related to property or materials contaminated with fentanyl. This may include municipalities; law enforcement; environmental health inspectors; companies owning or operating commercial real estate; or other sectors pursuing or requiring remediation as well as contractors, subcontractors; and third-party consultants providing remediation-related services.

Procedures for the assessment and remediation of property or materials contaminated with fentanyl are outlined. These will be most applicable in situations where contamination with fentanyl is known (or determined) to have occurred. Typically, the need for assessment and remediation will be triggered by law enforcement or other regulatory agency.

This Guidance was developed by Stantec Consulting Ltd. for the Government of Alberta. To develop this document, the Stantec team reviewed current legislation, similar hazardous substance guidance, and other reference materials available at the time of publication. Professional experience, industry best practices, and consultation with subject matter experts also informed the final Guidance.

The focus of this Guidance is limited to dealing with fentanyl and fentanyl analogues known at the time of publication (herein after combined and referred to as fentanyl).

Definitions for many technical terms used in this document are provided in **Appendix A**.

Limitations

The procedures outlined in this Guidance document are most applicable in situations where contamination with fentanyl is known to have occurred and the need for assessment and remediation has been triggered by law enforcement or other regulatory agency.

Procedures are not tailored to scenarios in which individuals, family members or community agencies providing services to people who use substances may encounter unknown or suspicious powders (or capsules, tablets, solutions) or be concerned about *potential* exposure to fentanyl or other synthetic opioids. These readers may find the following Health Canada information helpful (for more details, go to https://www.canada.ca/en/health-canada/services/substance-use/controlled-illegal-drugs/fentanyl/exposure.html#1).

Concerned about potential exposure to fentanyl?
If you have come into contact with fentanyl or other synthetic opioids, know that skin exposure to fentanyl is extremely unlikely to immediately harm you.

If your skin does come in contact with fentanyl or other potent synthetic opioids, wash the area with soap and water to remove the drug from your skin.

- *Soap and water easily removes fentanyl residue.*
- *Do not use alcohol-based hand sanitizers as these may increase the absorption of the drug into the skin.*

When handling any suspicious substances, such as suspected fentanyl – it's important to wear the appropriate personal protective equipment – especially in situations where airborne fentanyl powder is present or if there is environmental contamination. Worn correctly, personal protective equipment will protect you. This includes gloves, respiratory protection (masks), and safety glasses.

Procedures outlined in this document promote a healthy and safe environment for individuals undertaking fentanyl remediation activities, however, users of this Guidance are advised to consult provincial or professional occupational health and safety policies on relevant regulations and protective guidelines.

Users of this Guidance may encounter additional hazards that are not addressed in this document; in such cases, other resources should be consulted. For complex situations, consultation with a third-party consultant experienced with fentanyl remediation is recommended.

Disclaimer

The material in this Guidance is for information only and is current to [November 2019]. The information contained in the Guidance is based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed; however, information relating to this Guidance is continuously developing.

Any use which a person makes of this Guidance is the sole responsibility of such user. This Guidance is not applicable in all situations and it is up to the user to assess its applicability and appropriateness. If used, this Guidance is intended to be used only within the user's scope and authority. At all times, the user must comply with manufacturer's and seller's instructions relating to any of their products or items referred to in the Guidance, if the Guidance is used.

At all times, persons must comply with all applicable laws. If there is any inconsistency or conflict between any of the information contained in this Guidance and applicable laws, the legislative requirements shall prevail. It is recommended that users obtain their own independent legal and insurance advice and perform their own due diligence.

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1.0 General Information on Fentanyl

1.1 What is Fentanyl?

Fentanyl is a highly potent synthetic opioid that rapidly acts to depress the central nervous system and respiratory function. Fentanyl is the strongest opioid available for medical use in humans. Although it is a powerful painkiller that can be prescribed by a physician for medical reasons, it can also be mixed with other illicit drugs. The Canadian Centre for Occupational Health and Safety states that the lethal dose of 2 milligrams (mg) of pure fentanyl—roughly equivalent to four grains of salt[1]—will kill the average adult. However, this is a generalization, since the specific lethal dose for an individual will depend on many factors, including weight and opioid tolerance.

Fentanyl is a crystalline solid with common forms including powders, liquids, nasal sprays, lozenges called “lollipops”, dermal patches, injectables (i.e. a fentanyl dose administered by intramuscular injection), and tablets (i.e. tablets).

According to the InterAgency Board, the particulate size of synthetic opioid powders typically ranges from 0.2-2.0 microns (µ), the powders are easily aerosolized and are both water and lipid soluble (i.e. can dissolve in both water and fats/oils)[2].

1.2 Analogues and Derivatives

Only a few fentanyl analogues (e.g. sufentanyl, alfentanyl, and remifentanil) are approved for pharmaceutical use in Canada. Carfentanil (or carfentanyl), another legally manufactured fentanyl analogue, is intended for veterinary use on large animals, and is not approved for medical use in humans.

Illicit fentanyl analogues are typically distributed as tainted powdered heroin, mixed with other illicit drugs such as heroin or cocaine or may be pressed into counterfeit tablets that mimic other opioids or medications. In the last five years, new fentanyl analogues have been rapidly emerging, created by clandestine chemists. Some of these new analogues include:

- Acetylfentanyl
- Acrylfentanyl

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[1] Canadian Centre for Occupational Health and Safety (CCOHS) *Opioids (including Fentanyl) – Precautions for first responders,* October 2018.
[2] The Interagency Board. *Recommendations on Selection and Use of Personal Protective Equipment and Decontamination Products for First Responders Against Exposure Hazards to Synthetic Opioids, Including Fentanyl and Fentanyl Analogues*, 2017.

- Butyrfentanyl
- Cyclopropylfentanyl
- 4-fluoroisobutyrfentanyl hydrochloride
- Furanyl fentanyl
- Lofentanil
- 2-methylacetylfentanyl
- 3-methylfentanyl
- Methylfuranylfentanyl
- Methylmethoxyacetylfentanyl
- Methoxyacetylfentanyl

1.3 Fentanyl Exposure and Emergency Response

1.3.1 Exposure

Handling fentanyl can be risky if the proper precautions are not taken. Fentanyl exposure symptoms include[3]:

- Respiratory distress, respiratory depression or arrest
- Nervous system depression
- Drowsiness
- Reduced level or loss of consciousness
- Dizziness
- Nausea/vomiting
- Limp body

For an individual of average body weight (75 kg), such symptoms can occur at doses as low as 2.5 micrograms (µg)[4]. The occurrence of these symptoms can reduce the ability for the exposed person to function properly, increasing the risk of accidents and injuries.

Routes of exposure to fentanyl include:

- Inhalation of powders and aerosols
- Absorption through skin, eyes, and mucous membranes
- Ingestion (via hand-to-mouth actions)
- Physical contact with sharps or needles

[3] Justice Institute of British Columbia. Fentanyl Safety for First Responders Website. *Overdose Signs & Symptoms*. https://www.fentanylsafety.com/naloxone/.
[4] Baxter, Christina, *The drugs don't work,* CRBNe Convergence, Orlando, USA, November 2018.

Inhalation is the exposure route of greatest concern. Inhaled fentanyl directly enters the body via the respiratory tract and is rapidly absorbed through the lungs into the bloodstream. In sufficient quantity, fentanyl can quickly exert toxic effects on the body once it has entered the bloodstream.

Fentanyl in liquid or gel form can also be rapidly absorbed through the skin into the bloodstream, resulting in similar effects to inhalation, although at a slower rate of absorption. Absorption of liquid fentanyl through the skin increases as the surface area of application increases, if it is applied on broken skin, and as the skin temperature increases.

Incidental skin contact with small amounts of dry fentanyl products is not likely to result in exposure to fatal levels of fentanyl. Nonetheless, to reduce the potential for sub-lethal symptoms, any residue from direct skin contact with suspect dry product should be promptly removed. The area should also be washed with skin-safe, low-pH soap under abundant running water[5]. Do not use alcohol-based hand cleaner because skin absorption may be increased.

1.3.2 Emergency Response

If exposure to fentanyl is suspected, call 911 immediately. If possible, move person to a clean environment.

More information on fentanyl and other opioids, signs and symptoms of an opioid overdose, responding to an overdose and naloxone is available on the Alberta Health Services website:

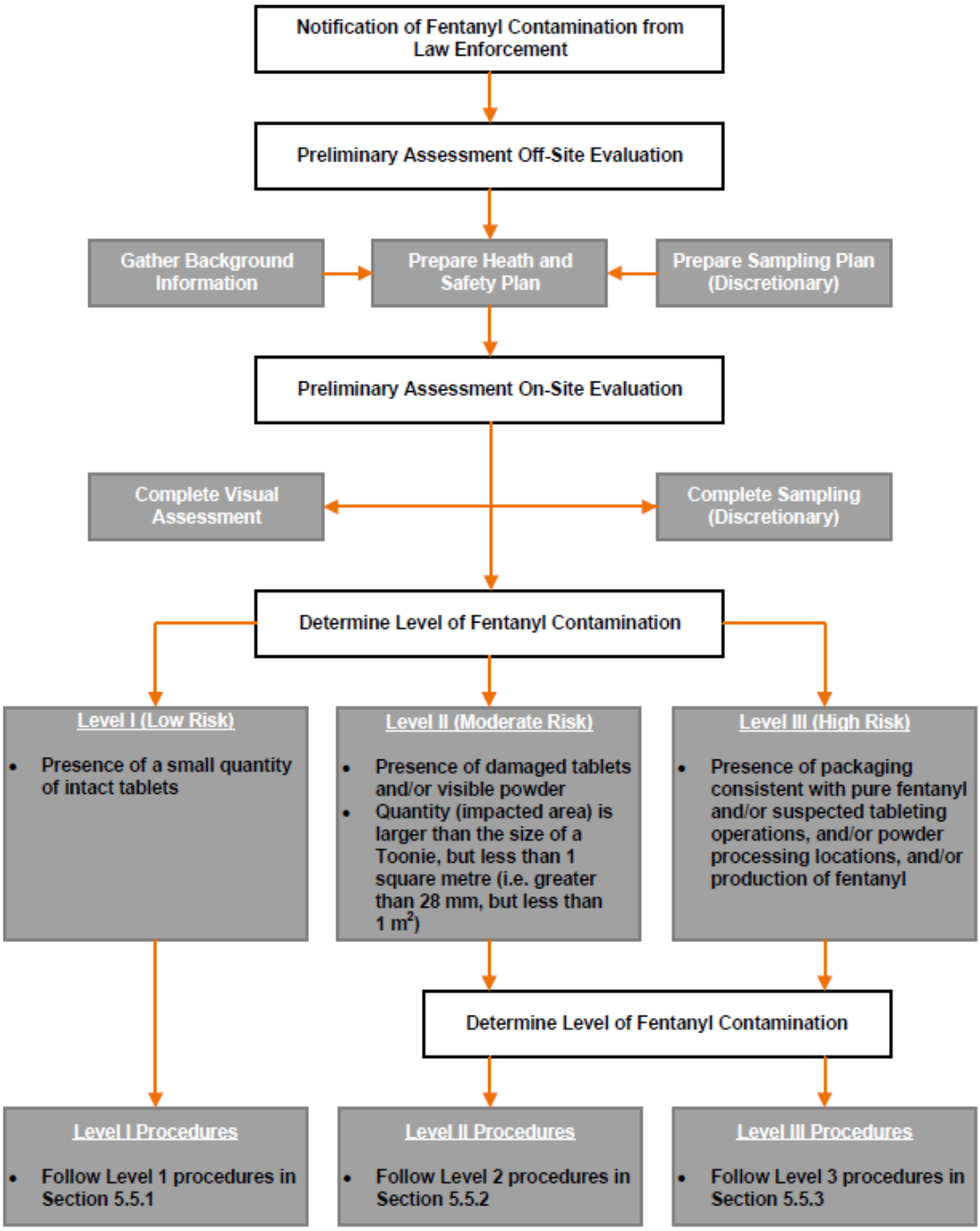
https://www.albertahealthservices.ca/info/Page16025.aspx

[5] Baxter, Christina, *Synthetic Opioids in Operational Environments – Part II: Decontamination* CRBNe Convergence, Orlando, USA, November 2018.

2.0 Overview Flowchart

The Guidance has been designed to establish procedures for the assessment and remediation of property or materials contaminated with fentanyl. Please refer to **Figure 1** for an overview of the process. Further details are provided in the sections below.

Figure 1: Fentanyl Remediation Flowchart



3.0 Preliminary Site Assessment

The objective of the preliminary site assessment is to evaluate the site and determine the extent and severity of the contamination. The information is to be used to develop the remediation scope of work. A preliminary site assessment should be performed before starting any fentanyl remediation work. This includes both an off-site evaluation (i.e. background review and information gathering to establish suitable measures for protecting those personnel who will perform the on-site assessment) and an on-site evaluation.

3.1 Notification of Fentanyl Contamination

There are two situations which typically occur upon discovery of suspect fentanyl contamination in Alberta:

- An official notification from law enforcement is forwarded to Alberta Health Services and/or Indigenous Services Canada - First Nations and Inuit Health Branch
- A member of the public discovers a suspect situation

When an official notification is received by Alberta Health Services and/or Indigenous Services Canada - First Nations and Inuit Health Branch from law enforcement a standard process of response is followed which is intended to protect the public.

If a member of the public discovers a suspect situation they should **stop and assess** the situation without touching any suspect material.

If the situation meets the Level I Fentanyl Contamination definition as noted in **Figure 1** and **Section 4.0 Table 1**, then Level I Procedures described in **Section 5.5.1** can be followed.

For Level II and Level III Fentanyl Contamination as defined in **Figure 1** and **Section 4.0 Table 1**, the individual should secure and leave the area immediately without touching any suspect material and call law enforcement and/or a professional remediation company.

The heating, ventilation, and air conditioning (HVAC) system may be compromised and should be turned off to prevent the spread of the contamination. In Level III situations, there may be other hazardous chemicals present in addition to fentanyl, which will need to be properly handled and disposed of.

3.2 Who Should Conduct the Assessment?

3.2.1 Remediation Contractor

Remediation contractors have a critical role in providing a safe work environment that minimizes further exposures to fentanyl, for both their own personnel and the public. The contractor should maintain insurance with reputable insurers whose policies are valid in the jurisdiction in which the services are performed. Hire a contractor who has proven experience in the remediation of fentanyl-contaminated properties and materials.

For cleaning and restoring heating, ventilation, and air conditioning (HVAC) systems, the National Air Duct Cleaning Association (NADCA) recommends engaging an Air Systems Cleaning Specialist (ASCS) or a Certified Ventilation Inspector (CVI) as defined in the *NADCA Standard for Assessment, Cleaning, and Restoration of HVAC Systems 2013*.

More information on how to select a remediation contractor is provided in **Appendix B**.

3.2.2 Third-Party Consultant

A third-party consultant can play an important role in the assessment and remediation process, particularly for larger and more complex remediation work. Qualified professionals can ensure that the level of risk posed by a property/site/situation is properly assessed, appropriate work health and safety measures are implemented and managed, and that the level of remediation undertaken is appropriate for the level of contamination. To avoid any perceived conflict of interest, the consultant should be fully independent of the remediation contractor. The consultant should maintain insurance with reputable insurers whose policies are valid in the jurisdiction in which the services are performed. Hiring a consultant with experience in fentanyl remediation is recommended.

Engaging third-party persons in this process helps to:

- Minimize risks for the client, who may not possess the knowledge and/or experience to properly oversee this type of project
- Reduce liability
- Increase public and personnel protection during the assessment and remediation process

More information on how to select a third-party consultant is provided in **Appendix C**.

3.3 Off-site Evaluation (Preparation for on-site assessment)

3.3.1 Gathering Background Information

The purpose of the off-site evaluation is to gather enough background information to understand the potential level of contamination and to develop a health and safety plan (HASP) for the on-site evaluation, which may include a sampling plan. Ideally, the following information should be obtained from the property owner, manager, occupant, police service, Indigenous Services Canada - First Nations and Inuit Health Branch and/or Alberta Health Services, as appropriate:

- Property address
- Property description: single residence, duplex, apartment unit, hotel, other (e.g. barn, tool shed, vehicle, motor home, camper, boat, prison cell, staffed care facility, etc.)
- Layout of the property, including adjacent properties and structures
- Existing building/area security measures for preventing unauthorized access
- Property status: owner-occupied, rental, vacant, unlawful resident, or other
- Hazardous building materials survey reports for the site, if completed
- Property site plan or floor plan
- Areas of the building known or suspected to be contaminated with fentanyl
- Estimate of contamination level
- Detailed inventory and description of contents (e.g. furnishings, objects, personal possessions) within known/suspect fentanyl-contaminated areas of building, including porous/non-porous nature of outer surface of contents
- Nature of known or suspect contaminated surface(s) other than contents, including location (e.g. floor, wall, ceiling, countertop, etc.), porosity (i.e. porous or non-porous), and description of surface (e.g. marble countertop, painted drywall wall, etc.)
- Property photographs or video footage, where available, particularly from the initial discovery of suspect contamination
- The physical state (or form) of the fentanyl or suspect fentanyl (e.g. solid/tablet, powder, liquid, gel)
- Any evidence suggesting fentanyl manufacturing, mixing, distribution, or consumption
- Results of on-site field test, if performed
- Results of forensic crime lab tests, where conducted
- Current HVAC blueprints or architectural drawings for the property or, if not available, the HVAC system components present, the known locations of air ducting, airflow patterns, locations of room air intakes and returns in suspect contaminated areas, locations of building air handling units serving the area(s) of concern, locations of building exhausts serving the area(s) of concern, and the type of HVAC air ducting used (e.g. flex duct, sheet metal ducting, presence of insulation inside ducting, etc.)

- Operational status of the HVAC system that serves the area(s) of suspect/known contamination at the time of discovery of suspected contamination (i.e. system active or deactivated)
- Additional information regarding the HVAC system (e.g. what other areas does it serve within the building or other buildings, how is the HVAC system zoned)
- Presence of other known hazards (e.g. electrical, hazardous chemicals, extreme temperature, confined space, biological hazards, asbestos, lead-paint, mould, etc.)
- Any additional information as deemed necessary by project stakeholders based on site-specific requirements or details

3.3.2 Health and Safety Plan

Before starting any work activities, the hazards and risks associated with the planned work should be assessed. This initial assessment helps determine what hazard controls should be implemented to minimize personnel's exposure to fentanyl and to minimize potential contamination of "clean" areas.

Based on the gathered background information and before conducting the on-site evaluation, a health and safety plan (HASP) should be prepared. The level of suspected contamination and the nature of the site will drive the decision regarding which control measures to follow and what personal protective equipment (PPE) is required to minimize or prevent personnel potential exposures. Refer to **Section 4.0** for a description of the criteria established for low, moderate, and high levels of contamination (or Level I, II or III as determined following the on-site evaluation).

Where the level of contamination cannot be clearly determined, it is suggested that more protective control measures to be implemented, including the appropriate PPE. The American Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH) recommend self-contained breathing apparatus with a Level A protective suit when entering an area with an unknown contaminant, when entering an area where the concentration of the contaminant is unknown, or where the exposure risk is unknown.

As best practice, a specific standard operating procedure (SOP) should be prepared for all the elements of PPE use, including putting on (donning), taking off (doffing), and disposing of PPE after use. All PPE should be donned/doffed under supervision, with assistance as needed. To prevent any transfer of contamination from the PPE to the wearer or others, follow a specific sequence when doffing PPE. Personnel should thoroughly wash when exiting the work area, paying special attention to the skin near where the various items of PPE meet, overlap, or are sealed together.

Appendix D provides a summary of the minimum PPE recommendations and details on donning and doffing procedures.

3.3.3 Sampling Plan

The off-site evaluation is intended to help characterize the anticipated level of contamination (e.g. low, moderate, or high). If the off-site evaluation suggests a moderate to high level of fentanyl contamination (see **Section 4.0**), or if the extent of contamination cannot be clearly determined based on the provided information, a sampling plan should be prepared and should include the collection of both pre-remediation and post-remediation samples. Each sampling plan should be customized to the site-specific conditions.

Depending on the age of a building, other hazardous building materials may also be present, such as asbestos-containing materials or lead-based paint. If existing hazardous building material survey reports are not available, or do not sufficiently characterize the potential hazards from these materials, bulk samples of building materials that must be disturbed or removed should also be collected and analyzed before starting any remediation work.

Based on the site-specific conditions a sampling plan should be established suitable to the situation, including the sample locations, the number of samples to be collected, and the validated sampling methodology. Consideration must be given to areas where contamination is known such as adjacent rooms, high traffic areas, ventilation systems, hard and soft surfaces, drainage areas.

For example, for an area where low levels of suspected fentanyl contamination is expected, sampling may not be required. For a moderate level of contamination, 30 to 40 samples may have to be collected per room or area to determine the extent of contamination depending on the room size (i.e. square footage) and various types of surfaces present in the area. For a high level contamination, 50 to 100 samples may be required, also depending on the square footage and surface types present.

Consideration should be given to sampling in any area into which airborne fentanyl can migrate, such as walls, ceilings, ducting, baseboards, cabinetry and electrical fixtures.

The sampling plan should specifically identify the analytical laboratory that will complete the analysis, as well as the number of samples to be collected for quality control/quality assurance purposes (e.g. field blanks or controls). The analytical laboratory should be accredited by the American Industrial Hygiene Association (AIHA) Industrial Hygiene Laboratory Accreditation Program and be an active participant of a Pharmaceutical Proficiency Analytical Testing program.

The customized sampling plan may incorporate the use of field detection techniques (e.g. ion mobility spectroscopy analyzer or fentanyl test kit), as well as the collection and laboratory analysis of surface wipe/swab/air samples. The pre- and post-remediation sampling locations should be indicated on a site plan, as part of the sampling plan. See **Appendix E** for further sampling guidance.

3.4 On-site Evaluation

The objective of the on-site evaluation is to determine the extent of contamination, collect pre-remediation samples (if applicable), and obtain additional information (e.g. photos, visual observation notes) which will be used to prepare a comprehensive fentanyl remediation scope of work that satisfies site-specific requirements.

The person performing the assessment should identify the contents in the contaminated area that can be cleaned effectively, and what must be treated and disposed of.

There are many tools available to assist in the completion of the on-site evaluation including visual assessment, and various sampling methodologies.

3.4.1 Visual Assessment

The visual assessment should include all rooms and areas known or suspected to be contaminated, all rooms or areas connected to those rooms or areas via doors and/or windows, and all rooms or areas connected via the HVAC system (if there is any suspicion of transfer via the HVAC system). The visual assessment should also include outdoor structures that may have been used to store fentanyl-contaminated materials and adjacent spaces that may not have been involved in the fentanyl production, as well as signs of ground disturbance (i.e. potential burial of waste).

When conducting the visual assessment, minimize the potential generation of airborne particulates or transfer of contamination to potentially clean areas. Do not move contents of rooms or areas or remove building finishes. Do not disturb settled dusts or powders.

Collect notes in a manner that will allow the note paper or media, writing implements, and other accessories to be effectively decontaminated when exiting the work area (e.g. waterproof paper, digital tablet and stylus in waterproof enclosures, etc.).

Unless dedicated exclusively to the collection of photos during fentanyl remediation work, cell phones are not to be used for this purpose during an on-site evaluation under any circumstances.

The on-site evaluation may indicate that a higher level of contamination is present than initially anticipated during the off-site evaluation. If this occurs, stop work until it can be verified that the assessor is wearing the appropriate PPE, appropriate controls are in place to prevent contamination of surrounding locations, and that the sampling plan (or the lack of a sampling plan) is appropriate for the site. Do not resume work until the appropriate PPE is available for use, the appropriate controls have been established, and the sampling plan (or lack thereof) is confirmed to be appropriate by a proficient person.

A room-by-room assessment should be completed, including the collection of photographs, notes, and sketches regarding the following:

- Observed solid or packaged drug materials, including:
  - Location/position within room or area
  - Type of surface on which they are located (e.g. marble countertop, painted drywall wall, etc.)
  - Physical state (or form) (e.g. solid/tablet, powder, liquid, gel)
- Observed dust or powders on surfaces, including:
  - Description (e.g. colour, consistency, etc.)
- Surfaces covered with dusts or powders, including:
  - Location (e.g. floor, wall, ceiling, countertop, etc.) and position in the room or area
  - Surface porosity (porous or non-porous)
  - Description of surface (e.g. marble countertop, painted drywall wall, etc.)
  - Total affected surface area
- All fixtures or coverings that could absorb airborne fentanyl powder or that could hide or contain spaces where airborne fentanyl powder could have settled and cannot be easily or safely decontaminated (e.g. electrical outlets, outlet covers and electrical boxes, baseboards, trim, light fixtures, vent covers/grilles, appliance filters, etc.)
- Types of other building materials present and not visibly contaminated with dust, including:
  - Location (e.g. floor, wall, ceiling, countertop, etc.)
  - Surface porosity (porous vs non-porous)
  - Description of surface (e.g. marble countertop, painted drywall wall, etc.)
- Details of room contents, including:
  - Detailed inventory and description of contents (e.g. furnishings, objects, personal possessions) in known/suspect fentanyl-contaminated areas of building
  - Porosity of contents (porous or non-porous at surface)
  - Potential for dust to resist decontamination or to have penetrated contents due to surface features (e.g. cracks, openings, grooves, etc.)
- Components of HVAC system, where this can be determined without demolishing or removing building materials or moving building contents, including:
  - Locations of supply and return air grilles in contaminated areas
  - Types and locations of HVAC system components present in rooms or areas suspected of being contaminated (e.g. furnaces, air conditioners, fan coil units, variable air flow boxes, etc.) or in rooms connected to the same HVAC system as a room or area suspected of being contaminated
  - Types and locations of HVAC system components present in mechanical rooms
  - Locations of air ducts and direction of airflows
  - Locations at which air from suspect contaminated areas is exhausted from building
  - Type of HVAC air ducting used (e.g. flex duct, sheet metal ducting, presence of insulation inside ducting, etc.)

- Room layout, including locations and rough areas of observed dust, drugs or drug paraphernalia
- Operational status of the HVAC system at the time of the assessment (active or deactivated)
- Existing building/area security measures for preventing unauthorized access
- Evidence of fentanyl manufacturing, mixing, distribution, or consumption
- Evidence of other known hazards (e.g. electrical, hazardous chemicals6, extreme temperature, confined space, biological hazards, asbestos, lead-paint, mould, etc.)

3.4.2 Sampling

Surface wipe sampling and air sampling are tools that can be used to assist in the on-site evaluation. Refer to **Section 3.3.3** and **Appendix E** for further information on sampling. An example sampling plan is provided in **Appendix F**.

Suspect fentanyl-containing materials that are fully sealed/packaged should not be opened under any circumstances. Where necessary, sampling should be conducted to determine the presence of fentanyl contamination on the outer surface of the packaging. Sealed suspect materials should be decontaminated and disposed of as per the Guidance requirements or, if required, decontaminated, double-bagged, and released to law enforcement.

3.5 Preliminary Assessment Report

The preliminary assessment report documents the findings of the on-site evaluation, describing the condition of the contaminated site before remediation is undertaken. It should include the following sections:

- Background information
- Methodologies used for on-site evaluation, including:
  - Collection of visual/site observations
  - Use of direct-reading instruments
  - Collection of surface wipe sampling (where applicable)
  - Collection of air sampling (where applicable)
  - Collection of bulk hazardous building materials (where applicable)
- Preliminary site plan and floor plan
- Findings and conclusions:
  - Visual observations
  - Room-by-room inventory of contaminated materials
  - Sampling results for fentanyl, if applicable
  - Sampling results for hazardous building materials, if applicable

[6] Justice Institute of British Columbia. Fentanyl Safety for First Responders Website. *Fentanyl Clandestine Lab Precursors.*

- Remediation scope of work
- Appendices, as applicable and available:
  - HASP developed for the on-site evaluation
  - Copies of any laboratory certificates of analysis
  - Copies of any existing hazardous building materials survey reports

3.5.1 Background Information

The report should summarize the reason for completing the work, the objective of the work, and the information collected during the off-site evaluation.

3.5.2 Room-By-Room Inventory

The report should include information on the building materials used at the site, including the type of interior surfaces (e.g. walls, ceilings, floors, countertops) and a detailed inventory of all contents (e.g. furnishings, objects, personal possessions). The porous/non-porous natures of the surfaces and contents should be noted, along with any other findings that could complicate remediation. Areas and rooms not found to be contaminated should also be clearly identified.

3.5.3 Preliminary Site Plan

The preliminary site plan and/or floor plan should include the address, the layout of the property showing adjacent properties and structures, the size and location of all rooms, how rooms connect, and their use. The location of doors, windows, ventilation system components, appliances and other fixed or non-removable contents should also be noted.

3.5.4 Remediation Scope of Work Details

Many factors will affect the remediation scope of work. The type of site should be considered. For example, sites with other occupants nearby, such as private or public multiple-dwelling units (e.g. apartment building, motel) and commercial/retail sites require careful assessment when determining how much of a structure must be remediated and if other occupants need to vacate the building during the remediation or until the remediation is complete.

Other more specialized remediation environments will require entirely different considerations. For example, vehicles used to transport illicit drugs may become contaminated with fentanyl. The same general principles outlined in this Guidance will apply for the remediation of specialized environments such as vehicles. Use of a third-party consultant should be considered. A consultant can assist in ensuring site conditions are appropriately assessed, that risks are minimized and liability is reduced, and recommend ways to conduct work in a manner that does not endanger personnel or the public.

The scope of work should include the following:

- Room-by-room inventory of items that must be disposed of as waste, including:
  - All porous materials (e.g. upholstered furniture, curtains, bedding, clothing, etc.)
  - All items with a high potential for human contact that cannot be readily decontaminated (e.g. children's toys, bottles, food-preparation surfaces, etc.)
  - All fixtures or coverings that could absorb airborne fentanyl powder or that could hide or contain spaces where airborne fentanyl powder could have settled and cannot be easily or safely decontaminated (e.g. electrical outlets, outlet covers and electrical boxes, baseboards, trim, light fixtures, vent covers/grilles, appliance filters)
  - All hazardous materials and illicit drug manufacturing equipment
- Room-by-room inventory of site contents and structures to be decontaminated (e.g. walls, ceilings, floors, counters, air supply/return grills, doorknobs, etc.)
- Waste handling and disposal plan
- Remediation sampling plan, including:
  - Planned methodology for sampling during remediation work to monitor for contamination
  - General requirements for sampling should be consistent with those outlined in **Section 3.3.3**
- Requirements for documents to be submitted to client by contractor and/or consultant prior to start of work, including, but not limited to:
  - Identification of remediation contractor's project manager and site supervisor, proof of competency (e.g. training certificates, years of experience, etc.) and notice of who will perform post-remediation sampling, if applicable
  - Site-specific HASP, including emergency response plan
  - Site communication plan
  - Site security plan

4.0 Classification of Remediation Work Procedures

Handling fentanyl can be risky if the proper precautions are not taken. Generally, illicit fentanyl operations fall into three categories:

- Consumption
- Distribution
- Production

Consumption and distribution operations are typically considered low risk because the fentanyl is often found in tablet form. When fentanyl is compressed in tablet form there is a low inhalation risk since there is a very low probability of the product to become airborne and widespread throughout an environment. However, when considering consumption and/or distribution operations, the product may be consumed by inhalation from its powdered state, rather than in tablet form. The inhalation process involves adulterated powdered fentanyl being placed on a piece of foil and heated from below to generate vapours which are then inhaled.

The findings of the off-site and on-site evaluations will establish the extent and level of contamination from which a site-specific scope of work can be prepared. In most cases, a site-specific remediation scope of work will only be required for Level II and Level III contamination.

This Guidance describes three levels of fentanyl contamination:

- Level I = Low level of contamination
- Level II = Moderate level of contamination
- Level III = High level of contamination

Table 1 can be used as a general guidance for this ranking system. Each level of contamination has a corresponding remediation procedure which specifies the minimum requirements for PPE, equipment, control measures, and work procedures that should be followed to protect the personnel and others from exposure to fentanyl.

Table 1: Classification of Contamination Level and Required Remediation Work Procedures

Required Work Procedures	Description of Contamination Level
Level I (low risk) 	• Presence of a small quantity of intact tablets
Level II (moderate risk) 	• Presence of damaged tablets and/or visible powder • Quantity (impacted area) is larger than the size of a Toonie but less than 1 square metre (i.e. greater than 28 mm, but less than 1 m^2)  This Photo by Unknown Author is licensed under CC BY-SA
Level III (high risk) 	• Presence of packaging consistent with pure fentanyl and/or suspected tableting operations, and/or powder processing locations, and/or production of fentanyl • Contamination covering a surface of > 1 m^2; or • Contamination within HVAC system is known/suspected

5.0 Fentanyl Remediation Work Procedures

The objective of any fentanyl remediation work is to reduce the contamination level to non-detectable concentrations on surfaces and in the air, based on laboratory sample collection and analysis or measurements collected from direct-reading instrumentation. It is important to understand that many factors affect the extent of the remediation scope of work. These will vary from case-by-case, but the same general principles outlined in this Guidance are applicable.

5.1 Planning

During the preliminary assessment, the work procedures that must be followed will be established and the remediation scope of work and plan that satisfies all site-specific requirements will be prepared.

5.2 General Approach

All remediation work procedures should address the following five topics:

- Work area isolation
- Personnel protection
- Fentanyl decontamination procedures
- Personnel and equipment clean-up and decontamination
- Waste handling and disposal

5.3 Neutralization Solution

A neutralization solution [7,8] is used to destroy or inactivate fentanyl. To be effective, the neutralization solution must remain on contaminated surfaces for the prescribed contact time (the "neutralization time").

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7 Durnal, Evan Fentanyl Decontamination Studies Slide Deck. https://www.epa.gov/sites/production/files/2018-11/documents/decon_presentation_011.pdf.

8 United States EPA Fact Sheet: Fentanyl and Fentanyl Analogs. https://www.epa.gov/emergency-response/fact-sheet-fentanyl-and-fentanyl-analogs.

Neutralization solutions must not be used on skin. Use low-pH soap and water to decontaminate skin surfaces. When a neutralization solution is used on respirators, other PPE, or other sensitive equipment, rinse the equipment with water after the prescribed contact time.

5.4 Who Should Conduct the Remediation and Inspections?

5.4.1 Remediation Contractor

The remediation work procedures should be completed by a remediation contractor, as described in **Section 3.2.1**. Further information on how to retain a remediation contractor is provided in **Appendix B**.

5.4.2 Inspections

Inspections are strongly recommended for Level II (moderate risk) and Level III (high risk) remediation projects. Inspections should be conducted by an experienced and trained professional before, during, and after the remediation work to check that the area is safe for the personnel and the public. Both the third-party consultant and the remediation contractor may conduct the inspections concurrently, but it is important that the inspections are objective, and that one party does not influence the other. The findings of the inspections should be documented and signed by the individuals conducting the inspections. Further information on how to select a third-party consultant is provided in **Appendix C**.

This table further describes each type of inspection. Remediation procedures are further described in **Section 5.5**.

Table 2: Inspection Summary for Level II and Level III Remediation Procedures

Type of Inspection	Inspection Conducted By	Inspection Schedule	Objective of Inspection
Pre-Remediation	Third-party consultant (typically), as described in **Section 3.1.1**	Before starting any fentanyl remediation work	Check that appropriate hazard controls and all work procedures are in place and meet the requirements of the site-specific scope of work. At a minimum, the pre-remediation inspection must include a visual examination of the following components: • Work area signage and containment barriers, including checking the integrity of any required enclosures or barriers • Equipment and supplies, including PPE, to verify that the equipment available is appropriate, functional, and in sufficient quantities • Negative air ventilation system used is able to achieve and maintain the required negative air pressure levels Once the inspection has been completed and the work area has been deemed acceptable, the remediation work should proceed as per the procedures described in **Section 5.5**.
During Work	Site supervisor or another third-party consultant	Before each shift	If remediation is expected to require several consecutive hours of work, routine inspections should be arranged to check that the area is still safe for personnel. The prescribed hazard control measures must remain in place and continue to be effective, and the prescribed work procedures must continue to be followed in accordance with **Section 5.5** and the site-specific project scope of work. Any deficiencies identified during the inspection should be corrected before starting the work shift.
Post-Remediation	Third-party consultant	After the remediation work has been completed	To confirm the remediation was effective and evaluate the potential for building occupants to return to their space. More information on the requirements for the post-remediation inspection/assessment is provided in **Section 6.0**.

5.5 Remediation Work Procedures

This section of the Guidance outlines hazard control measures and work procedures for fentanyl-contaminated sites, facilities and structures for Level I, II, and III procedures.

Prior to conducting any remediation work activities, it is recommended that personnel review and understand the information provided in the following resources:

Alberta Health Services Naloxone Save Me Steps:

https://www.albertahealthservices.ca/info/Page16025.aspx

AB OHS Bulletins:

Naloxone in the Workplace: OHS information for workers and employers
https://open.alberta.ca/publications/9781460135846

Fentanyl – Protection of workers during remediation of illegal fentanyl labs
https://ohs-pubstore.labour.alberta.ca/ch075

Protection of workers from synthetic opioid (SO) exposure: OHS information for employers
https://open.alberta.ca/publications/9781460138632

5.5.1 Level I Procedures

5.5.1.1 Equipment

For Level I procedures, equipment may include, but is not limited to, the following:

- PPE for environments with minimal to low levels of contamination as detailed in Appendix D, including:
  - Disposable, chemical-resistant gloves
  - Disposable, particulate-impermeable coveralls, with boot covers that are integrated or sealed to coveralls (discretionary)
  - P100 filtering facepiece respirator (disposable or reusable half-face) (discretionary)
  - Non-vented or indirectly-vented safety goggles (discretionary)
  - Chemical-resistant rubber boots (discretionary)
- Naloxone kits with syringes or pre-packaged naloxone applicators containing enough doses and individual applicators for all personnel on site
- Resealable zippered freezer storage bags

- Impermeable containers suitable to receive and retain any fentanyl-contaminated materials until disposal at an approved site; containers should be both air- and water-tight and must be resistant to damage and rupture
- Neutralization solution
- Spray bottle to apply neutralization solution
- Highly absorbent wipes for PPE decontamination
- Impermeable, dust-proof waste containers (e.g. tear-proof plastic waste bags)
- Washing facilities consisting of a wash basin, clean water, low-pH soap, and towels

5.5.1.2 Work Area Isolation and Public/Personnel Protection (discretionary)

- Barriers and warning signs should be positioned in areas to restrict access of unauthorized personnel and the public until the work is complete
- Do not work alone (i.e. follow “buddy system”) for health monitoring reasons
- Adhere to the site-specific health and safety plan (HASP)

5.5.1.3 Decontamination Procedures

1. Personnel should put on (don) all required PPE before entering the work area. A second person should assist to ensure that all PPE is being worn correctly. Refer to **Appendix D** for guidance on donning PPE.
2. Enter the restricted area.
3. Gently spray the appropriate neutralization solution on any fentanyl powder or other solids (e.g. tablets), as well as all adjacent surfaces, until fully wetted. For the adjacent surfaces, the spray should cover a radius of at least 1 metre (m) beyond any area where fentanyl was detected or suspected to be present, based on the results of the preliminary site assessment. Be careful while spraying, to avoid making the powder airborne: be mindful of the spray velocity, angle, application method, etc.
4. Allow the necessary neutralization time to pass.
5. Gather neutralized tablets or powder (i.e. waste) as follows:
    a. Turn resealable zippered storage bag inside out.
    b. Place hand inside reversed storage bag (i.e. like a glove).
    c. Transfer waste into the storage bag.
    d. Invert storage bag and seal.
    e. Place storage bag into second resealable zippered storage bag and seal.
6. Place sealed zippered storage bags into impermeable waste container (e.g. tear-proof garbage bag).
7. Re-clean surface using the neutralization solution.

5.5.1.4 Personnel and Equipment Clean-Up and Decontamination

The steps below provide an overview of the clean-up and decontamination technique. Be sure to review and follow the additional guidance on PPE doffing techniques provided in **Appendix D**.

1. Remove PPE using proper doffing techniques to avoid incidental contact with the outer layers of the PPE.
2. Place all disposable PPE (including respirator cartridges) in an impermeable waste container and dispose of according to the requirements of Alberta Waste Control Regulation (Alberta Regulation 192/1996).
3. Wash hands with low-pH soap and water before leaving the work area and before bringing anything to your mouth (e.g. eating, chewing, drinking, or smoking). Do not use alcohol-based wipes/solutions or the neutralization solution on the skin.

5.5.1.5 Waste Handling and Disposal

Contact a provincial waste broker or hazardous waste management facility to dispose of waste in accordance with the Alberta Waste Control Regulation (Alberta Regulation 192/1996).

5.5.2 Level II Procedures

5.5.2.1 Equipment

In addition to the equipment prescribed for Level I procedures, the equipment that should be used during Level II procedures includes, but is not limited to the following:

- Wear PPE required for environments with moderate levels of contamination, as detailed in **Appendix D**, including:
  - Double-layered, disposable, chemical-resistant gloves
  - Disposable, particulate-impermeable coveralls with head covering and boot covers that are integrated or sealed to coveralls
  - Chemical-resistant rubber boots
  - Full-face respirator with P100 filters
- Encapsulant/sealant as required for polyethylene sheeting: non-toxic, non-flammable, water-insoluble
- Neutralization solution
- Encapsulant as required
- Sprayer for neutralization solution: low-pressure sprayer
- Sprayer for encapsulant as required: low-pressure sprayer
- Tear-proof polyethylene sheeting as required
- Spray glue
- Duct tape
- Air pressure monitoring device(s) (i.e. manometer), as required
- Vacuum cleaner equipped with a high-efficiency particulate air (HEPA) filter, di-octyl-phthalate/poly-alpha-olephin (DOP/PAO) tested on-site by an experienced and trained person
- Mops, cloths, brushes, water, and other supplies for clean-up
- Appropriate building supplies to construct enclosures/barriers as required

- Portable/construction air handling or exhaust units (“negative air units”) equipped with HEPA filters, DOP/PAO tested on-site by an experienced and trained person as required

5.5.2.2 Work Area Isolation and Public/Personnel Protection

- Use barriers and/or enclosures to restrict access to authorized personnel only, who are protected with proper PPE:
  - Completely isolate the contaminated work area from clean areas and the outdoors with tear-proof polyethylene sheeting sealed with spray glue and duct tape.
  - Position barriers at least 10 m away from the work area to allow sufficient working space, where possible.
  - Where the work area is accessible to the public, construct a solid barrier (e.g. construction hoarding).
- If required to isolate the work area (i.e. where existing walls/ceiling/floor do not exist or are unsuitable to isolate the contaminated work area), full enclosures should be erected. Full enclosures must be dust-impermeable and supported by a secure, adequate, and safe structure, with fully sealed joints and chambered airlock entryways/exits.
- A personnel decontamination unit must be attached to the work area with airlocks consisting of a dirty room, wash area with basin, clean water, low-pH soap and towels, clean change room, with curtained doorways at main entrance and at each room entry, and a lockable access door (if there is a risk of public entry when no personnel are present at the site).
- Where practical, construct a separate equipment and waste decontamination unit consisting of a holding room and wash room for removing equipment and waste material from the contaminated work area.
- If the preliminary assessment concluded that air handling system(s) are not contaminated with fentanyl, the system(s) should be removed from service and sealed to isolate the interior surfaces of the HVAC system components from the contaminated work area.
- Lock-out and isolate all other electrical and mechanical equipment in the work area.
- Supply electrical power for remediation work through a ground fault circuit interrupter (GFCI).
- Install HEPA-filtered exhaust unit(s) in the work area to provide negative pressure within the enclosure and contain the contaminants:
  - Each HEPA-filtered exhaust unit should be DOP/PAO tested on-site by an experienced and trained person before starting work.
  - HEPA-filtered exhaust units (DOP/PAO tested) should vent to the outdoors, unless not practical.
  - The negative pressure differential between the interior of the enclosure and the area outside the enclosure should be maintained at a minimum of 5 pascals (0.02 inches of water column) and continuously monitored with a manometer.
- Allow entry into and exit from the contaminated work area via the personnel decontamination unit only. All other means of access should be closed off, sealed, and locked where possible.

- Post signs warning of the danger of unprotected entry into the work area on the uncontaminated side of all doors and other access points available to the public.
- Lock the door to the personnel decontamination unit entrance, and the equipment and waste decontamination unit, at the end of each shift.
- Remove all equipment, materials, and waste from the contaminated work area through the equipment and waste decontamination unit, where possible. Personnel should not enter or exit the contaminated work area through the equipment and waste decontamination unit.
- A supervisor should be present at all times during the remediation work procedures.

5.5.2.3 Gross Decontamination and Removal Procedures

1. Do not use compressed air or dry sweeping to clean the contaminated work area.
2. Using a low-pressure sprayer filled with neutralization solution, gently spray the entire contaminated work area, including all surfaces of all porous and non-porous materials and all items marked “for disposal”. Spray visible powders, solids, liquids, and gels, as well as the exterior packaging of such materials, where present, until they are fully wetted. Spray the surface of building materials and non-porous contents on site until they are fully coated. Spray porous contents on site until the surface is wetted.
3. Spray surfaces adjacent to any area where fentanyl was detected or suspected to be present, based on the results of the preliminary site assessment. The spray should cover a radius of at least 1 m beyond the known/suspect contamination. Be careful while spraying, to avoid making the powders or liquids airborne: be mindful of the spray velocity, angle, application method, etc.
4. Spray the surfaces of all fixtures or coverings that could absorb airborne fentanyl powder or that could hide or contain spaces where airborne fentanyl powder could have settled and cannot be easily or safely decontaminated (e.g. electrical outlets, outlet covers and electrical boxes, baseboards, trim, light fixtures, vent covers/grilles, appliance filters, etc.). Before completing this work, check that all other hazards have been isolated (e.g. lock-out and tag-out electrical power supply to electrical sockets and boxes). Reference the project scope of work to check that all “inventory of items for disposal” are decontaminated.
5. Allow the necessary neutralization time to pass.
6. Spray surfaces behind and inside the removed fixtures and coverings.
7. Allow the necessary neutralization time to pass.
8. Following the scope of work’s “inventory of items for disposal”, place all items designated for disposal into tear-proof waste bags and seal with duct tape.
9. Apply neutralization solution to the exterior of the waste bags and allow the necessary neutralization time to pass.
10. Place waste bags inside a second waste bag (i.e. double-bag) and immediately transfer waste to the equipment and waste decontamination unit.
11. Regularly transfer waste bags from the equipment and waste decontamination unit to a designated waste storage bin outside of the enclosure. Lock the waste storage bin when it is unattended.

5.5.2.4 Residual Decontamination Procedures for Structural Elements and Surfaces

Residual decontamination may start once the gross decontamination and removal is completed.

1. Do not use compressed air or dry sweeping to clean the contaminated work area.
2. Use a vacuum equipped with a HEPA filter to clean loose dry material.
3. Clean all surfaces in the work area by damp-wiping and mopping with warm water until there is no visible residue. Follow these steps for damp-wiping:
   a. Use a folding technique to expose a clean surface of the cloth.
   b. Use each surface of the cloth one time only then dispose of it as contaminated waste.
4. Start damp-wiping in high locations and clean towards the floor. Begin at the point in the work area that is farthest from the personnel decontamination unit.
5. Minimize water pooling in the work area: collect wash water with a wet vacuum equipped with a HEPA filter.
6. After each area is cleaned, cordon off doors and openings to other rooms using polyethylene sheeting to avoid re-contamination.
7. Place waste into tear-proof waste bags at regular intervals and seal with duct tape. Double-bag and transfer all waste bags to the equipment and waste decontamination unit. Regularly transfer waste to designated waste storage bin. Lock the garbage storage bin when it is unattended.
8. Contact a provincial waste broker or hazardous waste management facility to dispose of waste in accordance with the Alberta Waste Control Regulation.

5.5.2.5 Equipment and Waste Decontamination and Handling

1. Surfaces of all non-disposable equipment and waste bags stored in the equipment and waste decontamination unit should first be cleaned with a vacuum equipped with a HEPA filter. Surfaces should then be wiped clean with cloths, sponges, or rags wetted with neutralization solution. Allow the required neutralization time then wipe clean with cloths, sponges, or rags.
2. Seal intakes and exhausts of HEPA-filtered exhaust fans before removing them from the work area. Apply the neutralization solution to the HEPA filters and dispose of as hazardous waste.
3. Before removing any non-disposable equipment and waste garbage bags from the work area, complete clearance sampling on representative surfaces to check for any residual contamination (see **Section 5.5.2.7**). If contamination is detected, the cleaning should be repeated until no contamination is detected.
4. Place the waste bags in impermeable containers or in designated waste storage bin for transportation to an off-site landfill.
5. Contact a provincial waste broker or hazardous waste management facility to dispose of waste in accordance with the Alberta Waste Control Regulation.

5.5.2.6 Personnel Decontamination

1. Before leaving the work area, remove gross contamination from disposable protective clothing by wet-wiping and/or using a vacuum equipped with a HEPA filter.
2. Leave the respirator on and enter the dirty room of the decontamination unit, remove disposable protective clothing and place into tear-proof waste bags and seal with duct tape. Double-bag and transfer all waste bags to the equipment and waste decontamination unit.
3. In the wash room of the decontamination unit, wash hands, face, and respirator prior to respirator removal, then wash face and hands again after removing respirator before leaving the wash room and entering the clean room.
4. Don street clothes in the clean room prior to leaving work site.

5.5.2.7 Post-Remediation Assessment and Clean-Up

1. Following remediation, post-remediation samples should be collected according to the prepared sampling plan within the remediation area to determine if the remediation is acceptable. The customized sampling plan may incorporate the use of field detection techniques (e.g. ion mobility spectroscopy analyzer or fentanyl test kit), as well as the collection and laboratory analysis of surface wipe/swab/air samples.
2. If contamination is detected, repeat the cleaning steps until post-remediation sampling demonstrates that no contamination is detected.
3. If post-remediation sampling reveals no concerns, spray barriers with encapsulant/sealant, remove barriers/enclosures by rolling them towards the centre of the work area.
4. Do not install new trim, fixtures, etc. until all barriers/enclosures have been removed and the surfaces of all building materials are fully dry.

5.5.3 Level III Procedures

5.5.3.1 Equipment

In addition to the equipment prescribed for Category II procedures, the equipment that should be used during Level III procedures may include, but is not limited to the following:

- Wear PPE for high level of contamination as detailed in **Appendix D**, including:
  - Double-layered, disposable, chemical-resistant gloves
  - Disposable, particulate-impermeable coveralls with head covering and boot covers that are integrated or sealed to coveralls
  - Chemical-resistant rubber boots
  - Full-face respirator with P100 filters, powered air-purifying respirator with P100 filters, **or** self-contained breathing apparatus
- Equipment and waste decontamination unit consisting of a clean room, holding room, and wash room for removing equipment and waste material from the contaminated work area

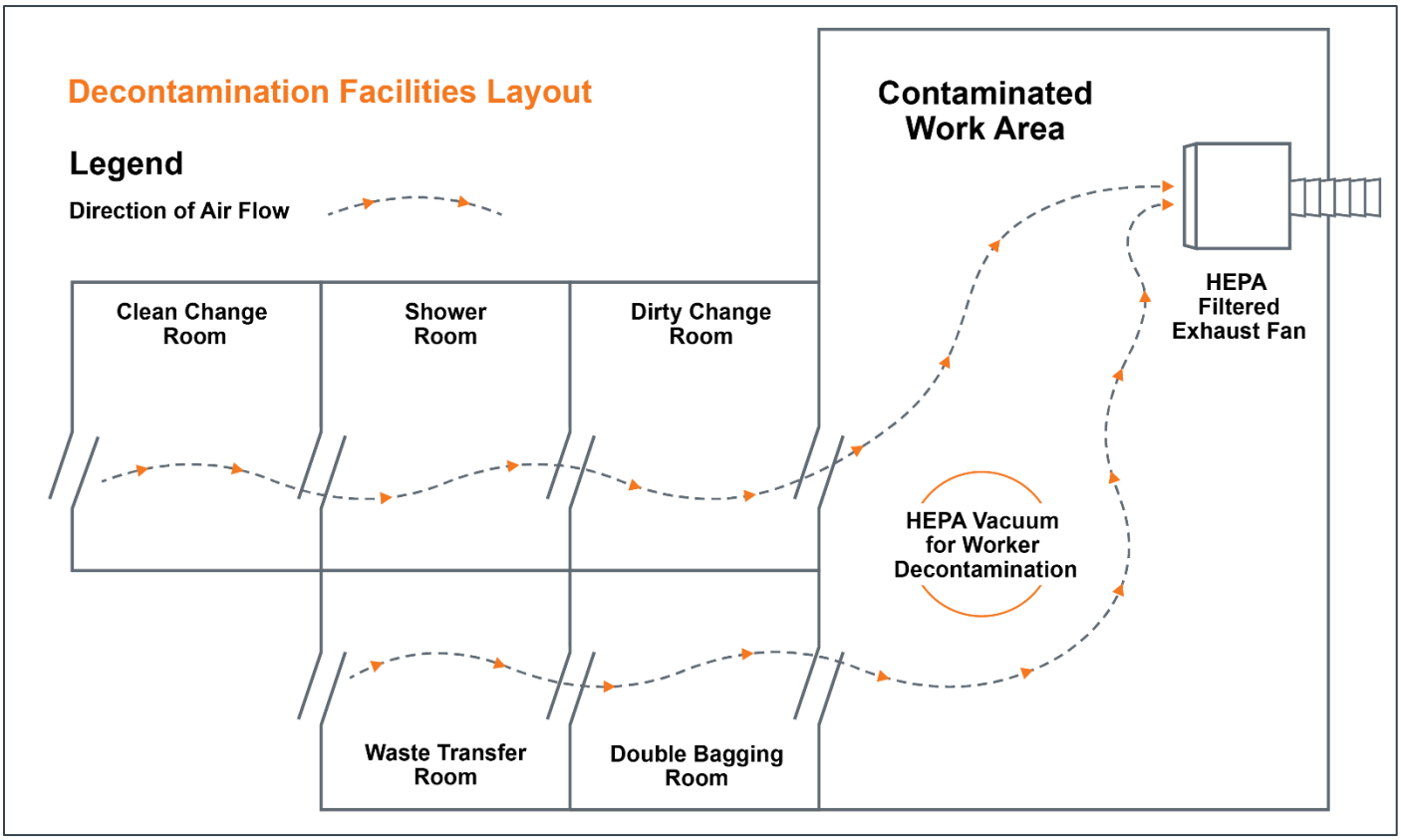
5.5.3.2 Work Area Isolation and Public/Personnel Protection

- Use barriers and/or enclosures to restrict access to authorized personnel only, who are protected with proper PPE:
  - Completely isolate the contaminated work area from clean areas and the outdoors with tear-proof polyethylene sheeting sealed with spray glue and duct tape.
  - Position barriers at least 10 m away from the work area to allow sufficient working space.
  - Where the work area is accessible to the public, construct a solid barrier should be constructed (e.g. construction hoarding).
- If required to isolate the work area (i.e. where existing walls/ceiling/floor do not exist or are unsuitable for isolation of contaminated work area), full enclosures should be erected. Full enclosures must be dust impermeable and supported by a secure, adequate, and safe structure, with fully sealed joints and chambered airlock entryways/exits.
- Set up a three-stage personnel decontamination unit with airlocks, consisting of a dirty room, shower with hot and cold water, low-pH soap and towels, and a clean change room.
- If the air handling system(s) is determined to be part of the clean area (i.e. it is identified as uncontaminated), it should be removed from service and sealed to isolate it from the work area.
- Lock-out and isolate all other electrical and mechanical equipment in the work area.
- Supply electrical power for remediation work through a ground fault circuit interrupter (GFCI)
- Install HEPA-filtered exhaust unit(s) in the work area to provide negative pressure within the enclosure and contain the contaminants. Check that the work area is properly isolated by ensuring the air flows from outside the work area into the contaminated area for the entire duration of the project.
  - Each HEPA-filtered exhaust unit should be DOP/PAO tested on-site by an experienced and trained person before starting work.
  - The HEPA-filtered exhaust units (DOP/PAO tested) should vent to the outdoors.
  - The negative pressure differential between the interior of the enclosure and the area outside of the enclosure should be maintained at a minimum of 5 pascals (0.02 inches of water column) and continuously monitored and recorded with a digital manometer.
- Allow entry into and exit from the contaminated work area via personnel decontamination unit only. All other means of access should be closed off, sealed, and locked where possible.
- Post a sign warning of the danger of unprotected entry into the work area on the uncontaminated side of all doors and other access points available to the public. A sign must be posted at all times, for the entire duration of the project.
- Lock the door to the personnel decontamination unit entrance, and the equipment and waste decontamination unit, at the end of each shift.
- Remove all equipment, materials, and waste from the contaminated work area through the equipment and waste decontamination unit. Personnel should not enter or exit the contaminated work area through the equipment and waste decontamination unit.

- An experienced and trained supervisor should be present at all times during the remediation work procedures

An example of Category III procedure work area layout is provided in Figure 2.

Figure 2: Level III Procedure Work Area Layout



Source: Adapted with permission from *EACO Lead Guideline for Construction, Renovation, Maintenance or Repair*. October 2014.

5.5.3.3 Decontamination and Removal Procedures for HVAC System

This procedure should always be completed first, before gross and residual remediation.

A proficient HVAC remediation contractor should complete the project's scope of work as required, in accordance with the National Air Duct Cleaning Association (NADCA) ACR, *The NADCA Standard for Assessment, Cleaning, and Restoration of HVAC Systems* 2013.

If the scope of work requires the HVAC system to be removed and replaced, the following general approach should be followed:

1. Apply neutralization solution to thoroughly coat the interior of the ducting as far as possible.
2. Allow the necessary neutralization time to pass.
3. Remove the section of the ducting by cutting it well within the section of ducting wetted on the interior to minimize generation of airborne dust. Use hand tools where possible for cutting ductwork.
4. Place cut sections of ducting into tear-proof waste bags, seal bags with duct tape, then wrap and fully seal in tear-proof, polyethylene sheeting.
5. Place waste bags inside a second waste bag (i.e. double-bag) and immediately place waste in the equipment and waste decontamination unit. Transfer the waste in the decontamination unit to the designated waste storage bin on a regular basis.

5.5.3.4 Gross Decontamination and Removal Procedures

1. Do not use compressed air or dry sweeping to clean the contaminated work area.
2. Using a low-pressure sprayer filled with neutralization solution, gently spray the entire contaminated work area, including all surfaces of all porous and non-porous materials and all items marked “for disposal”. Spray visible powders, solids, liquids, and gels, as well as the exterior packaging of such materials, where present, until they are fully wetted. Spray the surface of building material and non-porous contents on site until they are fully coated. Spray porous contents on site until the surface is wetted.
3. If HVAC remediation is required, complete this as per **Section 5.5.3.3**.
4. Spray surfaces adjacent to any area where fentanyl was detected or suspected to be present, based on the results of the preliminary site assessment. The spray should cover a radius of at least 1 m beyond the known/suspect contamination. Be careful while spraying, to avoid making the powders and liquids airborne: be mindful of the spray velocity, angle, application method, etc.
5. Spray the surfaces of all fixtures or coverings that could absorb airborne fentanyl powder or that could hide or contain spaces where airborne fentanyl powder could have settled and cannot be easily or safely decontaminated (e.g. electrical outlets, outlet covers and electrical boxes, baseboards, trim, light fixtures, vent covers/grilles, appliance filters, etc.). Before completing this work, check that all other hazards have been isolated (e.g. lock-out and tag-out electrical power supply to electrical sockets and boxes). Reference the project scope of work to check that all “inventory of items for disposal” are decontaminated.
6. Allow the necessary neutralization time to pass.
7. Spray surfaces behind and inside the removed fixtures and coverings.
8. Allow the necessary neutralization time to pass.
9. Following the scope of work’s “inventory of items for disposal”, place all items designated for disposal into tear-proof waste bags and seal with duct tape.
10. Apply neutralization solution to the exterior of the waste bags and allow the necessary neutralization time to pass.
11. Place waste bags inside a second waste bag (i.e. double-bag) and immediately transfer waste to the equipment and waste decontamination unit.

12. Regularly transfer waste bags from the equipment and waste decontamination unit to a designated waste storage bin outside of the enclosure. Lock the garbage storage bin when it is unattended.

5.5.3.5 Residual Decontamination Procedures for Structural Elements and Surfaces

Residual decontamination may start once the gross decontamination and removal is completed.

1. Do not use compressed air or dry sweeping to clean the contaminated work area.
2. Use a vacuum equipped with a HEPA filter to clean loose dry material.
3. Clean all surfaces in the work area by damp-wiping and mopping with warm water until there is no visible residue. Follow these steps for damp-wiping:
    a. Use folding technique to expose a clean surface of the cloth.
    b. Use each surface of a cleaning cloth one time only and dispose of it as contaminated waste.
4. Start damp-wiping in high locations and clean towards floor. Begin at the point in the work area that is farthest from the personnel decontamination unit.
5. Minimize water pooling within the work area: collect wash water with a wet vacuum equipped with a HEPA filter.
6. After each area is cleaned, cordon off doors and openings to other rooms using polyethylene sheeting to avoid re-contamination.
7. Place waste into tear-proof waste bags at regular intervals and seal with duct tape. Double-bag and transfer all waste bags to the equipment and waste decontamination unit. Regularly transfer waste to designated waste storage bin. Lock the garbage storage bin when it is unattended.
8. Contact a provincial waste broker or hazardous waste management facility to dispose of waste in accordance with the *Alberta Waste Control Regulation*.

5.5.3.6 Equipment and Waste Decontamination and Handling

1. Surfaces of all non-disposable equipment and fentanyl waste garbage bags stored in the equipment and waste decontamination unit should first be cleaned with a vacuum equipped with a HEPA filter. Surfaces should then be wiped clean with cloths, sponges, or rags wetted with neutralization solution. Allow the required neutralization time (see **Section 5.3**) then wipe clean with cloths, sponges, or rags.
2. Seal intakes and exhausts of HEPA-filtered exhaust fans before removing them from the work area.
3. Before removing any non-disposable equipment and fentanyl waste garbage bags from the work area, complete clearance sampling on representative surfaces to check for any residual contamination (see **Section 5.5.3.7**). If contamination is detected, the cleaning should be repeated until no contamination is detected.
4. Place the waste garbage bags in impermeable containers or in garbage storage bin for transportation to an off-site landfill.
5. Contact a provincial waste broker or hazardous waste management facility to dispose of waste in accordance with the *Alberta Waste Control Regulation*.

5.5.3.7 Personnel Decontamination

1. Before leaving the work area, remove gross contamination from disposable protective clothing by wet-wiping and/or using a vacuum equipped with a HEPA filter.
2. Leave the respirator on and enter the dirty room of the decontamination unit, remove disposable protective clothing and place into tear-proof waste bags and seal with duct tape. Double-bag and transfer all waste bags to the equipment and waste decontamination unit.
3. In the shower room of the decontamination unit, shower without removing respirator and clean respirator while in the shower.
4. In the clean room of the decontamination unit, remove respirator and don street clothes in clean area prior to leaving work site.

5.5.3.8 Post-Remediation Assessment and Clean-Up

1. Following remediation, post-remediation samples should be collected according to the prepared sampling plan within the remediation area to determine if the remediation is acceptable. The customized sampling plan may incorporate the use of field detection techniques (e.g. ion mobility spectroscopy analyzer or fentanyl test kit), as well as the collection and laboratory analysis of surface wipe/swab/air samples.
2. If contamination is detected, repeat the cleaning steps until no contamination is detected.
3. If post-remediation sampling reveals no concerns, spray barriers with encapsulant/sealant, remove barriers/enclosures by rolling them towards the centre of the work area.
4. Do not install new trim, fixtures, etc. until barriers/enclosures have been removed and the surfaces of all building materials are fully dry.

5.5.4 Special Circumstances – Vehicle Decontamination Procedures

5.5.4.1 Equipment

The equipment that should be used during vehicle decontamination procedures includes, but is not limited to the following:

- Wear PPE required for environments with moderate levels of contamination, as detailed in **Appendix D**, including:
  - Double-layered, disposable, chemical-resistant gloves
  - Disposable, particulate-impermeable coveralls with head covering and boot covers that are integrated or sealed to coveralls
  - Chemical-resistant rubber boots
  - Full-face respirator with P100 filters
- Naloxone kits for all personnel completing the decontamination
- Highly-absorbent wipes for PPE decontamination
- Washing facilities consisting of a wash basin, clean water, low-pH soap, and towels
- Neutralization solution

- Sprayer for neutralization solution: low-pressure sprayer
- Hollow tubing for electrostatic sprayer, suitable for conveyance of neutralization solution onto surfaces of vehicle HVAC system.
- Vacuum cleaner equipped with a high-efficiency particulate air (HEPA) filter, di-octyl-phthalate/poly-alpha-olephin (DOP/PAO) tested on-site by an experienced and trained person
- Mops, cloths, brushes, water, and other supplies for clean-up
- Designated waste storage bin; should be dust-impermeable containers suitable to receive and retain any fentanyl-contaminated materials until disposal at an approved site; containers should be both air- and water-tight and must be resistant to damage and rupture.

5.5.4.2 Work Area Isolation and Public/Personnel Protection

- Use barriers to isolate the contaminated vehicle and to restrict access to unauthorized personnel.
- Do not work alone (i.e. follow “buddy system”) for health monitoring purposes.
- Adhere to the established site-specific health and safety plan (HASP).

5.5.4.3 Vehicle Interior Decontamination and Removal Procedures

1. Do not use compressed air or dry sweeping to clean the contaminated vehicle.
2. All spraying of neutralization solution should be done using a low-pressure sprayer filled with neutralization solution.
3. Gently spray the entire interior of vehicle with neutralization solution, including all surfaces of all porous and non-porous materials until the surfaces are fully wetted. Ensure areas below vehicle seating including underside of seating, are sprayed.
4. Allow the necessary neutralization time to pass.
5. Remove any unfixed, porous materials from the interior of the vehicle and place all items into tear-proof waste bags and seal with duct tape.
6. Unbolt vehicle seating, and gently lift seating to access underside of seating.
7. Using low-pressure sprayer filled with neutralization solution, gently spray underside of vehicle seating. Also spray all surfaces previously below seating.
8. Allow the necessary neutralization time to pass.
9. Lift vehicle floormats. Using low-pressure sprayer filled with neutralization solution, spray underside of floor mats and surfaces below floormats.
10. Allow the necessary neutralization time to pass.
11. Remove floormats and seating. Place floormats into tear-proof waste bags and seal with duct tape.
12. Re-spray surfaces previously under floormats and seating and allow the necessary neutralization time to pass.
13. Remove carpeting from vehicle surfaces, and place into tear-proof waste bags and seal with duct tape.

14. Spray surfaces previously under carpeting and allow the necessary neutralization time to pass.
15. Remove any other porous materials from the interior of the vehicle and place all items into tear-proof waste bags and seal with duct tape.
16. Spray surfaces previously under any such additional porous items, and allow the necessary neutralization time to pass.
17. Clean all non-porous surfaces by damp-wiping with warm water until there is no visible residue. Follow these steps for damp-wiping:
    a. Use folding technique to expose a clean surface of the cloth.
    b. Use each surface of a cleaning cloth one time only and dispose of it as contaminated waste.
18. Place waste into tear-proof waste bags at regular intervals and seal with duct tape. Double-bag and transfer all waste bags to the designated waste storage bin and close bin.

5.5.4.4 Decontamination and Removal Procedures for Vehicle HVAC System

The following general approach should be followed:

1. Apply neutralization solution to thoroughly coat the interior of the vehicle heating ventilation and air conditioning (HVAC) system, including any filter, ducting fans and grilles. Consider the use of an electrostatic sprayer to ensure even application to all surfaces.
2. Allow the necessary neutralization time to pass.
3. Place waste bags inside a second waste bag (i.e. double-bag waste), immediately place waste in the designated waste storage bin, and close bin.

5.5.4.5 Post-Remediation Assessment

1. Following remediation, post-remediation samples should be collected according to the prepared sampling plan within the interior of the vehicle to determine if the remediation is acceptable. The customized sampling plan may incorporate the use of field detection techniques (e.g. ion mobility spectroscopy analyzer), as well as the collection and laboratory analysis of surface wipe or air samples, where appropriate. Approximately 20-30 samples should be collected from vehicle surfaces to confirm all surfaces have been effectively decontaminated.
2. If contamination is detected, repeat the cleaning steps and conduct a full re-test of 20-30 samples until no contamination is detected.

5.5.4.6 Equipment Decontamination

1. Surfaces of all non-disposable equipment should initially be cleaned with a vacuum equipped with a HEPA filter. Surfaces should then be wiped clean with cloths, sponges, or rags wetted with neutralization solution. Allow the required neutralization time to pass and then wipe clean, as necessary, with cloths, sponges, or rags dampened with water.

5.5.4.7 Waste Handling

1. All waste should be handled while wearing the appropriate PPE.
2. Place waste into tear-proof waste bags at regular intervals and seal with duct tape. Double-bag and transfer all waste bags to the designated waste storage bin.
3. Contact a provincial waste broker or hazardous waste management facility to dispose of waste in accordance with the Alberta Waste Control Regulation.
4. Release waste directly to the care of provincial waste broker or hazardous waste management facility. Keep waste stored securely until release.

5.5.4.8 Personnel Decontamination

1. With respirator on, move away from vehicle to an open area near waste bin and remove gross contamination from disposable protective clothing and respirator by wet-wiping exterior with cloths, sponges or rags dampened with neutralization solution and using a vacuum equipped with a HEPA filter.
2. Allow the necessary neutralization time.
3. With respirator on, remove disposable protective clothing and place into tear-proof waste bags and seal with duct tape. Double-bag and transfer to the designated waste storage bin.
4. Proceed immediately to the washing facility. Wash hands, respirator and exposed surfaces of face and neck prior to respirator removal. Wash hands and face again after removing respirator and before leaving work site.

6.0 Post-Remediation Assessment

6.1 Who Should Conduct the Assessment?

Following remediation, a third-party consultant should complete a visual assessment and collect post-remediation samples (if planned). The purpose of this assessment is to determine if the remediation was effective. Refer to **Appendix C** for details on retaining a third-party consultant.

To complete the post-remediation assessment, the project's scope of work and health and safety plan (HASP) should first be reviewed.

If the post-remediation assessment determines that contamination is still present, further remediation activities are required and additional post-remediation samples should be collected (if planned). This process must be repeated until no contamination is detected. If contracted, the third-party consultant should prepare a post-remediation report to document that the property has been satisfactorily remediated as described in **Section 6.6**.

There are many tools available to assist in the determination of the effectiveness of the remediation such as monitoring (or observations made) during remediation activities, visual assessment following remediation activities, and surface wipe and air sampling methodologies. Further information is provided below.

6.2 Monitoring During Remediation

As noted in **Section 5.4.2**, inspections should be conducted by an experienced and trained person before, during, and after the remediation work to check that the area is safe for the personnel and the public.

If remediation is expected to require several consecutive hours of work, routine inspections should be arranged to check that the area is still safe for personnel and the public. The prescribed hazard control measures must remain in place and continue to be effective, and that the prescribed work procedures must continue to be followed in accordance with Section 5.5 and the site-specific project scope of work. Any deficiencies identified during the inspection should be corrected before starting the work shift.

Observations made during these inspections can assist in determining the effectiveness of the remediation.

6.3 Visual Assessment

The work area passes the visual assessment if there is no visible dust or debris on any surfaces. Closely inspect areas that are difficult to access or clean, such as corners or rough surfaces. The presence of any dust, debris, or other residues indicates that the cleaning was insufficient. Additional cleaning is therefore required. A follow-up visual assessment is required after each additional cleaning.

6.4 Sampling

Follow the post-remediation sampling requirements as detailed in the customized sampling plan, if warranted. Refer to **Appendix E** for sampling guidance.

6.5 Current Benchmark for Demonstrating Effective Remediation

Where fentanyl contamination is known, or suspected, to be present, it is important to have a benchmark that can be used to indicate that remediation efforts have successfully reduced fentanyl to non-detectable concentrations on surfaces and/or in the air. In some cases, air sampling for fentanyl in conjunction with surface sampling may be needed to determine whether an area has been adequately remediated.

The lowest limit of detection for fentanyl and fentanyl citrate currently available by laboratory analysis Sampling Methodology for LZ-SOP-00259/2, and two real-time presumptive tests, Thermal Desorption Direct Analysis in Real Time Mass Spectrometry (TD-DART-MS) and Ion Mobility Spectroscopy (IMS) is **1 nanogram[9].** Using this sampling methodology, the measure of effective remediation is:

- <1.0 ng per 100 square centimetres (ng/100 cm^2) for surface wipe samples[10]
- Non-detectable for TD-DART-MS and IMS

A measure of effective remediation is if post-remediation sampling results are below the lowest limit of detection for the chosen sampling methodology.

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[9] Sisco E, et al. *Rapid detection of fentanyl, fentanyl analogues, and opioids for on-site or laboratory based drug seizure screening using thermal desorption DART-MS and ion mobility spectrometry.* Forensic Chemistry 4 (2017) 108-115. https://www.ncbi.nlm.nih.gov/pubmed/29251300

[10] *Method LZ SOP-00504*. Bureau Veritas Laboratories https://orders.bvlabs.com/search-sampling-guide/?method_name=FENTANYL

6.6 Documentation and Reporting

If a third-party consultant or contractor was retained, the remediation process should be well documented including a post-remediation summary report. The post-remediation assessment report documents the conditions of the site after remediation was completed. It should include the following sections:

- Background information
- Methodologies used, including:
  - Collection of visual observations
  - Use of direct-reading instruments
  - Collection of surface wipe sampling (where applicable)
  - Collection of air sampling (where applicable)
- Floor plan identifying sampling locations

- Findings and conclusions:
  - Visual observations
  - Sampling results for fentanyl
  - A clear statement as to whether the property has been remediated satisfactorily to meet the established re-occupancy criteria
- Copies of laboratory certificates of analysis for any collected samples analyzed at a laboratory

The post-remediation report should be reviewed and signed-off by a proficient third-party.

Appendices

Appendix A Definitions

Airlock	Formed when two **curtained doorways** are placed a distance apart.
Air Monitoring	The process of measuring airborne fentanyl particulate levels in a specified area or in the breathing zone of a personnel over time, in accordance to a validated air sampling method.
Clean Room	The uncontaminated area of a decontamination unit where personnel change from their “uncontaminated” PPE and back into their street clothes. It is adjacent to the wash area and opens to the outside of the decontamination unit.
Contaminated Material	Any material, surface, personal possession that is known (or suspected) to be contaminated with fentanyl in solid, powder, liquid or gel form.
Contaminated Site	A site that is known or suspected to contain fentanyl-contaminated materials and surfaces that are actually or potentially hazardous to health of the occupants.
Curtained Doorway	A device allowing movement of persons from one room to another while minimizing air movement between those rooms. Curtained doorways are typically constructed by overlapping two sheets of polyethylene over an existing or temporarily framed doorway then securing each sheet along the top of the doorway and both vertical edges. The door flaps must be constructed to allow make-up air to flow into the containment area.
Dirty Room	A room adjacent to the contaminated containment work area where personnel dispose of waste or remove PPE before entering the wash area.
Dioctyl Phthalate	DOP or dioctyl phthalate is a liquid chemical which produces mono- or poly-dispersed test aerosol of sub-micron particles, generated to challenge (evaluate integrity of) HEPA filters.
DOP/PAO Testing	Testing of equipment fitted with high efficiency particulate air (HEPA) filters, such as vacuum cleaners and negative pressure units, after the HEPA filter has been installed. The test is used to determine whether there are imperfections in the filter or in the seal between the filter and the cabinet frame. An aerosol producing **dioctyl phthalate (DOP)** or **poly alfa olefin particles (PAO)**, 0.3 µm in diameter or larger, is introduced on the upstream side of the HEPA unit. If more than 0.03% of aerosol particles are detected with a photometer on the downstream side, the filter must be repaired or changed, and the equipment retested.

Encapsulation	Process of applying a surface sealant to create a physical barrier that will decrease or eliminate potential exposure to any residual contaminants that may remain following decontamination. This is not a substitute for cleaning.
Enclosure	Impermeable barriers installed to completely seal off the contaminated work area from the outside environment and inhibit the movement of fentanyl particulate.
Equipment and Waste Transfer Area	Allows for the removal of fentanyl-contaminated waste material and equipment. This area is separate from the personnel decontamination area, typically consisting of a wash area and clean room, with an airlock between each room.
Fentanyl Clandestine Drug Lab	Where illicit fentanyl is manufactured or produced.
Fentanyl Powder Processing	Where illicit fentanyl powder is mixed into counterfeit heroin or other drugs.
Fentanyl Tableting Operation	Where illicit fentanyl powder is mixed and then pressed into commercial tableting machines to produce counterfeit tablets.
High-Risk Handling	Includes packaging consistent with pure fentanyl, suspected tableting operations, suspected powder processing locations, evidence of PPE use, or synthesis locations where fentanyl may be being produced (**clandestine drug lab**).
High-Use Area	An area in a property that can be easily accessed and is regularly used by adults and children.
Independent	The absence of any relationship that could threaten the impartiality of a person or organization based on ownership, governance, management, personnel, shared resources, finances, contracts, marketing (including branding), and payment of a sales commission or other inducement for the referral of new clients.
Limited-Use Area	An area that is likely to be accessed only by adults and for short periods of time. This includes crawl spaces and wall cavities not used as duct runs that are unlikely to be renovated.
Naloxone	Naloxone, sold as Narcan and other names, is a medication used to block the effects of opioids, especially in overdose. It may be combined with an opioid (in the same tablet) to decrease the risk of opioid misuse. Naloxone works within two to five minutes (if administered intravenously or injected into muscle). Can also be administered by spraying into nose. The effects of naloxone last up to an hour. Multiple doses may be required, as the duration of action of most opioids is greater than that of naloxone.
Negative Air Pressure System	Reduced air pressure within the contaminated work area compared to the ambient air pressure, produced by using negative air units. Prevents contaminated air from leaking out of the work area.
Neutralization Time	The time the neutralization solution must stay in place to effectively destroy fentanyl.

Poly Alfa Olefin	PAO or poly alfa olefin is a mono- or poly-dispersed test aerosol of submicron particles, generated to challenge (evaluate integrity of) HEPA filters.
Preliminary Assessment	The process to determine the presence or absence of fentanyl, or the extent and magnitude of contamination if fentanyl is present in a property/site. The preliminary assessment is completed by an experienced or trained person.
Remediation	Removal of a hazardous substance from an environment.
Sampling Plan	A plan detailing the methodology, type, number, and location of samples to be collected. The plan should follow occupational hygiene protocols and be prepared by an experienced or trained person, as defined by the Alberta OHS Act.
Three-Stage Decontamination Unit	A decontamination enclosure system for personnel to use to prevent the spread of fentanyl particulate beyond the contaminated work area. It includes a dirty room, a wash room/area, and a clean room, with an airlock between each room.

Appendix B How to Select a Remediation Contractor

The remediation contractor has a critical role in ensuring the work is completed safely and that all personnel and the public are not at risk of fentanyl exposure during or after the remediation process. For this reason, retaining an experienced and trained contractor is a key element in ensuring the successful remediation of fentanyl-contaminated sites.

The following additional guidance is provided to assist property owners and/or their designated representatives and other agencies in evaluating the suitability of a remediation contractor for planned fentanyl work.

Core Competencies

All fentanyl remediation contractor project teams should demonstrate knowledge, experience, and ability in the following core competencies, which are organized below into three key domains.

Project Planning and Execution

- Reviewing project specifications documents and blueprints, including for heating, ventilation and air conditioning (HVAC) systems, to determine project requirements and identify potential impediments or hazards associated with remediation work.
- Safely performing initial on-site assessments of contaminated sites to determine site-specific requirements for remediation work.
- Visually identifying contamination from fentanyl and its analogues, in all possible forms (e.g. tablet, powder, liquid).
- Determining what areas may be contaminated based on visually-identified contamination.
- Developing a sampling plan and conducting sampling for fentanyl contamination (if performing the preliminary assessment of site).
- Interpreting sampling results to determine areas that require remediation.
- Developing and executing a remediation plan in consultation with site owner/management, including contingency and emergency response planning and scheduling/phasing.
- Development of a site-specific project HASP/safe work procedures in compliance with the Alberta OHS legislation.
- Maintaining daily work logs and completing regular progress reports.
- Obtaining appropriate permits and forms for the work and communicating, as required, with governmental agencies/representatives.
- Developing and executing procedures in case of work site emergency.

- Designing and implementing effective site controls, including measures for isolating work area from surrounding areas of site.
- Effectively isolating and maintaining isolation of work areas from surrounding areas of site.
- Properly operating and maintaining equipment required for remediation, including portable narcotics scanner, if used.
- Conducting on-site inspections of site controls, equipment, and supplies to verify that controls are properly implemented and maintained.
- Performing fentanyl cleaning procedures, including minimizing generation of airborne fentanyl.
- Properly and safely decontaminating any contaminated equipment, PPE, and personnel.
- Providing contractor personnel with sufficient training on work procedures and codes of practice to be proficient at the tasks they are assigned.
- Evaluating competency of contractor personnel and only allowing experienced and trained personnel on the work site.
- Establishing clear communication between project stakeholders and within and between contractor personnel to prevent errors or misunderstandings.
- Working as an effective team with subtrades, site owners/management, and third-party consultants to achieve project goals, including effective communication and coordination.

<u>Health, Safety, and Security</u>

- Inspecting a work site to identify actual site conditions, including all health and safety hazards and/or impediments to work.
- Effectively correcting any identified hazards/impediments present at site.
- Maintaining site security to prevent unauthorized access to work area.
- Ensuring adequate protection of authorized site visitors.
- Checking for proper use, maintenance, decontamination, and disposal of personnel PPE, including:
    - Fitting, fit testing, using, cleaning, and maintaining respirators
    - Replacing the respirator filter
    - Using disposable protective clothing (e.g. gloves, coveralls, etc.)
    - Decontaminating and removing PPE when exiting work area
- Identifying and correcting improper use of PPE.
- Identifying health and safety hazards on-site, both related to fentanyl and in general (e.g. electrical, mechanical, chemical, physical, biological, etc.).
- Monitoring contractor's personnel to check that they are properly following procedures and protocols for fentanyl remediation, as per Alberta OHS legislation. Providing corrections as necessary.
- Recognizing potential health problems in personnel and providing basic first aid when identified, including administering naloxone where personnel exhibit symptoms of exposure and rotating personnel to avoid heat-related distress.

Hazardous Waste Management

- Using proper methods and procedures for handling contaminated waste generated within work area to minimize contamination of other site areas or exposure to personnel.
- Properly disposing and transporting contaminated waste from work area to end receiver, including completion of required permits/forms.

All contractor personnel should be able to demonstrate knowledge of the following:

- Health hazards of fentanyl, including pathways of entry into the body, symptoms of exposure, appropriate methods for limiting exposure, and actions to be taken in case of accidental exposure.
- Requirements, responsibilities, and rights under applicable Alberta OHS legislation.
- Legislative requirements for fentanyl remediation in Alberta.
- Required materials and equipment for remediation work.
- Required measures for isolating work area and maintaining the work area isolation, including proper use of negative air equipment.
- Required measures/controls for protecting remediation personnel.
- Required measures/controls for protecting site staff and containing fentanyl within work areas.
- Common safety hazards, and how to mitigate them, in indoor construction sites including, but not limited to electrical, mechanical, thermal, motion, and pressure hazards.
- Limitations of PPE, including conditions under which PPE is no longer sufficiently protective and appropriate corrective measures.

Personnel Training

All contractor personnel should be experienced and have the appropriate training to do the assigned work.

Some basic training commonly provided by contractors to their personnel as part of their obligations under this Regulation includes:

- Workplace Hazardous Materials Information System (WHMIS 2015)
- Working at Heights
- Dangerous Goods Transportation and Handling

Personnel training should also include the following:

- One or both of:
  - National Fire Protection Association (NFPA) 472: *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents* – Operations Level course

    - Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-hour course
- Institute of Inspection Cleaning and Restoration Certification (IICRC) Trauma and Crime Scene Clean-up Technician 2-day course
- Emergency First Aid Cardio Pulmonary Resuscitation/Automated External Defibrillator, Level A
- Administration of Naloxone
- Training in the correct operation of direct-reading fentanyl-detection equipment, if used

Proof of adequate training (e.g. certificate of completion) should be obtained for all project personnel. All training should be confirmed to have been provided by an experienced and trained person. Training that involves testing of comprehension via a proctored and scored examination provides the greatest assurance that contractor personnel have good comprehension of the provided training.

Professional Qualifications

If a third-party consultant is not retained for the preliminary site assessment and supervision of remediation work, it is still recommended that a certified occupational hygiene professional (i.e. Registered Occupational Hygienist [ROH] in good standing with the Canadian Registration Board of Occupational Hygienists [CRBOH] or a Certified Industrial Hygienist [CIH] in good standing with the American Board of Industrial Hygiene [ABIH]), or other safety professional (e.g. Canadian Registered Safety Professional [CRSP], Certified Safety Professional [CSP] or National Construction Safety Officer [NCSO]) or engineer, who is familiar with the work, provides sign-off on the results of assessments and remediation inspections. The professional should demonstrate capability and competency by providing evidence of education and training. This will best ensure that the remediation work is completed following appropriate and proper standards and practices.

In the case of cleaning and restoring HVAC systems contaminated by fentanyl, the following additional contractor qualifications should be considered:

- National Air Duct Cleaning Association (NADCA) Air Systems Cleaning Specialist (ASCS) or Certified Ventilation Inspector (CVI) as defined in the *NADCA's Standard for Assessment, Cleaning, and Restoration of HVAC Systems*

Project Experience

A contractor's proven experience in successfully completing fentanyl remediation projects of a similar scope and scale is a strong indication of that contractor's likely competency.

Experience successfully completing remediation projects for other hazardous materials (e.g. asbestos, lead, biohazardous materials, radioactive materials, mould, etc.) that follow recognized national/provincial standards and guidelines, should also be considered.

As with any contractor, consider asking for references from former clients to verify if the contractor's documented experience. When discussing the contractor's performance with provided references, consider requesting insight into the contractor's core competencies listed at the beginning of this appendix.

Insurance

All retained contractors should possess insurance sufficient for the specific work being considered. The following are suggested minimum coverage types and values for fentanyl remediation contractors. Additional types and amounts of insurance may be required depending on the nature of the site and remediation work.

- Commercial General liability insurance in an amount not less than $5 million per occurrence, insuring against bodily injury, personal injury and property damage and including coverage for products and completed operations.
- Contractors Pollution liability in an amount not less than $2 million per claim and in the aggregate.

Appendix C How to Select a Third-Party Consultant

Improper remediation of fentanyl-contaminated sites may have severe consequences (up to and including death) associated with potential legal liability. Use of an independent third-party consultant's services during fentanyl remediation can help mitigate these risks for property owners and/or management, who may not possess the knowledge and/or experience to properly oversee this type of project.

The role of the third-party consultant can include assisting with the preliminary assessment to establish fentanyl contamination levels before remediation. The third-party consultant may also perform overall supervision of the third-party contractor, on behalf of the site owner or management, and enforce appropriate health and safety practices and work procedures required during remediation. As defined in the Guideline, it is strongly recommended that a third-party consultant be retained to perform the post-remediation assessment and determine suitability of the site for re-occupancy. Many third-party consultants can also provide support with construction management services, such as contract administration and project tendering.

Third-party consultants with Registered Occupational Hygienists (ROH) or Certified Industrial Hygienists (CIH) on-staff can be identified through the consultant listing/public roster sections of the following websites:

- Canadian Board of Registered Occupational Hygienists (CRBOH) [https://www.crboh.ca/]
- American Board of Industrial Hygiene (ABIH) [http://www.abih.org/]
- American Industrial Hygiene Association (AIHA) [https://www.aiha.org/], or by contacting the Alberta local section of the AIHA

Core Competencies

All consultant project teams should demonstrate knowledge, experience, and ability in the following core competencies, which are organized into three key domains.

Project Planning, Assessments, Review, and Oversight

- Reviewing project specifications documents and blueprints, including for heating, ventilation and air conditioning (HVAC) systems, to determine project requirements and identify potential impediments or hazards associated with remediation work.
- Safely performing initial on-site assessments of contaminated sites to determine site-specific requirements for remediation work.

- Visually identifying contamination from fentanyl and its analogues, in all possible forms (e.g. tablet, powder, liquid).
- Determining what areas may be contaminated based on visually-identified contamination. Developing a sampling plan and conducting sampling for fentanyl contamination (if performing the preliminary assessment of site).
- Interpreting sampling results to determine areas that require remediation.
- Evaluating appropriateness of sampling techniques for specific site conditions.
- Evaluating competency of laboratory analysis based on review of laboratory reports and accreditations.
- Interpreting sampling results and/or reviewing accuracy of interpretation of sampling results by other parties.
- Developing and/or assisting in the development of a remediation plan in consultation with site owner/management and remediation contractor, including contingency and emergency response and management planning.
- Developing and/or assisting in the development of site-specific project health and safety plan (HASP)/safe work procedures in compliance with the Alberta OHS legislation.
- Reviewing contractor submittals (i.e. project plans, sampling plans, permits and forms, and modification requests) and providing recommendations to improve such submittals, as necessary to meet project requirements.
- Anticipating health or safety hazards associated with requested changes to project plans or procedures.
- Communicating effectively with governmental agencies/representatives and other project stakeholders on behalf of owner/property management.
- Completing formal, written project status reports.
- Developing procedures in case of work site emergency and providing support as needed during an emergency.
- Designing effective site controls, including measures for isolating work area from surrounding areas of site.
- Conducting on-site inspection of site controls, equipment, and supplies to verify that controls are properly implemented and maintained.
- Inspecting, monitoring, and enforcing contractor work practices and procedures, before, during, and after completion of remediation work, including:
    - Work area enclosure integrity and appropriateness of initial set-up
    - Negative air pressure system components (must be able to interpret manometer data and trends to maintain adequate work area isolation)
    - Waste packaging and removal procedures
    - Personnel and equipment decontamination procedures
- Properly operating and maintaining portable narcotics scanner/detector, if employed by consultant.
- Performing fentanyl cleaning procedures, including minimizing generation of airborne fentanyl.

- Properly and safely decontaminating any contaminated equipment, PPE, and personnel.
- Evaluating competency and knowledge of contractor personnel with respect to health hazards, abatement procedures, and control measures and only allowing experienced and trained personnel on the work site.
- Establishing clear communication between project stakeholders and within and between contractor personnel to prevent errors or misunderstandings.
- Working as an effective team with subtrades, site owners/management, and remediation contractors to achieve project goals, including effective communication and coordination.

Health, Safety, and Security

- Inspecting a work site to identify actual site conditions, including all health and safety hazards and/or impediments to work.
- Interpreting and describing health and safety requirements under the Alberta OHS legislation.
- Inspecting health and safety compliance with the Alberta OHS legislation.
- Recommending and enforcing corrective actions for any identified hazards/impediments present at site.
- Inspecting for and monitoring ability of site security measures to prevent unauthorized access to work area.
- Monitoring to ensure authorized site visitors have adequate protection.
- Evaluating for and enforcing proper use, maintenance, decontamination, and disposal of personnel PPE, including:
    - Fitting, fit testing, using, cleaning, and maintaining respirators
    - Replacing the respirator filter
    - Using disposable protective clothing (e.g. gloves, coveralls, etc.)
    - Decontaminating and removing PPE when exiting work area
- Identifying and correcting improper use of PPE.
- Identifying health and safety hazards on-site, both related to fentanyl and in general (e.g. electrical, mechanical, chemical, physical, biological, etc.), including identifying signs and symptoms of hazardous exposure to such hazards.
- Monitoring contractor's personnel to check that they are properly following procedures and protocols for fentanyl remediation, as per Alberta OHS legislation. Providing corrections as necessary.
- Effectively enforcing project requirements/standards as project site health and safety authority.
- Recognizing potential health problems in personnel and providing basic first aid when identified, including administering naloxone where personnel exhibit symptoms of exposure and rotating personnel to avoid heat-related distress.

Hazardous Waste Management

- Evaluating methods and procedures used to handle contaminated waste generated within work area to ensure safe work procedures are followed and contamination of other site areas and/or exposure to personnel is minimized.
- Evaluating practices for disposal and transport of contaminated waste from work area to end receiver is done following all legislated requirements, including completion of required permits/forms.

All consultant team members should also have demonstrated knowledge of the following:

- Health hazards of fentanyl, including mechanisms of entry into the body, mechanisms of action, symptoms of exposure, methods for limiting exposure, and actions to be taken in case of accidental exposure.
- Requirements, responsibilities, and rights under applicable Alberta OHS legislation.
- Legislative requirements for fentanyl remediation in Alberta.
- Required permits and forms that must be completed by contractors or property owners/management.
- Appropriate materials, equipment, and supplies for use in the remediation of fentanyl contamination.
- Appropriate measures for isolating work area(s) and maintaining the work area isolation, including proper use of negative air machines.
- Appropriate measures and controls for protecting remediation personnel based on levels of identified contamination.
- Appropriate measures and controls for protecting of site staff and containing fentanyl within work areas.
- Appropriate methods for sampling fentanyl on surfaces and in air, including limitations of these methods.
- Industrial hygiene sampling principles, including collection methods, chains of custody, quality assurance/quality control blanks, proper methods for calibrating air sampling pumps, proper methods for collecting surface wipe samples, etc.
- Methods for successfully anticipating, recognizing, evaluating, and controlling chemical, physical, biological and ergonomic health hazards, with specific knowledge of how these principles should be applied to fentanyl-contaminated sites and the fentanyl remediation process.
- Knowledge of common safety hazards, and how to mitigate them, on indoor construction sites including, but not limited to electrical, mechanical, thermal, motion, and pressure hazards.
- Limitations of PPE, including conditions under which PPE is no longer sufficiently protective and appropriate corrective measures.

Consultant Training

All consultant team members should be experienced and have the appropriate training to do the assigned work.

Some basic training commonly provided by contractors to their personnel as part of their obligations under this Regulation includes:

- Workplace Hazardous Materials Information System (WHMIS 2015)
- Working at Heights

Training should also include the following:

- One or both of:
  - National Fire Protection Association (NFPA) 472: *Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents* – Operations Level course
  - Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-hour course
- Emergency First Aid Cardio Pulmonary Resuscitation/Automated External Defibrillator, Level A
- Naloxone Administration
- Training in the correct operation of direct-reading fentanyl-detection equipment, if used

Proof of adequate training (e.g. certificate of completion) should be obtained for all project personnel. All training should be confirmed to have been provided by an experienced and trained person. Training that involves testing of comprehension via a proctored and scored examination provides the greatest assurance that the consultant has good comprehension of the training topic.

Consultant Qualifications

The third-party consultant team should include a Registered Occupational Hygienist (ROH) in good standing with the Canadian Registration Board of Occupational Hygienists (CRBOH) or a Certified Industrial Hygienist (CIH) in good standing with the American Board of Industrial Hygiene (ABIH). Sign-off on the results of assessments, remediation inspections, and remediation clearance reports by such a certified occupational hygiene professional best ensures that the remediation work is completed following appropriate and proper standards and practices. Other certified professionals who can clearly demonstrate an equivalent level of knowledge and experience to that held by a CIH or ROH can also fill this role.

The third-party consultant should be free of any potential conflicts of interest and should be independent of the remediation contractor. Any perceived conflicts of interest should be declared to the project authority as soon as possible.

Project Experience

Consider a consultant's experience in successfully providing the following services to other clients in the past:

- Developing fentanyl remediation specifications or equivalent documentation of required safe work practices.
- Providing preliminary site assessments.
- Overseeing fentanyl remediation contractors during remediation work.
- Conducting post-remediation assessments.
- Offering construction management services.

Also consider a consultant's experience in successfully providing these services on projects of similar scope and scale involving other hazardous materials, particularly where the consultant can demonstrate experience in developing and overseeing a contractor's implementation of safe work plans/procedures for substances with a high potential for acute harm or serious chronic health effects and limited procedural regulations for the completion of remediation work (e.g. biohazardous waste, radioactive materials, carcinogenic chemicals, etc.).

Consider asking for references from former clients of the consultant to verify the consultant's documented experience. When discussing the consultant's performance with provided references, consider requesting insight into the consultant's abilities with respect to the core competencies listed at the beginning of this appendix.

Insurance

All retained third-party consultants should possess insurance sufficient for the specific work being considered. The following are suggested minimum coverage types and values for fentanyl remediation contractors. Additional types and amounts of insurance may be required depending on the nature of the site and remediation work.

- Commercial General liability insurance in an amount not less than $5 million per occurrence, insuring against bodily injury, personal injury and property damage and including coverage for products and completed operations.
- Errors and Omissions insurance in an amount not less than $2 million per claim and in the aggregate insuring liability resulting from errors and omissions in the performance of professional services related to remediation work.

Appendix D Personal Protective Equipment (PPE) Guidance

Table D-1: PPE Recommendations[11]

Level of Contamination / Work Procedures	Recommended Skin Protection	Recommended Eye, Face, and Respiratory Protection
Level I (minimal to low risk)	• Disposable chemical-resistant gloves suitable for protection against fentanyl and remediation chemicals, certified to National Fire Protection Association (NFPA 1999–2018) Standard on Protective Clothing and Ensembles for Emergency Medical Operations • Disposable coveralls (impervious to particulates) (discretionary) • Chemical-resistant rubber boots (discretionary)	• National Institute for Occupational Safety and Health (NIOSH)-certified disposable P100 filtering face piece respirator or reusable, tight-fitting, elastomeric, half-face air-purifying respirator (APR) with P100 filters • Non-vented or indirectly vented goggles (discretionary)
Level II (moderate risk)	• Two layered pairs (inner and outer) of disposable chemical-resistant gloves suitable for protection against fentanyl and remediation chemicals, certified to NFPA 1999–2018 • Disposable coveralls (impervious to particulates) with integrated boot covers, or separate boot covers sealed to coveralls • Chemical-resistant rubber boots	• NIOSH-certified reusable, tight-fitting, elastomeric, full-face air-purifying respirator (APR) with P100 filters
Level III (high risk)	• Two layered pairs (inner and outer) of disposable chemical-resistant gloves suitable for protection against fentanyl and remediation chemicals, certified to NFPA 1999–2018 • Disposable coveralls with head covering and with integrated boot covers, or separate boot covers sealed to coveralls certified to NFPA 1999: 2018; or Class 4 or 4R certified to NFPA 1994 • Chemical-resistant rubber boots	• NIOSH-certified reusable, tight-fitting, elastomeric full-face air-purifying respirator (APR) with P100 filters; or powered air-purifying respirator (PAPR) with P100 filters; or self-contained breathing apparatus, certified to NFPA 1981

Note: Additional respiratory protection may be required as recommended by the supplier of any chemicals used for neutralization solutions or cleaners.

Incorrectly putting on (donning) PPE and removing (doffing) PPE can increase the wearer's overall exposure to fentanyl. Proficiency when donning and doffing PPE can only be achieved through the

[11] Adapted from The InterAgency Board. *Recommendations on Selection and Use of Personal Protective Equipment and Decontamination Products for First Responders Against Exposure Hazards to Synthetic Opioids, Including Fentanyl and Fentanyl Analogues*, 2017, 6.

repeated practice of the procedures. Therefore, interactive training is recommended before use: personnel should practice donning, adjusting, using, and doffing the specific PPE that they will be required to use on site. Emphasize doing everything slowly and carefully to minimize the risk of making a mistake. Re-usable PPE should be cleaned and then stored in a cool, dry place where it can be reused later.

PPE required for fentanyl remediation includes disposable, impermeable coveralls with an attached hood and booties, disposable chemical-resistant gloves and appropriate respiratory protective equipment.

To avoid exposing skin at the wrist, it is recommended to use two sets of disposable chemical-resistant gloves with a cuff length that extends beyond the wrist. Street clothes should not be worn underneath PPE. If they are, they must be removed along with the disposable, impermeable coveralls and disposed of as fentanyl hazardous waste**. Personnel must never take contaminated street clothes or PPE home for laundering.** Table D.2 outlines the steps to follow.

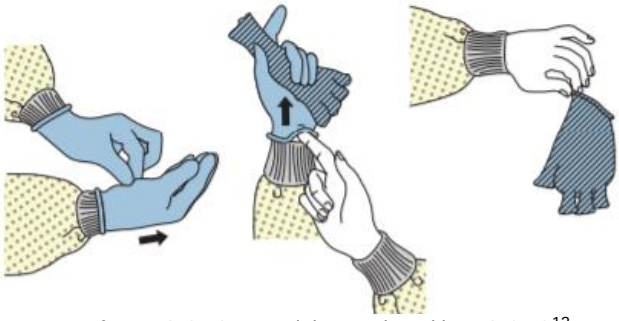
Table D-2: PPE Donning Guidance

Donning PPE
Preparation
• Check that all required PPE is available for use at the work site. Install the appropriate respirator filter.
• Inspect PPE for any visible damage, including rips or tears, before use. Do not use damaged PPE. Discard as appropriate.
• Inspect respirator to ensure all parts are present and properly installed, as per manufacturer's instructions.
In Clean Change Room
• Step into coveralls. Insert feet into boot covers, if they are an integrated component of coveralls.
• Pull coveralls up above waist, insert arms into armholes, and pull coveralls up over shoulders. Zip coveralls fully closed to chin. Do not place coverall hood over the head.
• If coveralls do not have integrated boot covers, pull separate boot covers over feet then seal cuff of boot covers to leg of coveralls with dust-impermeable tape.
• Step into additional appropriate footwear (e.g. chemical-resistant steel-toed rubber boots).
• Pull inner pair of chemical-resistant gloves over bare hands, ensuring cuff is under elastic cuff of coverall arms.
• To double-glove, pull on outer pair of chemical-resistant gloves over inner pair of gloves, ensuring cuff is under elastic cuff of coverall arms.
• Securely seal cuff of coverall arms to cuff of gloves with dust-impermeable tape.
• Put on the appropriate form of respirator. Ensure medical clearance and fit-testing has previously been completed as per guidance requirements. The wearer must be clean-shaven, such that no visible stubble or "shadow" is visible. Ensure respirator seals are in direct contact with face, free of hair or other obstructions.

Donning PPE
• Perform positive pressure seal check on respirator: place hand over the opening on the exhalation valve and exhale strongly. The face piece should pressurize slightly (a half-face respirator will bulge outward; a full-face respirator will lift slightly away where it contacts face). No audible hiss of escaping air or perceptible air leakage past seal should occur.  Image from “Breathe Right!” published by Oregon OSHA[12]
• Perform negative pressure seal check on respirator: cover filter cartridges with hands, or where cartridge openings face inwards, remove cartridges and cover openings with hands then inhale and hold for five seconds. If fitted correctly, a half-face respirator will remain collapsed for the duration of this step. For both half-face and full-face respirators, no audible hiss of escaping air or perceptible air leakage past seal should occur.  Image from “Breathe Right!” published by Oregon OSHA[12]
• Place goggles over eyes if the respirator used is not full-face.
• Pull coverall hood over the head and respirator. Ensure hood elastic seals are fully over the head such that no skin or hair is visible.

[12] Image taken from Oregon Occupational Safety and Health Administration document “Breathe Right! Oregon OSHA’s guide to developing a respiratory protection program for small-business owners and managers” available at https://osha.oregon.gov/OSHAPubs/3330.pdf. Reference to specific commercial products, manufacturers, companies, or trademarks does not constitute its endorsement or recommendation by the Oregon Government or Oregon OSHA. Materials used are available on Oregon OSHA website at no charge.

Table D-3: PPE Doffing Guidance

Doffing PPE
• Do not remove respirator until in the clean room.
In Dirty Room
• Remove tape seals around gloves and boot covers (if applicable), and place in designated hazardous waste container.
• Remove outer gloves and place in designated waste container.
• Apply neutralization solution to the exterior surfaces of re-usable footwear. Remove and store in the clean room to allow for the prescribed contact time. Remove boot covers and dispose of in designated waste container.
• Remove goggles, apply neutralization solution, then rinse with water and store in clean room.
• Unzip disposable coverall fully. Starting at the hood, roll coverall back upon itself, such that interior surface is continually exposed during rolling, moving down the body.
• Place coverall in designated waste container.
• Remove boot covers and place in designated waste container (if applicable).
• Remove inner gloves by following these steps: o Using one gloved hand, grasp the palm area of the other gloved hand and peel off the first glove. o Hold the removed glove in the gloved hand. o Slide the fingers of the ungloved hand under the remaining glove at the wrist, then peel off the second glove over the first glove. o Place the gloves in the designed waste container.  Image from US CDC; Materials Developed by US CDC[13]
In Wash Area
• Wash hands with low-pH soap and water.
• Put on a new pair of disposable gloves.
• Wet a cloth with 10% hydrogen peroxide and wipe the exterior of the respirator. The cloth should only be used once.
• Place the cloth and disposable gloves in a designated waste container.

[13] Image taken from US Centers for Disease Control and Prevention (CDC) poster "How to Safely Remove Personal Protective Equipment (PPE)", CS250672-E. Reference to specific commercial products, manufacturers, companies, or trademarks does not constitute its endorsement or recommendation by the U.S. Government, Department of Health and Human Services, or Centers for Disease Control and Prevention. Materials used are available on CDC website at no charge.

• Wait 10 minutes then wipe the respirator off with low-pH liquid soap and rinse with water.
In Clean Change Room
• Remove the filter cartridges and dispose of in designated waste container.
• Remove the respirator and hang to dry. Place in resealable plastic bag once dry.

Appendix E Guidance for Fentanyl Sampling

Where sampling is planned, samples should be collected by experienced and trained professionals, as described in **Appendix C**. A site-specific sampling plan should identify:

- The sampling methods to be used.
- If surface and/or air samples are to be collected.
- The validated analytical method to be followed.
- The analytical laboratory that will complete the analysis.

The analytical laboratory should be accredited through the American Industrial Hygiene Association (AIHA) Industrial Hygiene Laboratory Accreditation Program and be an active participant of a Pharmaceutical Proficiency Analytical Testing program. The pre- and post-remediation sample locations should be indicated on a site or floor plan. Post-remediation sampling is a tool to help determine if the remediation has been effective. Table E-1 provides an overview of the current methods available for fentanyl detection.

Table E-1: Guidance for Fentanyl Sampling

Method	Advantages	Limitations	Uses	Comments
Colourimetric reagent Real time presumptive test (presence/ absence)	• Instant qualitative feedback • No instrument calibration • Positive fentanyl detection is visually confirmed by a colour change	• May have false negatives/positives • Sensitivity: > 1 µg [8] • Qualitative test	• To screen for fentanyl contamination on all materials, equipment, supplies, and PPE as they are removed from the fentanyl remediation enclosure • To check the exterior of an enclosure and verify that no contamination is outside of the work area (e.g. check the effectiveness of the containment)	• Numerous products on the market • The specific test kit to be used should be thoroughly reviewed to check that it can reliably and consistently detect fentanyl and fentanyl analogues of concern • Only name-brand products ordered directly from the original manufacturer or authorized distributer should be used • Results should be verified with wipe/swab samples sent for laboratory analysis

Method	Advantages	Limitations	Uses	Comments
	• Cost: less than $3/sample			
Thermal Desorption Direct Analysis in Real Time Mass Spectrometry (TD-DART-MS) Real time presumptive test (presence/absence)	• Instant qualitative feedback • Positive fentanyl detection is confirmed with an alarm	• May have false negatives/positives • Sensitivity: 1–100 ng [8] • Qualitative test • Instrument must be calibrated, operated, and maintained according to manufacturer's specifications • Cost: $40K–$150K	• To screen for fentanyl contamination on all materials, equipment, supplies, and PPE as they are removed from the fentanyl remediation enclosure • To check the exterior of an enclosure and verify that no contamination is outside of the work area (e.g. check the effectiveness of the containment)	• Numerous products on the market • The specific detector should be confirmed with manufacturer to check that it can reliably and consistently detect fentanyl and fentanyl analogues of concern at a sufficiently low detection limit that meets project requirements • Avoid contamination of the detector on the instrument itself. In such cases, suspend screening until the detector has been decontaminated and the instrument has been confirmed to be functioning properly, as per manufacturer directions
Ion Mobility Spectroscopy (IMS) Real time presumptive test (presence/absence)	• Instant qualitative feedback • Positive fentanyl detection is confirmed with an alarm	• May have false negatives/positives • Sensitivity: 1–100 ng[8] • Qualitative test • Instrument must be calibrated, operated, and maintained according to manufacturer's specifications • Cost: $40K–$150K	• To screen for fentanyl contamination on all materials, equipment, supplies, and PPE as they are removed from the fentanyl remediation enclosure • To check the exterior of an enclosure and verify that no contamination is outside of the work area (e.g. check the effectiveness of the containment)	• Numerous products on the market • The specific detector should be confirmed with manufacturer to check that it can reliably and consistently detect fentanyl and fentanyl analogues of concern at a sufficiently low detection limit that meets project requirements • Avoid contamination of the detector on the instrument itself. In such cases, suspend screening until the detector has been decontaminated and the instrument has been confirmed to be functioning properly, as per manufacturer directions
Raman Spectroscopy Real time presumptive test (presence/absence)	• Instant qualitative feedback • Capable of measuring through opaque and non-opaque	• Sensitivity: > 1 µg • Cost: $33K–$115K	• Bulk detection (> 1 µg) of fentanyl	• Numerous products on the market • The specific detector should be confirmed with manufacturer to check that it can reliably and consistently detect fentanyl and fentanyl analogues of concern at a sufficiently low detection limit that meets project requirements

Method	Advantages	Limitations	Uses	Comments
	containers up to several millimetres in thickness, except for metals [14]			• Avoid contamination of the detector on the instrument itself. In such cases, suspend screening until the detector has been decontaminated and the instrument has been confirmed to be functioning properly, as per manufacturer directions
Sampling Methodology for *Method LZ SOP-00504* Fentanyl Citrate CAS # 990-73-8 Fentanyl CAS # 437-38-7	• Validated method for fentanyl in air and surface • Quantitative test • High sensitivity • Low limit of detection for fentanyl (1 ng)	• Time lag: results must wait for sample shipping and lab analysis	• To confirm and document that clearance criteria has been achieved	• All laboratories conducting analysis should be accredited through the AIHA Industrial Hygiene Laboratory Accreditation Program and be an active participant of a Pharmaceutical Proficiency Analytical Testing program • Analysis typically conducted within seven business days; rush services are available • Currently, there are limited analytical laboratories capable of this analysis • See Table F.2 for air and surface sampling methodology details
National Institute for Occupational Safety and Health (NIOSH) 9106	• Quantitative test	• Time lag: results must wait for sample shipping and lab analysis • Low sensitivity • Limit of detection is: 0.1 µg/100 cm^2	• To confirm and document that clearance criteria has been achieved	• Not recommended because of the method's detection limit

[8] Baxter, Christina. *Synthetic Opioids in Operational Environments – Part I: Detection*. CRBNe Convergence, Orlando, USA, (March 2018).

Table E-2: Sampling Methodology for Method LZ SOP-00504

Air Sampling Method LZ SOP-00504
• Analysis by high-performance liquid chromatography with tandem mass spectrometry (LC-MS/MS) • Media is a 25 mm glass fiber filter mounted in an Institute of Occupational Medicine (IOM) sampler or three-piece cassette • Flowrate is 2 litres per minute (LPM) • Sampling volume range: 30–960 L • Sampling time range: 15 to 480 minutes • Include at least one field blank with every set of samples • Personal air samples should be collected in the person's breathing zone • Area air samples should be collected at the approximate head height of an average standing human (e.g. approximately 1.5 m above floor) using sampling tripods • Following collection, samples should be placed in a clear bag with zip closure, while still in the work area • The outer surface of the bag should be considered contaminated and treated as per the requirements of this Guidance during removal from the enclosure • Do not open bags containing collected samples outside the work area • The exterior surface of air sampling pumps and accessories must be treated with neutralization solution when exiting the work area • Pump tubing should be appropriately disposed of as fentanyl-contaminated waste (following neutralization) • Any additional materials to be submitted to the laboratory other than samples (e.g. paper chain of custody) should be placed within a second clear bag with zip closure and be clearly labelled to indicate that fentanyl may be present on materials inside the bag • Gloves and writing implements used for labelling of samples should be disposed of appropriately as fentanyl-contaminated waste
Surface Sampling Method LZ SOP-00504
• Swab/wipe samples for analysis by analytical laboratories should be collected following standard industrial hygiene methodology for surface sampling, using fentanyl-specific sampling media as specified by the analytical laboratory. The generalized methodology is outlined in the ASTM International Standard D6966-18: Standard Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Determination of Metals, or NIOSH method 9106 • Swab sampling is recommended to reduce the potential for direct contact with potentially contaminated surfaces • Ensure that sample numbers and associated locations are properly recorded on the site or floor plan and with photographs if possible • Field notebooks should not be taken into the work area during swab/wipe sampling due to the potential for contamination • Following collection, samples should be placed in a clear bag with zip closure while still in the work area • The outer surface of the bag should be considered contaminated and treated as per the requirements of this Guidance during removal from the enclosure • Do not open bags containing collected samples outside the work area • Any additional materials to be submitted to the laboratory other than samples (e.g. paper chain of custody) should be placed within a second clear bag with zip closure and be clearly labelled to indicate that fentanyl may be present on materials inside the bag • Templates, gloves, and writing implements used for labelling of samples should be disposed of appropriately as fentanyl-contaminated waste

Appendix F Sampling Plan Examples

F.1 Factors to Consider When Preparing the Sampling Plan

Each sampling plan should be customized to the site-specific conditions by a third-party consultant as defined in **Appendix C**. Sampling may be completed by two people: one person as the "Sampler" and the other person as the "Record-Keeper". The customized sampling plan may incorporate the use of field detection techniques (e.g. TD-DART-MS or IMS), as well as the collection and laboratory analysis of surface wipe/swab/air samples. The pre- and post-remediation sampling locations should be indicated on a site plan, as part of the sampling plan. Sampling should target areas where contamination is most likely.

Ventilation systems tend to collect and redistribute dust throughout a facility or structure. Therefore, the vents, stove hoods, ductwork, ceiling fans and the walls and ceilings near the ventilation ducts can be contaminated. Generally, it is recommended to collect wipe samples from the following surfaces:

- Each major non-porous floor surface and baseboards
- Vents, stove hoods, ductwork, ceiling fans, and the walls and ceilings near ventilation ducts
- Each major home appliance, if it is to remain in premises, inside and outside (e.g. refrigerator, oven, microwave, dishwasher, washing machine, dryer, etc.)
- Each major cabinet, counter, and/or built-in feature (e.g. kitchen cabinets, counters, vanities, etc.)
- Each bathroom and/or kitchen fixture or grouping of fixtures
- Doorknobs, light switches, electrical outlets and central vacuum outlets

F.2 Suggestions for Sampling Preparation

- Review sampling plan and determine what equipment/supplies are needed and bring extras for unexpected occurrences
- Obtain the sample collection media/containers, templates and chain of custody form(s) from an accredited laboratory
- All direct-reading equipment should be calibrated according to manufacturer specification and analytical sampling method
- New chemical-resistant disposable gloves should be worn for the collection of each wipe sample, and the gloves should be discarded between wipe sample collection to prevent cross-contamination
- Each analytical wipe/air sample collected should be uniquely labelled and sealed in an appropriate container and submitted to an accredited laboratory for analysis

F.3 Sample Collection Recommendations

All field-sampling activities should be documented using permanent ink on a sample log form or in a bound notebook with sequentially numbered pages. Errors should be corrected by drawing a single line through the error, so it remains legible, and adjacent to the error, have the responsible person date and sign the correction. Any deviation from procedures in the sampling plan should be noted. Take a photograph of each sample location, if possible. The following information should be recorded in the field notebook or sample log form:

- Project name
- Project address
- Date of project
- Name of personnel and tasks they performed
- Purpose of project
- Arrival and departure times
- Field instruments used
- Sample number and corresponding photograph number
- Sample location
- Surface type for wipe samples

F.4 Pre-Remediation Assessment Sampling

- Use a TD-DART-MS or an IMS to conduct presence/absence spot measurements within the contaminated area. A known surface area should be sampled. For example, a suggested approach would be to collect samples of a 10 cm x 10 cm surface area. Using a detection limit of 1 nanogram, results would then be reported as ng/100 cm^2 for wipe samples.

F.5 Post-Remediation Assessment Sampling

- Use same TD-DART-MS or an IMS to conduct presence/absence spot measurements within the previously contaminated area, in addition to three-stage decontamination rooms and waste transfer areas.
    - If fentanyl is detected in any measurement, have the subject room re-cleaned.
    - Once re-cleaned repeat presence/absence spot measurements in room with TD-DART-MS or an IMS; repeat this step until no fentanyl is detected.
- Once the TD-DART-MS or an IMS detects no fentanyl throughout the area, randomly collect surface and/or area air samples in each room for analysis by an accredited analytical laboratory.
- A measure of effective remediation is if post-remediation sampling results are below the lowest limit of detection for the chosen sampling methodology, for example:
    - <1.0 ng per 100 square centimeters (ng/100 cm2) for wipe samples
    - Non-detectable for TD-DART-MS and IMS

F.6 Example of Post-Remediation Sampling in a Vehicle

F.6.1 Unique Considerations for a Vehicle

Seats and floor mats should be removed during remediation and should not be reinstalled until post-remediation assessment sampling indicates the remediation of these items has been satisfactory. In some situations, it may be more economical to replace these items rather than repeatedly remediate.

F.6.2 Post-Remediation Assessment Sampling

- Use same TD-DART-MS or an IMS to conduct presence/absence spot measurements within the remediated interior of the vehicle and the remediated removed seats and floor mats. A surface of approximately 100 cm^2 should be wiped for each sample. The entire interior should be analyzed including doorknobs, all compartments, HVAC inlets, roof, floor, dashboard, etc.
    - If fentanyl is detected in any measurement, the entire vehicle interior should be re-cleaned, except if the detection was on the removed seats/floor mats, in which case these items should be re-cleaned.
    - Once re-cleaned repeat presence/absence spot measurements with TD-DART-MS or an IMS; repeat this step until no fentanyl is detected.
- Once the TD-DART-MS or an IMS detects no fentanyl throughout the remediated interior of the vehicle, seats and floor mats, random collection of surface wipe samples for analysis by an accredited analytical laboratory may be completed for verification of the absence of fentanyl.

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