



## UBC Building Operations Spill Preparedness & Response Procedure

### Purpose

This procedure is applicable to all UBC Building Operations activities involving hazardous materials where the potential exists for the spill of these materials. Building Operations workers should ensure that all spills of hazardous materials are reported to Risk Management Services (RMS) and that spills are immediately contained and remediated.

The release of hazardous materials (including ozone depleting substances, ODS) to the environment is prohibited. Risk Management Services (RMS) alerts the appropriate authority to external releases of hazardous materials to air, water and/or land as required by law.

Handling, use, transportation (including moving) of all hazardous materials requires the use of appropriate written safe work procedures. Refer to table below for **specific spill cleanup procedures**.

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## Scope

This document specifies the spill preparedness and response requirements for all service and maintenance workers and is related to repair, maintenance and transportation activities of equipment containing hazardous materials, as well as road incidents or accidents involving and/or animal bedding waste.

This procedure is designed to:

- Ensure health and safety of all UBC workers
- Control and minimize any potential adverse environmental impacts resulting from the spills of hazardous materials or ozone depleting substances
- Ensure that all workers are knowledgeable in the material hazards and the appropriate emergency procedures for the clean-up of spills
- Ensure that UBC Building Operations and its workers are compliant with the pertinent regulations
- Ensure that all spills of hazardous materials are reported to the appropriate authority

The specific as well as the general spill response requirements related to the various types of activities involving hazardous materials include the topics listed below:

- Planning, Preparation and Spill Prevention
- Spill Cleanup
- Training
- Spill Reporting

## Background

This procedure is based on various federal, provincial, and district regulations as well as UBC policies and procedures:

- [Environmental Management Act Spill Reporting Regulation](#)
- [Transportation of Dangerous Goods Regulations](#)
- [BC Hazardous Waste Regulation](#)
- [BC Emergency Program Management Regulation](#)
- [Metro Vancouver Sewer Use Bylaw No. 299, 2007 Consolidated](#)
- [Ozone Depleting Substances and Other Halocarbons Regulations](#)
- [Pest Control Act & Regulations](#)
- [Hazardous Materials Management \(UBC Policy 9\)](#)
- [Environmental Protection Compliance \(UBC Policy 6\)](#)
- [Spill Reporting Procedure](#)
- [Spill Clean Up Procedures](#)
- [Spill Reporting Form](#)
- [UBC Storage Tank Resources](#)
- [Spill Contingency Plan, UBC Utilities, Electrical Department](#)

The Glossary of Terms in [Appendix A](#) at the end of this document provides additional details regarding hazardous materials and spills.



### **Responsibilities:**

The primary responsibility of a person who has possession, charge, or control of a hazardous material is to do everything practicable and safe to prevent a spill of that material.

### Management and Supervisors:

- Provision a safe, healthy, secure and environmentally friendly workplace
- Ensure that prohibited products are not brought to the University or its affiliated sites
- Establish programs to prevent the escape of the hazardous material
- Identify areas where there are potential risks of spills
- Adopt procedures and technologies to minimize or eliminate such risks
- Ensure employees handling hazardous materials are trained in the relevant procedures and technologies
- Ensure that all workers receive WHMIS education and training on all Controlled Products with which they are expected to work (refer to UBC Building Operations Workplace Hazardous Material Information System (WHMIS) Policy I-B-14).
- Ensure that all requirements of this procedure are met where there exists the potential for a spill of hazardous materials and when a spill of hazardous materials occurs.
- Supply appropriate personal protective equipment required for spill remediation.
- Ensure that supervisors and workers are trained in spill reporting and remediation procedures as required by their work.
- Ensure that workers are instructed on the appropriate reporting and remediation procedures for spills of hazardous materials with which they work.

### Building Operations Workers, who will be deemed the Responsible Persons:

- When a spill does occur, act quickly to safely stop, contain and minimize the effects of the spill utilizing spill response procedures.
- Attend scheduled training sessions supplied by the University.
- Read and understand any material information (including but not limited to Workplace or supplier labels, and MSDS sheets) provided by supervisors.
- Follow all procedures provided by Building Operations and/or applicable regulatory agencies and working with all materials in a safe manner.
- Report ANY spilled material to their supervisor immediately and initiate the immediate reporting of any material spills required to be reported to Risk Management Services as identified in this procedure.

### Building Operations Stores:

- The purchase and dispensing of all hazardous materials used by Building Operations Trade Shops (but the person requiring the material should determine whether the material is a prohibited, restricted, or controlled substance). No prohibited materials should be purchased.
- The purchase and dispensing of appropriate personal protective equipment and any other equipment required for spill remediation (including Spill Clean-Up Kits).

### Risk Management Services:

- Report all spills (depending on the type and quantity) to provincial and federal agencies such as, BC Emergency Preparedness (formerly PEP) and MOE. There are specific legal obligations to



report spills to external agencies. Stricter penalties may be imposed for convictions arising from a spill if there was a delay in responding to or reporting of the spill.

## General Spill Response Procedure for All Activities

### Planning, Preparation and Spill Prevention

*The release of hazardous materials to the environment is prohibited.*

- Determine what types of spills or releases can occur during various Building Operations activities
- Determine if substances bought, stored, used, handled by UBC Building Operations or its affiliated sites are hazardous (Prohibited, Restricted, or Controlled Products). Refer to the "Glossary of Terms" in Appendix A for more details
- Have **spill kits** in place which include: absorbent materials, drain covers, personal protective equipment (gloves, coverall, safety glasses). Refer to link for additional suggestions [www.spilldepot.com/content/spill-response-kit](http://www.spilldepot.com/content/spill-response-kit)
- Know where spill kits are located and replenish spill materials as necessary
- Have a **written procedure** related to spill response posted at the location of possible spill or release
- All employees responding to spills are properly **trained**
- Workers/UBC employees should not release, allow, or cause the release of a hazardous material or an [ODS or other halocarbon](#) from any equipment (air conditioning or refrigeration units, containers, devices)
- Hazardous materials that can cause spills should be stored and transported safely using means of containment (e.g. secondary containers, spill pallets, etc.)
- Work areas are regularly inspected and checked for spills, leaks or releases
- If a spill or release occurs, workers refer to the detailed spill cleanup procedures and attempt to clean spills only if safe to do so
- Depending on severity of spill or release, workers should know who (or what agency) to contact

### Spill Response and Cleanup

Building Operation workers may be able to respond to a small spill, however, they should never put themselves at risk. This may include initiating an emergency response if the spill is larger than the immediately available spill clean-up capabilities of Building Operations.

- Proper personal protective equipment (PPE) should be used at all times
- Act quickly to safely stop, contain and minimize the effects of the spill, and clean up the affected area, where possible and safe.
- Identify the hazardous material type and the quantity spilled.
- Use spill kits from designated areas

### Spill Reporting

- When spill occurs worker should contact his or her supervisor as soon as it is practicable to do so.



- If there is any doubt about any person's safety, or for large spills of any kind that cannot be contained safely, immediately call 911. Vancouver Fire and Rescue Services (VFRS) will notify their Hazmat Teams.
- Workers should also report spill to:
  - Building Operations Service Centre (604-822-2173)
  - Risk Management Services Main Office (604-822-2029)
  - After hours contact UBC Security (604-822-2222)
- As required by law, RMS Environmental Services alerts the appropriate authority to external releases of dangerous goods to air, water and/or land. This ensures that all hazardous material spills are reported as required.
- Worker (or supervisor) should file a written report of any hazardous spills with RMS by completing the UBC [Spill Reporting Form](#) as soon as possible.
- Workers should report any release of an Ozone Depleting Substances by completing the [UBC ODS Release Report form](#) and submitting it to UBC RMS, Environmental Services as soon as possible.

#### Unattended Material Spills:

- If an unattended material spill is observed, the Building Operations worker should contact his or her supervisor for instructions immediately.
- If the spill is not attributable to Building Operation activities, the worker or supervisor should contact Risk Management Services and the Building Operations Service Centre. RMS will respond to the site to identify the materials and evaluate the spill.

#### Training

All Building Operations workers responding to spills are properly **trained** including: procedure, material, personal protective equipment (PPE), hazards and limitation, proper hazardous waste disposal, reporting requirements.

Workers have the following responsibilities regarding training:

- Attend all scheduled training sessions as supplied by Building Operations and/or the University.
- Read and understand any WHMIS related material and labelling.
- Follow all relevant procedures provided by Building Operations, Risk Management Services and/or other regulatory agencies.
- Work with all hazardous materials in a safe manner.
- Workers should understand the importance of appropriate PPE as well as its limitations.
- Request additional information when working with new hazardous materials or equipment, or devices, as necessary. This includes work related to service, moving and transportation of equipment that potentially contains hazardous materials.
- Refer to the "[Specific Spill Response Requirements](#)" for different types of spills and activities in the following sections. These procedures are to be used only by the worker responsible for cleaning up the spill (the responsible person), or a worker dispatched to clean up the spill using the appropriate written safe work procedure.



## Animal Bedding Waste Compactors Spill Response Procedure

### Purpose

The following procedure addresses the proper spill response in case of accidental release of soiled animal bedding from compactors, in the event of road accidents or other emergency situations.

### Scope

The spill procedure is intended for the vehicles driving the waste compactors to the waste treatment and disposal facility. Each metal, leak-proof compactor (15-25 m<sup>3</sup> capacity) is hauled separately by a UBC Waste Management truck. This procedure is also designed to ensure compliance with the Canadian Food Inspection Agency (CFIA) requirements.

### Procedure

#### Planning, Preparation and Spill Prevention

- Truck drivers should inspect compactors containing bedding waste and ensure that they do not leak before transportation.
- In case of a road accident or spill incident, they should clean up the bedding and decontaminate the ground area around the compactor using the spill kit provided on each truck.
- Take all possible measures to stop, contain or minimize the effects of the spill.
- Inspect spill kit periodically.

#### Spill Response and Cleanup

The Waste Management truck is equipped with the following spill response and clean up materials and equipment:

- Broom
- Shovel
- Heavy duty (6 mil) garbage bags
- Bleach
- Water
- Spray pump
- Gloves
- Caution tape

If a small spill occurs due to a road accident, the driver will:

- Take all possible measures to stop, contain or minimize the effects of the spill
- Place signs or barrier tape at the boundary of the area warning of a spill
- Clean up the waste bedding using a shovel or broom and garbage bags
- Spray the ground area with 10% bleach solution for decontamination

In case of large spills that cannot be cleaned up safely, the driver will call 911, report the spill and request assistance.

- Restock spill kit with supplies/materials used

#### Training

All drivers are trained in spill clean-up procedures in case of emergencies.

#### Spill Reporting

All spills should be reported to the following agencies:

- UBC Building Operations (Manager, Municipal Services, 604-822-0439 cell: 604 250-1581)



- UBC Risk Management Services ([Ligia Gheorghita](#), Advisor, Environmental Services, 604-822-9840)
- Government of Canada (Inspector, Canadian Food Inspection Agency, 604-666-3837)



## Chemical Spill Response Procedure for Storage Tanks and Containers

### Purpose

The following procedure addresses the proper spill response in case of accidental spills or leaks of chemicals from storage tanks or containers.

### Scope

The spill procedure is intended for Building Operations staff responding to chemical spills from containers or storage tanks. Mechanical rooms hold a variety of chemicals such as strong acids or bases (caustics). For example, water chillers use chemical inhibitors to prevent formation of bacteria in the water. Most of these substances are both corrosive and toxic. (Refer to [Appendix C](#) for current list of chemicals). Some areas also store corrosive cleaning solutions such as bleach (sodium hypochlorite). These may be stored in containers (20L or less) or in storage tanks.

### Procedure

#### Planning, Preparation and Spill Prevention

- Provide appropriate spill kits, check regularly and replenish materials as necessary
- Secondary containment (110% of capacity, ), e.g. trays or spill pallets, should be used for all chemical storage tanks and containers
- Chemical storage areas are inspected, checked and tested for spills and leaks regularly
- Inspections should be documented and posted by the storage area
- Relevant MSDS should be posted in all storage areas and reviewed before responding to spills

#### Spill Response and Cleanup

- The spill kit is located at the Power House and includes the following materials and equipment: absorbent pads and pillows, kitty litter, Spill-X-A and Spill-X-C neutralizers\*.
- Identify the chemical used by reviewing the MSDS.
- Only respond if it's safe to do so.
- Use appropriate PPE (gloves, aprons/coveralls, rubber boots, face shields, respirators).
- Take action to stop the spill if active (i.e. closing valves or caps etc.).
- Prevent the corrosive and toxic chemical from leaving the building, spreading to adjacent areas, or entering drains by absorbing the chemicals, diking the area, and/or using drain plugs/barriers.
- Neutralize the chemicals as necessary using the appropriate neutralizer (Spill-X-C for caustics, and Spill-X-A for acids).
- Absorb, collect package for disposal as hazardous waste and contact ESF for pick-up.
- For large spills (or extremely toxic) call the Vancouver Fire Department (HazMat team).

#### Training

All workers are trained in spill clean-up procedures in case of emergencies.

#### Spill Reporting

All spills should be reported to the following agencies:

- UBC Building Operations (Service Centre, 604-822-2173)
- UBC Risk Management Services (Main Office, 604-822-2029)
- Complete the [Spill Reporting Form](#) in Appendix B

\*Note: Customizable spill kits available from vendors like [Acklands-Grainger](#)



## Fuel Tanks Spill Response Procedure

### Purpose

The following procedure addresses the proper spill response in case of accidental release of diesel fuel from fuel tanks used for generators or emergency generators.

### Scope

The spill procedure is intended for Building Operations staff servicing generators and responding to spills. The spills can occur during fueling or leak testing of fuel tanks and (emergency) generators.

### Procedure

#### Planning, Preparation and Spill Prevention

- Provide appropriate spill kits, check regularly and replenish materials as necessary
- Secondary containment (110% of capacity) should be used for all fuel tanks
- Tanks should be inspected, checked and tested for spills and leaks regularly
- Inspections should be documented
- Refer to RMS website ([Storage Tanks](#)) for more information
- All persons responsible for transferring the fuel to a storage tank system shall take all reasonable steps to prevent spills
- Ensure there is enough room in the tank BEFORE each delivery. MEASURE the fuel level in the tank before the delivery
- Monitor all fuel deliveries from beginning to end
- Print a fuel "Inventory Report"
- Place the fuel absorbent material and Spill Kit, at the fill site
- When the truck arrives:
  - One employee will be present during the fill procedure
  - Verify fuel type (diesel)
  - Verify fuel quantity
  - Verify safe working environment:
    - i. Fuel delivery personnel connects the ground strap to eliminate spark
    - ii. Equipment in good repair – no visible cracks, tears, etc.
    - iii. Snug fit of all connections
- When a tank vehicle is being unloaded, the vehicle operator shall remain:
  - in constant view of the fill pipe; and
  - in constant attendance at the delivery control valve
- Upon completion:
  - Print an "Inventory Increase Report" to verify fuel delivery
  - Sign the Fuel Delivery ticket from the fuel vendor
  - Verify removal of vendor equipment
  - Return fuel spill absorbent material and Spill Kit



### Spill Response and Cleanup

- Activate the Building Operations Fuel Spill Response Team by contacting the Building Operations Service Center at 604-822-2173.
- Spill kits are located at the Garage in room 0024 in the University Services Building and outside by the fuel pump.
- The maximum fuel spill volume (on the ground/floor) that can be cleaned up by Building Operations Fuel Spill Response Team (Hard Landscape crew) is **100 L**. [Note: volumes  $\geq$  100L have to be reported to Emergency Management BC (formerly PEP)].
- Take action to stop the spill if active (i.e. shutting off valves etc.).
- Prevent the oil from leaving the building, spreading to adjacent areas, or entering sewers or streams by diking the area, and/or using drain plugs/barriers and absorbing flowing fuel.

*If it is safe to do so:*

- Dike the area with sand bags, elastomer mats, or elastomer berms.
- Spread absorbents over the surface of the spill working from the perimeter of the spill to its center.
- Socks and pillows work best on pooled liquid while pads have an advantage on thin layers of oil.
- Containerize spill residues (i.e. contaminated socks, pads, Oil Sorb, etc.) and tag for disposal as hazardous waste (disposal can be arranged through the UBC Environmental Services Facility, contact 604-822-1285 for details).
- Contact UBC Risk Management Services at 604 822-2029 and the Fire Department HazMat Team (by dialing '911') if:
  - The quantity of spilled oil is more than 100 L (~25 gallons), or
  - The spill has entered a sanitary or storm drain, or
  - The spill has entered a ground or surface water, or
  - The spill cannot be contained or stopped, or
  - The spill poses a fire/explosion hazard, or
  - Additional spill equipment/materials/training to address spill is needed and is not (immediately) available

Note: The maximum fuel volume that can be recovered in liquid state from a damaged leaking tank or from the ground/floor by Building Operations is **400L** (i.e. recovery tank capacity).

### Training

All workers are trained in spill clean-up procedures in case of emergencies.

### Spill Reporting

All spills should be reported to the following agencies:

- UBC Building Operations (Service Centre, 604-822-2173)
- UBC Building Operations ([Michael Chapman](#), Manager Mechanical Trades, 604-827-5538, cell: 778 877-0169)
- UBC Risk Management Services (Main Office, 604-822-2029)
- Complete the [Spill Reporting Form](#) in Appendix B



***Spill kit contents:***

- ❑ (50) – 15" X 19" Absorbent pads
- ❑ (4) - 3" X 12' SOCs
- ❑ (8) - 17" X 19" Absorbent Pillows
- ❑ (1) - Pair Nitrile Gloves
- ❑ (5) - Disposal Bags
- ❑ (5) - Goggles
- ❑ (1) - Emergency Response Handbook

***PPE:***

- Gloves
- Coveralls
- Respirators with organic vapour cartridges



## Laboratory Hazardous Materials Spill Notification Procedure

### Purpose

The following procedure addresses the proper spill reporting when Building Operations staff discovers hazardous materials leaks or spills in research laboratories.

### Scope

This spill reporting procedure is intended for Building Operations staff servicing laboratories. It outlines the Building Operations staff response when discovering hazardous materials spill (i.e. laboratory glass, needles/syringes, bio-hazardous bags, chemical etc.) in a research laboratory that is not attributable to the work activities of Building Operations.

Building Operations staff is responsible in such cases to notify their supervisor, Building Operations Service Centre, and RMS.

### Procedure

#### Spill Reporting

- If spill is identified in the lab, report it immediately to activate UBC's spill response process to:
  - UBC Building Operations Service Centre (604-822-2173)
  - RMS main office at 604-822-2029 (also complete the [Spill Reporting Form](#) in Appendix B and submit to RMS Environmental Services)
  - Laboratory employees working in the area and their supervisor whenever possible
- Staff reporting spill should provide the following information:
  - Contact person name and phone number
  - Location of spill and if location of spill in a high traffic area (e.g. are pedestrians or vehicles moving through the spill?)
  - Type and amount of spilled material (e.g. glass, needles/syringes, full or empty chemical bottles, bio-hazardous waste bags)

#### Training

- All custodial staff and other Building Operations staff providing services to laboratories are trained on basic lab hazards and hazard identification and reporting procedures.



## Mercury Spill Response Procedure

### Purpose

The following procedure addresses the proper spill response in case of accidental release of mercury from various types of older devices or equipment, which include: thermometers, manometers, barometers, blood pressure monitors, fluorescent lamps/light bulbs, thermostats and electric switches.

### Scope

This spill procedure is intended for Building Operations staff moving or handling mercury containing equipment and/or responding to mercury spills. Note that mercury is a silver gray metallic, toxic element that is a liquid at ordinary ambient temperatures. Mercury can also exist in a vapor form at warmer temperatures. The warmer the temperature, the more quickly the mercury gets into the air (i.e. a temperature increase from 18°C to 26°C doubles mercury's vapor pressure). If spilled mercury is not cleaned up completely, it easily spreads around. Mercury forms droplets that can accumulate in the smallest spaces like cracks between floorboards and under fingernails. These droplets are very slippery and hard to remove from work surfaces or skin.

### Procedure

#### Planning, Preparation and Spill Prevention

- Provide appropriate spill kits, check regularly and replenish materials as necessary
- Mercury should be properly contained and safely removed by owner(s) of equipment
- Workers should recognize the types of equipment containing mercury and ensure that equipment does not contain mercury before moving; or that mercury is properly contained inside the unit and there is no risk of leakage
- Workers should ask departments to confirm that the equipment has been emptied before transportation
- Workers should not attempt to remove the mercury from the equipment
- If mercury cannot be removed, use secondary containment when moving the equipment

NOTE: Any equipment to be transported should display a completed and signed *UBC Laboratory & Equipment Clearance Form* in [Appendix D](#)

#### Spill Response and Cleanup

- Workers (moving crew) should report the spill to their supervisor and the Service Centre (604-822-2173); if necessary, contact RMS for further assistance
- Evacuate all personnel from area if spill is large, or room is small and ventilation is poor
- Ventilate area as much as possible; i.e. open all windows
- Mark off spill area with signs, barriers or yellow tape
- Prevent mercury from going down the drain by using drain covers or spill pillows, snakes, booms
- Contact the Vancouver Fire & Rescue Services (VFRS) team by calling 911, during working hours and after hours
- The VFRS hazmat team will clean up the spill
- Dispose of waste mercury, decontamination materials, contaminated PPE as hazardous waste



- Contact ESF at 604-822-6306 for pick-up and disposal

NOTE: In case the VFRS does not have appropriate spill materials, an emergency mercury spill kit is located at the Power House (contact the Shift Engineer at 604-822-4184 to obtain the kit)

### Training

- All workers (moving crew) should have basic WHMIS training before moving equipment

### Spill Reporting

All spills should be reported to the following:

- UBC Building Operations (Service Centre, 604-822-2173)
- UBC Building Operations (Manager, Municipal Services, 604-822-0439 cell: 604 250-1581)
- UBC Risk Management Services (Main Office, 604-822-2029)

### ***Mercury Spill Kit (MERCONKIT™):***

MERCONKIT™ spill kits are recommended for cleanup. These portable, self-contained kits meet mercury safety guidelines, handle spills, stop mercury vapors, decontaminate, and include instructions. They provide safe and effective clean up system for smaller/multiple spills; no mixing necessary. Detailed contents are below:

- MERCON Mercury Aspirator
- MERCONspray (250mL)
- MERCONtainer x 2 (475mL)
- MERCONvap (475mL)
- MERCONwipes (70)
- Safety goggles (1 pair)
- Nitrile Gloves (2 pairs)
- Disposal Bags (2)
- Mercury Spill information pamphlet
- Mercury Waste Labels

### ***Personal Protective Equipment (PPE):***

- Coveralls and plastic boot protectors
- Rubber or nitrile gloves
- Splash goggles
- Half-mask respirator with approved cartridge for mercury vapours



## Ozone Depleting Substances (ODS) Spill Response Procedure

### Purpose

The following procedure addresses the proper release response in case of accidental release of Ozone Depleting Substances (ODS) from various types of refrigeration equipment.

### Scope

This spill procedure is intended for Building Operations staff servicing, moving or handling air conditioning or refrigeration equipment and responding to leaks or releases of ODS.

### Procedure

#### Planning, Preparation and Spill Prevention

- Workers should use a device for the recovery or/and recycling of the ODS which meets the performance standards set out in [Schedule B](#) of the ODS regulations, to prevent the release of the ODS into the environment.
- Recycling and recovery should be performed in accordance with the [Code of Practice on Halons, published by Environment Canada](#).
- Prior to moving or disposal of air conditioning or refrigeration equipment or a container containing ODS, the ODS should be recovered using devices or methods that meet the performance standards set out in [Schedule B](#) of the ODS regulations.

#### ODS Release Response and Cleanup

- In case of an ODS release, contact VFD to test and ensure that oxygen levels are not below 19.5%
- Cordon off the area using yellow tape, and post a No Entry sign until area is safe to enter
- Note: when there is a leak or spill from ODS containing equipment the ODS will be in gas form at room temperature
- The “approved person” (worker or contractor) should attempt to stop the ODS release
- Continue to monitor O<sub>2</sub> level using hand held devices to ensure levels of oxygen remain safe
- Some mechanical rooms have digital O<sub>2</sub> readouts outside which should be reviewed before entering the room

#### Training

All workers are trained in release response procedures in case of emergencies.

#### Release Reporting

All releases should be reported to the following agencies:

- UBC Building Operations (Service Centre, 604-822-2173)
- UBC Building Operations ([Larry Schofield](#), Manager, HVAC & Mechanical Systems, 604-822-4421)
- UBC Risk Management Services (Main Office, 604-822-2029)
- Report releases of ODS (or other halocarbons) estimated to be equal or greater than **10 kg** (22 lbs) to Risk Management Services ([Ligia Gheorghita](#), Advisor, Environmental Services, 604-822-9840)
- Refer to the [Ozone Depleting Substances \(ODS\) & other Halocarbons 24-Hour Release Report](#) for additional information



## PCB Spill Response Procedure

### Purpose

The following procedure addresses the proper spill response in case of accidental release of oil containing Polychlorinated Biphenyls (PCBs) from electrical transformers or collection barrels mainly located at the UBC North (UNY) and UBC South (UNS) power sub-stations. UNY is located at 2446 Health Sciences Mall. UNS is located at 6075 Nurseries Road inside the South Campus Material Recycling Facility.

### Scope

The spill procedure is intended for Building Operations staff servicing the electrical transformers or other electrical equipment that may contain oil with PCBs and/or responding to spills at the two UBC substations, UNY and UNS. The spills can occur during repairs and maintenance of transformers and capacitors containing PCB contaminated Voltesso 35 oil.

The two transformers at each location contain a main reservoir of 17,020 L and switching equipment with 11,000 L of Voltesso 35. 205 L drums are also stored in the plastic storage shed adjacent to each substation building. The transformers are located on crushed gravel overlying a buried copper grid. There is no spill containment in the form of drainage leading to a sump and separator. Note that the expected concentration of PCB in oil is approximately 1-30ppm.

### Procedure

#### Planning, Preparation and Spill Prevention

- Provide appropriate spill kits, check regularly and replenish materials as necessary
- In the event of a spill, a Utilities Emergency Operations Centre (EOC) will be established in the substation building or at the Power House. The response to an emergency depends on the severity of the spill and its potential impact.
- The response to an emergency depends on the severity of the spill and its potential impact:
  - volume of spill, i.e. smaller or larger than reportable threshold quantity (100 L)
  - spill can or cannot be contained on site
  - the real or potential impacts of the incident
  - the spill can be completely handled by UBC Utilities resources
  - risk to personnel, environment, equipment or the public
  - the need for outside support resources
  - who is contacted in an emergency
  - the degree of public/media/composite/communication
- Spills should be prevented by regular inspections and testing of reservoirs and drums.
- Secondary containment (110% of capacity) of drums should be employed

#### Spill Response and Control

- Spill kits are located at UNY & UNS (contents listed below)
- Identify the spilled material and confirm that it is Voltesso 35. Verify source (transformer or



drum) and consult MSDS.

- Determine the severity of the spill (e.g., amount, exact location, area affected, continuing).
- Decide if your level of training allows you to safely clean up the spill.
- If the spill cannot be safely and readily contained, call 911.
- Workers should protect themselves and others by:
  - Shutting off ignition sources – NO SMOKING and staying upwind of vapours
  - Warning others to stay out of the substation yard – shut gate and post hazard tape.
  - Wearing appropriate PPE: impervious, chemical-resistant clothing and footwear, goggles, nitrile, neoprene or Viton gloves, and full-face organic vapour cartridge respirator where oxygen is adequate (i.e., in yard NOT in substation building).
- Call for assistance – notify a supervisor.
- Respond to the spill only if safe and feasible to do so.
- Use spill kits (supplies and equipment) located in the shed adjacent to the substation building; response kits are maintained to ensure that sorbents, plugging compound and other basic items are available for immediate use whenever needed.
- Stop the flow by using a plugging compound if practical and safe to do so.
- For small spills, place drum, sorbent pads or pillows so that leak is contained.
- Do not flush oil into adjacent sewer/drainage system.
- For large spills (more than several hundred litres), isolate area and call contractor.
- Clean up by applying sorbents to small spills (less than 1 drum or 205 L) and excavate small amounts of contaminated gravel.
- Place spill clean-up materials in labelled containers and seal them.
- Contact ESF to make arrangements for pick-up and proper disposal as hazardous waste.
- Refer to detailed “Spill Contingency Plan” (hard copy available with Building Ops Head Electrician and RMS).
- Depending on the severity of the spill the following persons/agencies should be contacted:
  - Fire Department (HazMat)
  - Cleanup contractors (e.g. [CEDA](#) or [TERVITA](#))

### Training

All workers are trained in spill clean-up procedures in case of emergencies.

### Spill Reporting

All spills should be reported to the following agencies:

- UBC Building Operations (Service Centre, 604-822-2173)
- UBC Building Operations ([Stan Takenaka](#), Head Electrician, 604 822-4943, cell: 604 916-0631)
- UBC Building Operations ([Karl Fox](#), Superintendent Trades, 604 822-5644, cell: 604 868-4542)
- UBC Risk Management Services (Main Office, 604-822-2029)
- Complete the [Spill Reporting Form](#) in Appendix B



***Spill Kit Checklist:***

- |   |  |
|---|--|
| <input type="checkbox"/> oil sorbent pads   | <input type="checkbox"/> shovel, rake set                                    |
| <input type="checkbox"/> particulate sorbent  | <input type="checkbox"/> 1 Spill Squeegee, Floor Size, 18" Head              |
| <input type="checkbox"/> oil sorbent socks  | <input type="checkbox"/> 1 Spill Squeegee, Bench Size, 8" Head               |
| <input type="checkbox"/> 10 Spill Control Pillows, 1 litre size                                 | <input type="checkbox"/> 1 Polypropylene Broom                               |
| <input type="checkbox"/> 1 Instruction Booklet  | <input type="checkbox"/> 1 Bench Brush                                       |
| <input type="checkbox"/> 1 roll Barricade Tape, 100 feet  | <input type="checkbox"/> 1 Dust Pan  |
| <input type="checkbox"/> 1 Wringer  | <input type="checkbox"/> 1 Liquid Cleaner, 1 litre                           |
| <input type="checkbox"/> 2 Spill Clothing Kits - SHOULD BE SEALED (see also Checklist below)    | <input type="checkbox"/> 1 roll Chem/Kleen-Ups Towels, 9 3/4" X 100 ft. roll |
| <input type="checkbox"/> 1-10 litres Damming Material (unreactive, absorbent, e.g. vermiculite) | <input type="checkbox"/> 5 Hazardous Waste Disposal Bags 12" X 18"           |
| <input type="checkbox"/> Plugging Compound  | <input type="checkbox"/> 5 Biohazard Waste Disposal Bags 12" X 24"           |
|   | <input type="checkbox"/> Waste Disposal Bags 12" X 18"                       |

***Personal Protective Equipment (PPE) List:***

- TYVEK coveralls and encapsulated suits
- Rubber boots
- Foot covers, disposable, polyethylene
- Nitrile gloves (disposable)
- Chemical splash goggles, fog-free lens
- Dust and mist respirator
- Cartridge respirator (organic vapour – sealed)
- Self-Contained Breathing Apparatus (SCBA) (***for use by trained personnel only***)



## Vehicular Fluids Spill Response Procedure

### Purpose

The following procedure addresses the proper spill response in case of accidental release of vehicular fluids from vehicles on campus.

### Scope

The spill procedure is intended for Building Operations staff servicing vehicles at the UBC Garage and responding to spills on the road. The different types of vehicular fluids include: gasoline, diesel fuel, oil, etc. The vehicles involved in road accidents or incidents can be either part of the UBC fleet or may belong to external companies.

### Procedure

#### A. Automotive Spills at Garage

##### Planning, Preparation and Spill Prevention

- Provide appropriate spill kits, check regularly and replenish materials as necessary
- Secondary containment (110% of capacity) should be used for all vehicular fluids drums and containers, as applicable
- Containers and drums should be regularly inspected, checked and tested for spills and leaks
- Know where spill kits are located and replenish spill materials as necessary
- All persons responsible for transferring the vehicular fluids shall take all reasonable steps to prevent spills

##### Spill Response and Cleanup

- The spill kits are located in the Garage (USB room 0024) and outside by the fuel pump. Subsequently, a critical spare is available at Stores.
- The Garage team can clean up minor spills (a few liters). They can call for backup from the spill response team if necessary. Note that the maximum fuel spill volume (on the ground/floor) that can be cleaned up by Building Operations Fuel Spill Response Team (Hard Landscape crew) is **100 L**.
- Building Operations Fuel Spill Response Team should respond immediately to such a request from the garage and treat the call as an emergency.
- The attending mechanic will remain on site until all necessary direction has been given for clean-up activities.
- Prevent the oil from leaving the building, spreading to adjacent areas, or entering drains by absorbing flowing fuel, diking the area, and/or using drain plugs/barriers.
- Take action to stop the spill if active (i.e. shutting off valves etc.)

If it is safe to do so:

- Spread absorbents over the surface of the spill working from the perimeter of the spill to its center.
- Socks and pillows work best on pooled liquid while pads have an advantage on thin layers of oil.



- Containerize spill residues (i.e. contaminated socks, pads, Oil Sorb, etc.) and tag for disposal as hazardous waste (disposal can be arranged through the UBC Environmental Services Facility, contact 604-822-1285 for details).
- Contact UBC Risk Management Services at 604 822-2029 and the Fire Department HazMat Team (by dialing '911') if:
  - The quantity of spilled oil is more than 100 L (~25 gallons), or
  - The spill has entered a sanitary or storm drain, or
  - The spill has entered a ground or surface water, or
  - The spill cannot be contained or stopped, or
  - The spill poses a fire/explosion hazard, or
  - Additional spill equipment/materials/training to address spill is needed and is not (immediately) available

### Training

All workers are trained in spill clean-up procedures in case of emergencies.

### Spill Reporting

All spills should be reported to the following agencies:

- UBC Building Operations (Service Centre, 604-822-2173)
- UBC Building Operations (Garage, 604-822-9822)
- UBC Building Operations ([Adam McCluskey](#), Manager Inventory & Fleet, 604-822-0992, cell: 604 329-3694)
- UBC Risk Management Services (Main Office, 604-822-2029)

### ***Spill kit contents:***

- (50) – 15" x 19" Absorbent pads
- (4) – 3" x 12' SOCs
- (8) – 17" x 19" Absorbent Pillows
- (1) – Pair Nitrile Gloves
- (5) – Disposal Bags
- (5) – Goggles
- (1) – Emergency Response Handbook
- (X) – Cache basin (storm drains) covers

### ***PPE:***

- Gloves
- Safety goggles
- Coveralls
- Respirators with organic vapour cartridges



## B. Road Incidents and Accidents Involving Vehicular Fluids

### Planning, Preparation and Spill Prevention

- Provide appropriate spill kits, check regularly and replenish materials as necessary
- Secondary containment (110% of capacity) should be used for transporting all vehicular fluids drums and containers, as applicable
- All drivers and/or persons responsible for transferring the vehicular fluids shall take all reasonable steps to prevent spills
- UBC Utilities shall inspect permanent booms installed on the outlet of the south campus collection pond quarterly

### Spill Response and Cleanup

Building Operations workers may notice or are notified of road spills involving vehicles (e.g. construction trucks, fuelling trucks, etc.), and should take the following steps:

- Contact Building Operation Service Center (604-822-2173) to activate the Fuel Spill Response Team (Hard Landscape crew) and call Utilities as necessary

Building Operations Fuel Spill Response Team should take the following steps:

- Take action to stop the spill if active (i.e. shutting off valves etc.)
- Use the garage spill response kit and the proper PPE take action to prevent the spill from entering storm and sanitary sewers and to minimize the area affected.
  - Cover all the cache basins downstream from the spill
  - Absorbing flowing oil or diking the area with sand bags, containment booms, elastomer mats, or elastomer berms, etc.
  - Spread absorbents over the surface of the spill working from the perimeter of the spill to its center.
- Socks and pillows work best on pooled liquid while pads have an advantage on thin layers of oil.
- Containerize spill residues (i.e. contaminated socks, pads, Oil Sorb, etc.) and tag for disposal as hazardous waste (disposal can be arranged through the UBC Environmental Services Facility, contact 604-822-1285 for details).
- If there is a risk of spill material entering the storm system notify Building Operations Service Centre (604-822-2173) to contact the Alek Paderewski ([Mechanical Utilities Manager](#), 604-822-4179, cell: 604-803-7964)
- Assist Utilities with the spill clean-up

Building Operations Utilities Response Team will:

- Use the storm sewer spill response kit located at the Confined Space Rescue Truck
- Use drain guards and covers, absorbent booms, and pillows to protect CBs and manholes and absorb any oil entered the system
- Dike around spill area to contain spill
- If spill have a risk of reaching the south campus storm water collection pond, check the permanently installed containment booms to ensure the protection of the pond outfall
- If spill has a risk of reaching the Booming Ground Creek or Trail 7 outfall, use the portable mini booms to protect the outfalls to the creeks and prevent oil from further spreading
- Note that mini booms installation/positioning location may be changed based on water flow intensity



### Training

Building Operations Spill Response Teams are trained in spill clean-up procedures in case of emergencies.

### Spill Reporting

All spills should be reported to the following agencies:

- UBC Building Operations Mechanical Utilities Manager ([Alek Paderewski](#), 604-822-4179, cell: 604-803-7964)
- UBC Building Operations Service Centre (604-822-2173)
- UBC Risk Management Services Main Office (604-822-2029 )
- Complete the [Spill Reporting Form](#) in Appendix B and submit to RMS Environmental Services

### Emergency contact information

- UBC Building Operations (Service Centre, 604-822-2173)
- UBC Building Operations (Mechanical Utilities Manager, [Alek Paderewski](#), 604-822-4179, cell: 604 803-7964)
- UBC Risk Management Services, Main Office at 604 822-2029
- Fire Department HazMat Team (by dialing '911')

If:

- The quantity of spilled fuel/oil is more than 100 L (25 gallons), or
- The spill has entered a sanitary or storm drain, or
- The spill has entered a ground or surface water, or
- The spill cannot be contained or stopped, or
- The spill poses a fire/explosion hazard, or
- Additional spill equipment is needed and is not immediately available.

NOTE: In cases where spill response is beyond the capacity of the Fire Department Hazmat team, or when further remediation is required, RMS will contact one of the following companies to assist with the spill mitigation decontamination and remediation:

- [TERVITA](#)
- [Clean Harbors Environmental Services](#)

**Spill Kit** – includes the following materials and equipment, response capacity of 95 gallon/400L oil:

- |   |  |
|---|--|
| <input type="checkbox"/> Drain covers neoprene, 4       | <input type="checkbox"/> Pad Meltblown Oil Heavy Weight, 100/bale, 1 |
| <input type="checkbox"/> Plug N Dike Pattie, 2          | <input type="checkbox"/> Collapsible shovel, 1                       |
| <input type="checkbox"/> Boom Oil w/ Sock/Net 5"x10', 2 | <input type="checkbox"/> Absorbent sphag sorb 2.2 cuft, 1            |
| <input type="checkbox"/> Boom Oil w/ Sock/Net 8"x10', 1 | <input type="checkbox"/> Overpack drums 95 gallon,                   |
| <input type="checkbox"/> Sock Oil white 3"x4', 1        | <input type="checkbox"/> Labels spill kit, 1                         |
| <input type="checkbox"/> Sock Oil white 3"x8', 1        | <input type="checkbox"/> Ultra-passive skimmer, 2                    |
| <input type="checkbox"/> Oil pillow, 18"x18" 16/case, 1 | <input type="checkbox"/> <b>Mini-booms 8"x20', 2 each</b>            |

### **PPE:**

- Gloves nitrile heavy duty, 1 pair
- Safety goggles anti-fog, 1 pair
- Coveralls, 1 pair



## Appendix A: Glossary of Terms

- **Dangerous Goods** - means a product, substance or organism included by its nature or by the regulations in any of the classes listed in the schedule to the Canada Dangerous Goods Act, except for the exemption under section 1.25 (Transportation within a Facility: "these Regulations do not apply to dangerous goods that are transported solely within a manufacturing or processing facility to which public access is controlled").
- **Emergency Management BC** (formerly **PEP**) – means the BC Ministry of Justice Emergency Management (old [www.pep.bc.ca](http://www.pep.bc.ca) website is now [www.embc.gov.bc.ca](http://www.embc.gov.bc.ca))
- **Environment** – means the air, land, water and all other external conditions or influences under which humans, animals and plants live or are developed.
- **Fuel** (liquid) – means either natural (primary, such as petroleum) or artificial (secondary) fuel used to power vehicles. Artificial fuels include: Diesel, gasoline, kerosene, liquefied petroleum gases (propane and butane), coal tar, naphtha, and ethanol.
- **Hazardous Material** – means any prohibited product, restricted product, controlled product or hazardous waste.
- **Hazardous Products** - means products that are prohibited, restricted or controlled, as defined by the [Hazardous Products Act \(HPA\)](#).
  - **Prohibited Products** –means products listed in [Part I of Schedule I of the HPA](#), and examples include drywall cements or patching compounds containing asbestos; paint and varnish removers having a flashpoint less than 0° F; and aerosol containers containing any amount of vinyl chloride. It is illegal to manufacture or sell such products in Canada. Import of such products into Canada is also illegal.
  - **Restricted products** – means products listed in [Part II of Schedule 1 of the HPA](#), and examples include hazardous substances packaged for consumer use such as bleaches, cleansers, corrosives, petroleum distillates and adhesives. These are more commonly called "Consumer Products" and this part of the HPA applies only to products on the list AND only when sold in the size of container available to the retail public. For example, a 4-litre container of bleach is covered as a consumer (restricted) product but a 45-gallon drum is not.
  - **Controlled Products** – means products that fall within any one (or more) of the [six WHMIS hazard classes](#). The hazard classes are compressed gas, flammable and combustible material, oxidizing material, poisonous and infectious material, corrosive material, and dangerously reactive material.
  - **Pest control products** (PCP) – means products that are partially exempt and there is no requirement for MSDS and supplier label. However, the container should bear a legal PCP label. Provincial OHS requirements for workplace labeling and worker education and training apply. A pesticide information sheet may be available that supplies information on hazards associated with the product.



- **Hazardous Waste** – means dangerous goods that are no longer used for their original purpose at their time of disposal, or are in storage or transit before recycle, treatment or disposal. [Full Definition in section 1(1) of the BC Hazardous Waste Regulation]
- **Management or supervisors** – means any person who instructs, directs, and controls workers in the performance of their duties, including those who may be in the bargaining unit such as heads and subheads.
- **Mercury (waste)** – means (elemental) mercury which may be regulated as Class 8 (Corrosive) or Class 6.1 (Toxic Substance), as defined by the current Transportation of Dangerous Goods Regulation. The Metro Vancouver Sewer Use Bylaw No. 299, 2007 Consolidated and the BC Hazardous Waste Regulation, 2009 prohibit the discharge of waste mercury into sewers or landfills.
- **Ozone depleting substance** - means a substance listed in Class I or Class II of Schedule A of the [BC Ozone Depleting Substances and Other Halocarbons Regulations](#)
- **Remediation** – means action to eliminate, limit, correct, counteract, mitigate or remove any contaminate or the adverse effects on the environment or human health of any contaminate.
- **Responsible person** - means a person who had possession, charge, or control of a spilled substance immediately before the spill. Where a spill occurs, this person shall take all reasonable and practical action, having due regard for the safety of the public and of him or herself, to stop, contain and minimize the effects of the spill. This represents **further action** under the Environmental Management Act Spill Reporting Regulation. This person should also report any occurring spill.
- **Risk Management Services (RMS)** – means the University of British Columbia Risk Management Services.
- **Spill** – means a release or discharge into the environment of a substance in an amount equal to or greater than the amount listed in Column 2 of the Schedule of the BC Spill Reporting Spill Reporting Regulation. [Full Definition in section 1 of the BC Spill Reporting Regulation] There are different **types** of hazardous and pollution spills, as specified under the Emergency Management of BC and some are not covered by this plan.
- **Substance** - means a substance, product, material or other thing listed in Column 1 of the [Schedule](#) of the Environmental Management Act Spill Reporting Regulation. These substances are also defined in the Transportation of Dangerous Goods Regulations and include:
  - WHMIS controlled substances
  - Pesticides (pest controlled products), as defined by the Pest Control Products Act
  - Mixtures of products
  - Wastes, defined as per BC Hazardous Waste Regulation



**Appendix B: UBC RMS Spill Reporting Form**

**Fax to: Risk Management Services (604-822-6650)**  
**Attn: Manager, Environmental Services**

**Copy to be forwarded to Administrative Head of Unit**

**EMERGENCY RESPONSE INITIATED**

YES

NO

Name \_\_\_\_\_

Dept. \_\_\_\_\_

Phone number \_\_\_\_\_

Address \_\_\_\_\_

Material spilled \_\_\_\_\_

Quantity \_\_\_\_\_

Location \_\_\_\_\_

Date & time of spill \_\_\_\_\_

Description of spill, including cause and actions taken

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Agencies attending scene (e.g. Fire Dept. etc)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Please include any additional information on a separate sheet.



### Appendix C: List of Chemicals and MSDS Used In Storage Tanks or Containers

Chemical Product	Hazard	Supplier	Description of Usage	MSDS
Corrshield NT 4206	Corrosive Base	<a href="#">GE Power &amp; Water</a>	Chillers - Chilled Water Closed Loop Corrosion Inhibitor	Hard Copy Available
Inhibitor PM 8307	Corrosive Base	<a href="#">GE Power &amp; Water</a>	Chillers - Condenser Water Cooling Tower Corrosion Inhibitor	Hard Copy Available
Spectrus NX 1106	Corrosive Acid	<a href="#">GE Power &amp; Water</a>	Chillers - Condenser Water Biocide	Hard Copy Available
Spectrus OX 1205C	Corrosive Base	<a href="#">GE Power &amp; Water</a>	Chillers - Condenser Water Biocide	Hard Copy Available
BL-1770	Toxic	<a href="#">ChemTreat Canada</a>	Powerhouse – Boiler Water Treatment	Hard Copy Available
BL-122	Toxic, Corrosive	<a href="#">ChemTreat Canada</a>	Powerhouse – Boiler Water Treatment	Hard Copy Available
BL-1553	Toxic	<a href="#">ChemTreat Canada</a>	Power – Steam Line Treatment	Hard Copy Available



### Appendix D: UBC Laboratory & Equipment Clearance Form

Building:	Responsible (Lab) Supervisor:
Room Number:	Contact Number(s):
Department:	
<b>Laboratory &amp; Equipment Clearance SHOULD be obtained PRIOR to scheduled work being carried out by Bldg Ops workers.</b>	
Possible Hazards (NOTE: The responsible supervisor should indicate if these hazards have been in use in the lab <i>and SHOULD ensure the hazards have been controlled or removed as necessary</i> ):	
<input type="checkbox"/> Chemicals (including mercury) <input type="checkbox"/> Biohazards (Risk Group 1-3 including toxins) <input type="checkbox"/> Radiation	<input type="checkbox"/> Lasers <input type="checkbox"/> Magnetic Fields <input type="checkbox"/> Other (please specify)
<b>Prior to starting work, Building Operations Personnel and Responsible (Lab) Supervisor should establish:</b>	
Scope of work to be performed & define the work area and/or equipment to be moved/removed.	
<b>Responsible (Laboratory) Supervisor should confirm the following:</b>	
Yes / No / N/A	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Is it ensured energized equipment or experiments in process will not affect worker safety?
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Is it ensured the shutdowns of fume hoods or services will not affect the safety or operations of others?
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Is it ensured that <b>work surfaces</b> in this lab are clean and free of any hazards and residual contamination (chemicals, biohazards, etc)?
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Is it ensured that <b>equipment to be moved/removed</b> is clean and free of any hazards and residual contamination (chemicals, biohazards, radiation etc.)?
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Is it ensured that "Caution Radioactive Materials" warning labels are posted on work surfaces or equipment? (Responsible lab supervisor shall provide written authorization from the Radiation Safety Office that the equipment is free of radiation hazards.)
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Is it ensured that no laboratory work, that could expose worker to hazards during the course of his work, shall be conducted in the vicinity of the defined work area or equipment?
The undersigned responsible (lab) supervisor hereby verifies that the defined <b>work area and/or equipment</b> is free of biohazards, chemical or radiation contamination and that all other hazards are appropriately controlled.	
Name	Position
Date	Signature
Building Operations workers will communicate completion of work to responsible supervisor	
<b>Please post signed copy on Lab Door or Equipment to be moved</b>	



End of Document

Approved by

Name & Title	Date	Signature
DAVID WOODSON	JUNE 5, 2014	

MANAGING DIRECTOR,  
BUILDING OPERATIONS