# Background/Introduction

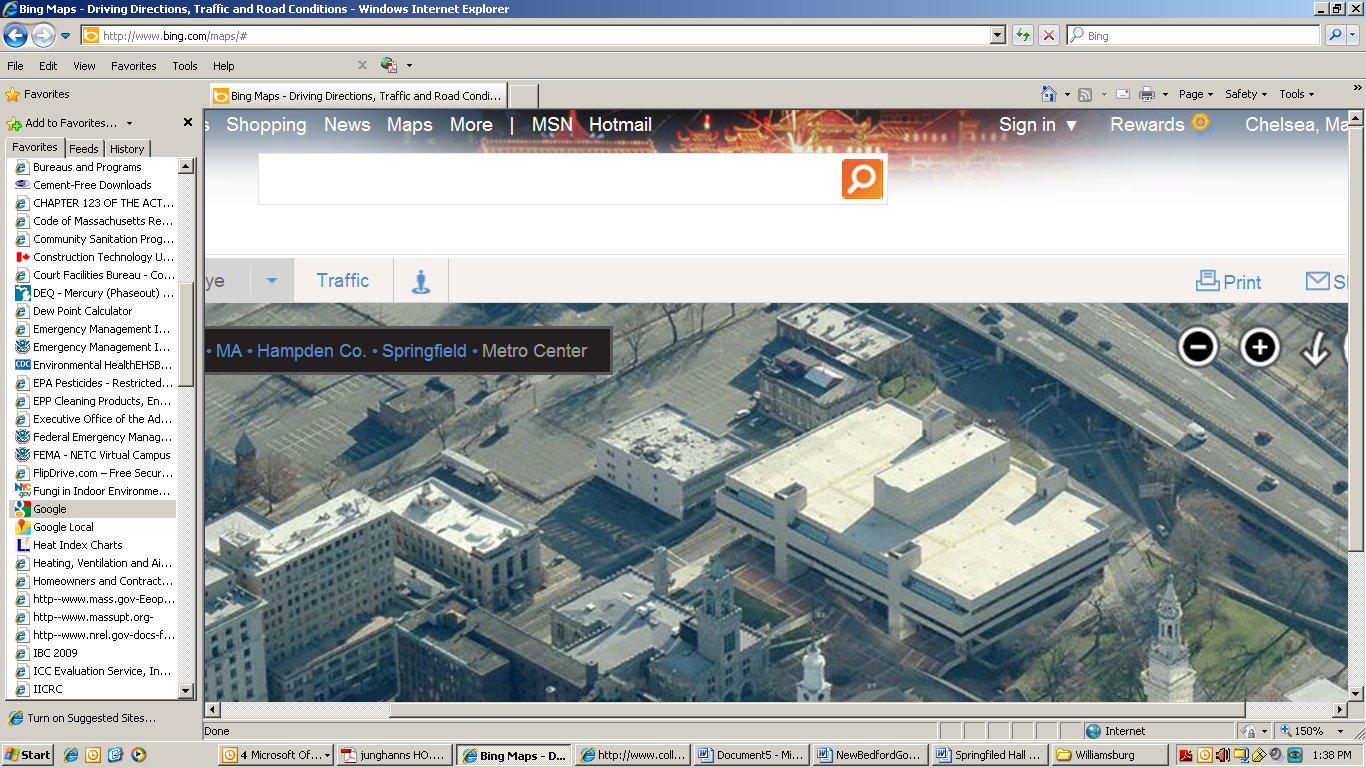
**ODOR ASSESSMENT**

**Hampden County Registry of Deeds**

**Hall of Justice**

**25 State Street**

**Springfield, MA**

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Prepared by:

Massachusetts Department of Public Health

Bureau for Environmental Health

Indoor Air Quality Program

February 2012

At the request of Administrative Offices of the Trial Court, the Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health (BEH) provided assistance and consultation regarding indoor air quality concerns at The Registry of Deeds (ROD) Office on the fourth floor of the Hall of Justice (HOJ), located at 25 State Street, Springfield, MA. The request was prompted by reports of odors and the detection of refrigerant gas inside the ROD office.

On September 14, 2011, the ROD was visited by Michael Feeney, Director of BEH’s Indoor Air Quality (IAQ) Program, to assess the possible source of odors reported by ROD employees. Prior to this assessment, HOJ staff had conducted air sampling for refrigerant gas (RG), suspecting that a free-standing air conditioner was the source of odors.

# Methods

Screening for refrigerant gases (RG) was conducted by HOJ staff using a Bachrach The Informant 2 Dual Purpose Refrigerant & Combustible Gas Leak Detector (RCD). The RCD can only indicate the presence of an RG and does not provide a quantitative air level.

# Results

The ROD has a staff of approximately 20. The RG air samples were taken throughout the ROD space prior to the BEH visit.

# Discussion

## Odor Investigation

HOJ staff tested a portable air conditioner (AC) brand/model Movincool Office Pro 18, which used Genetron® AZ-20 (R-410A) as its refrigerant (Attachment 1). The portable AC was identified by HOJ staff as the source of RG. Prior to the visit by BEH staff, the portable AC had been deactivated and removed and the area was ventilated by HOJ staff.

The portable AC was installed with its exhaust hose configured to vent into the ceiling plenum above the ROD. The heating, ventilating and air-conditioning system (HVAC) in the HOJ has ducted supply and return vents and therefore does not use a ceiling plenum for return air (MPDH, 2006). “Ceiling plenum return” is an HVAC system configuration that uses the space between the suspended ceiling and floor/roof decking as a duct to return air to the AHU in place of hard ducts. The Movincool Office Pro 18 is designed to vent into a ceiling plenum return system, which would draw the heated air and water vapor to the main air handler unit servicing the area, making it a part of the HVAC system

Because the HOJ does not use the ceiling plenum as part of the HVAC system, the ducting of the portable AC would pressurize the ceiling plenum, forcing waste heat and water vapor, and leaking RG if present, through spaces in the ceiling. Gaps in the ceiling tile system in Room 403C (Picture 1) and at the front desk near the main entrance to the ROD (Picture 2) would provide such pathways. In addition, pressurization of the ceiling plenum can force any dirt, dust and loose debris that accumulates above the ceiling tiles into occupied areas, providing sources of eye and respiratory irritation.

Reportedly, once the portable AC was removed from the ROD, no further RG detections were measured in any other location during this assessment with the exception of Room 403C.

According to HOJ staff who had conducted the monitoring with the RCD, a number of anomalous readings, such as detections of refrigerant vapors in outside air, or detections and non-detections in the same location, occurred during the use of the RCD in the ROD. These detections are believed to be false positive readings caused by the behavior of the RCD when placed in moving air. According to product literature: “False refrigerant indications are usually caused by abnormal changes in sensor temperature. These temperature changes are typically due to a sudden change in air flow past the sensor. To avoid false refrigerant indications, [do not] ... use the detector in windy areas [or] move the probe tip back and forth faster than 2" per second.” (Bacharach, 2011)

The use of this type of a portable AC system in a building without an HVAC air return plenum system is not recommended. This type of system should be ducted directly to the outdoors through an exterior wall or window.

# Conclusions/Recommendations

In view of the findings at the time of the visit, the following recommendations are made:

1. Discontinue the use of the portable AC unit unless it is vented directly outdoors.
2. ROD staff should consult with HOJ facilities staff on the most appropriate measures to provide additional supply and exhaust ventilation for the ROD offices and work areas.

# References

Bacharach. 2011. Bacharach, Inc. Instruction 0019-9211 Operation and Maintenance (Rev. 8). New Kensington, Pennsylvania. June 2011. (http://www.bacharach-inc.com/PDF/Instructions/19-9211.pdf)

MDPH. 2006. Hall of Justice (HOJ), 50 State Street, Springfield, Massachusetts. Massachusetts Department of Public Health, Emergency Response/Indoor Air Quality Program, Boston, MA. May 2006.

**Picture 1**

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**Space in Suspended Ceiling in Room 403C (arrow)**

**Picture 2**

**Space in Suspended Ceiling near the Front Desk near 
Main Entrance to the ROD (arrow)
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**Space in Suspended Ceiling near the Front Desk near**

**Main Entrance to the ROD (arrow)**

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| **SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**  Product name : Genetron® AZ-20 (R-410A)  MSDS Number : 000000009881  Product Use Description : Refrigerant  Company : Honeywell International, Inc.  101 Columbia Road  Morristown, NJ 07962-1057  For more information call : 800-522-8001  (Monday-Friday, 9:00am-5:00pm)  **In case of emergency call** : **Medical: 1-800-498-5701 or +1-651-523-0309**  : **Transportation: 1-800-424-9300 or +1-703-527-3887**  : (24 hours/day, 7 days/week) |
| **SECTION 2. HAZARDS IDENTIFICATION**  **Emergency Overview**  Form : Liquefied gas  Color : colourless  Odor : weak  Hazard Summary : Warning! Container under pressure. This product is not  flammable at ambient temperatures and atmospheric pressure. Gas reduces oxygen available for breathing. Causes asphyxiation in high concentrations. The victim will  not realize that he/she is suffocating. Inhalation may cause  central nervous system effects. May cause cardiac arrhythmia. May cause drowsiness and dizziness. Do not breathe vapour. Irritating to eyes and skin. Avoid contact with skin, eyes and clothing. At higher temperatures, (>250 C), decomposition products may include hydrofluoric acid (HF) and carbonyl halides. The ACGIH Threshold Limit Values (2007) for Hydrogen Fluoride are TLV-TWA 0.5 ppm and Ceiling Exposure Limit 2 ppm.  **Potential Health Effects**  Skin : Avoid skin contact with leaking liquid (danger of frostbite). |
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| May cause frostbite. Irritating to skin.  Eyes : Causes serious eye irritation.  May cause frostbite.  Ingestion : Unlikely route of exposure.  Effects due to ingestion may include: Gastrointestinal discomfort  Inhalation : Gas reduces oxygen available for breathing.  Causes asphyxiation in high concentrations. The victim will not realize that he/she is suffocating.  Inhalation may cause central nervous system effects. May cause cardiac arrhythmia.  Vapours may cause drowsiness and dizziness.  Chronic Exposure : None known.  **Carcinogenicity**  No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP, IARC, or OSHA. |
| **SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**  Chemical nature : Substance  Chemical Name CAS-No. Concentration Pentafluoroethane 354-33-6 50.00%  Difluoromethane 75-10-5 50.00% |
| **SECTION 4. FIRST AID MEASURES**  Inhalation : Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Use oxygen as required, provided a qualified operator is present. Call a physician. Do not give drugs from adrenaline-ephedrine group.  Skin contact : After contact with skin, wash immediately with plenty of water.  If there is evidence of frostbite, bathe (do not rub) with lukewarm (not hot) water. If water is not available, cover with a clean, soft cloth or similar covering. If symptoms persist, call a |
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| physician.  Eye contact : Rinse immediately with plenty of water, also under the eyelids,  for at least 15 minutes. In case of frostbite water should be lukewarm, not hot. If symptoms persist, call a physician.  Ingestion : Unlikely route of exposure. As this product is a gas, refer to the inhalation section. Do not induce vomiting without medical advice. Call a physician immediately.  **Notes to physician**  Treatment : Because of the possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should be used with special caution and only in situations of emergency life support. Treatment of overexposure should be directed at the control of symptoms and the clinical conditions. Treat frost- bitten areas as needed. |
| **SECTION 5. FIRE-FIGHTING MEASURES**  Flash point : not applicable Ignition temperature : >750 °C (1,382 °F) Lower explosion limit : None  Upper explosion limit : None  Specific hazards during fire : Contents under pressure.  fighting This product is not flammable at ambient temperatures and atmospheric pressure.  However, this material can ignite when mixed with air under pressure and exposed to strong ignition sources.  Container may rupture on heating.  Cool closed containers exposed to fire with water spray.  Do not allow run-off from fire fighting to enter drains or water courses.  Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.  In case of fire hazardous decomposition products may be produced such as:  Hydrogen halides Hydrogen fluoride  Carbon monoxide  Carbon dioxide (CO2) |
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| Carbonyl halides  Special protective : In the event of fire and/or explosion do not breathe fumes. equipment for fire-fighters Wear self-contained breathing apparatus and protective suit.  No unprotected exposed skin areas. |
| **SECTION 6. ACCIDENTAL RELEASE MEASURES**  Personal precautions : Immediately evacuate personnel to safe areas.  Keep people away from and upwind of spill/leak.  Wear personal protective equipment. Unprotected persons must be kept away.  Remove all sources of ignition.  Avoid skin contact with leaking liquid (danger of frostbite). Ventilate the area.  After release, disperses into the air.  Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.  Avoid accumulation of vapours in low areas.  Unprotected personnel should not return until air has been tested and determined safe.  Ensure that the oxygen content is >= 19.5%.  Environmental precautions : Prevent further leakage or spillage if safe to do so.  The product evaporates readily. Methods for cleaning up : Ventilate the area. |
| **SECTION 7. HANDLING AND STORAGE**  **Handling**  Handling : Handle with care.  Avoid inhalation of vapour or mist.  Do not get in eyes, on skin, or on clothing. Wear personal protective equipment.  Use only in well-ventilated areas.  Pressurized container. Protect from sunlight and do not expose to temperatures exceeding 50 °C.  Follow all standard safety precautions for handling and use of compressed gas cylinders.  Use authorized cylinders only.  Protect cylinders from physical damage.  Do not puncture or drop cylinders, expose them to open flame or excessive heat.  Do not pierce or burn, even after use. Do not spray on a naked |
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| flame or any incandescent material.  Do not remove screw cap until immediately ready for use. Always replace cap after use.  Advice on protection : The product is not flammable.  against fire and explosion Can form a combustible mixture with air at pressures above  atmospheric pressure.  **Storage**  Requirements for storage : Pressurized container: Protect from sunlight and do not expose areas and containers to temperatures exceeding 50 °C. Do not pierce or burn, even  after use.  Keep containers tightly closed in a dry, cool and well-ventilated place.  Storage rooms must be properly ventilated.  Ensure adequate ventilation, especially in confined areas. Protect cylinders from physical damage.  Store away from incompatible substances. |
| **SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**  Protective measures : Do not breathe vapour.  Avoid contact with skin, eyes and clothing.  Ensure that eyewash stations and safety showers are close to the workstation location.  Engineering measures : General room ventilation is adequate for storage and handling.  Perform filling operations only at stations with exhaust ventilation facilities.  Eye protection : Wear as appropriate:  Safety glasses with side-shields  If splashes are likely to occur, wear:  Goggles or face shield, giving complete protection to eyes  Hand protection : Leather gloves  In case of contact through splashing: Protective gloves  Neoprene gloves  Polyvinyl alcohol or nitrile- butyl-rubber gloves  Skin and body protection : Avoid skin contact with leaking liquid (danger of frostbite).  Wear cold insulating gloves/face shield/eye protection. Respiratory protection : In case of insufficient ventilation wear suitable respiratory |
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| equipment.  Wear a positive-pressure supplied-air respirator.  Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.  For rescue and maintenance work in storage tanks use self- contained breathing apparatus.  Hygiene measures : Handle in accordance with good industrial hygiene and safety  practice.  Ensure adequate ventilation, especially in confined areas. Avoid contact with skin, eyes and clothing.  Remove and wash contaminated clothing before re-use. Keep working clothes separately.  **Exposure Guidelines**  Difluoromethane 75-10-5 WEEL TWA 1,000 ppm 2,200  mg/m3  HONEYWELL TWA 1,000 ppm  Pentafluoroethane 354-33-6 WEEL TWA 1,000 ppm 4,900  mg/m3  HONEYWELL TWA 1,000 ppm |
| **SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES**  Form : Liquefied gas  Color : colourless  Odor : weak  pH : neutral  Freezing point : not determined Boiling point/boiling range : -48.5 °C (-55.3 °F)  Vapor pressure : 14,844 hPa  at 21.1 °C (70.0 °F)  Vapor pressure : 33,798 hPa  at 54.4 °C (129.9 °F)  Relative vapour density : 3 |
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| (Air = 1.0)  Density : 1.08 g/cm3  at 21.1 °C (70.0 °F)  Water solubility : no data available  Partition coefficient: n- : log Pow: 1.48 octanol/water  Partition coefficient: n- : log Pow: 0.21 octanol/water |
| **SECTION 10. STABILITY AND REACTIVITY**  Conditions to avoid : Pressurized container. Protect from sunlight and do not  expose to temperatures exceeding 50 °C. Decomposes under high temperature.  Some risk may be expected of corrosive and toxic decomposition products.  Can form a combustible mixture with air at pressures above atmospheric pressure.  Do not mix with oxygen or air above atmospheric pressure.  Materials to avoid : Finely divided aluminium Potassium  Calcium Powdered metals Aluminium Magnesium  Zinc  Hazardous decomposition : In case of fire hazardous decomposition products may be products produced such as:  Hydrogen fluoride Carbonyl halides Carbon monoxide Carbon dioxide (CO2)  Thermal decomposition : >250 °C  Hazardous reactions : Hazardous polymerisation does not occur.  Stable under normal conditions. |
| **SECTION 11. TOXICOLOGICAL INFORMATION**  Acute inhalation toxicity |
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| Pentafluoroethane  Difluoromethane  Sensitisation Pentafluoroethane  Difluoromethane  Repeated dose toxicity Pentafluoroethane  Difluoromethane  Genotoxicity in vitro Pentafluoroethane  Difluoromethane | : > 769000 ppm  Exposure time: 4 h Species: rat  > 769000 ppm Exposure time: 4 h Species: rat  : LC50: > 520000 ppm  Exposure time: 4 h Species: rat  : Cardiac sensitization Species: dogs  Note: No-observed-effect level 75,000 ppm  Lowest observable effect level 100,000 ppm  : Cardiac sensitization Species: dogs  Note: No-observed-effect level  >350,000 ppm  : Species: rat Application Route: Inhalation Exposure time: (4 Weeks) NOEL: 50000 ppm  Subchronic toxicity  : Species: rat Application Route: Inhalation Exposure time: (90 d) NOEL: 50000 ppm  Subchronic toxicity  : Test Method: Ames test Result: negative  : Test Method: Ames test Result: negative  : Cell type: Human lymphocytes | |
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| Genotoxicity in vivo Difluoromethane  Teratogenicity Pentafluoroethane  Difluoromethane  Further information | Result: negative  : Cell type: Chinese Hamster Ovary Cells Result: negative  : Cell type: Human lymphocytes Result: negative  Method: Mutagenicity (in vitro mammalian cytogenetic test)  : Test Method: Chromosome aberration test in vitro Result: negative  : Species: mouse  Cell type: Bone marrow  Method: Mutagenicity (micronucleus test) Result: negative  : Species: rabbit Application Route: Inhalation exposure NOAEL,Teratog: 50,000 ppm  NOAEL,Maternal: 50,000 ppm  Note: Did not show teratogenic effects in animal experiments.  Species: rat Application Route: Inhalation exposure NOAEL,Teratog: 50,000 ppm  NOAEL,Maternal: 50,000 ppm  Note: Did not show teratogenic effects in animal experiments.  : Species: rat Dose: NOEL - 50,000 ppm  Note: Did not show teratogenic effects in animal experiments.  Species: rabbit Dose: NOEL - 50,000 ppm  Note: Did not show teratogenic effects in animal experiments.  : Acute toxicity Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing. Rapid evaporation of the liquid may cause frostbite. May cause cardiac arrhythmia. |
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| **SECTION 12. ECOLOGICAL INFORMATION**  Biodegradability  Pentafluoroethane : Result: Not readily biodegradable.  Value: 5 %  Method: OECD 301 D  Difluoromethane : Note: Minimal  **Further information on ecology**  Additional ecological : This product is subject to U.S. Environmental Protection information Agency Clean Air Act Regulations at 40 CFR Part 82.  This product contains greenhouse gases which may contribute to global warming. Do NOT vent to the atmosphere. To comply with provisions of the U.S. Clean Air Act, any residual must be recovered. |
| **SECTION 13. DISPOSAL CONSIDERATIONS**  Waste Information: Observe all Federal, State, and Local Environmental regulations. Additional advice : This product is subject to U.S. Environmental Protection  Agency Clean Air Act Regulations Section 608 in 40 CFR Part 82 regarding refrigerant recycling. |
| **SECTION 14. TRANSPORT INFORMATION**  **DOT** UN/ID No. : UN 3163  Proper shipping name : LIQUEFIED GAS, N.O.S.  (Pentafluoroethane, Difluoromethane)  Class 2.2  Packing group  Hazard Labels 2.2  **IATA** UN/ID No. : UN 3163  Description of the goods : LIQUEFIED GAS, N.O.S.  (Pentafluoroethane, Difluoromethane)  Class : 2.2  Hazard Labels : 2.2 Packing instruction (cargo : 200 |
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| aircraft)  Packing instruction : 200 (passenger aircraft)  **IMDG** UN/ID No. : UN 3163  Description of the goods : LIQUEFIED GAS, N.O.S.  (PENTAFLUOROETHANE, DIFLUOROMETHANE)  Class : 2.2  Hazard Labels : 2.2  EmS Number : F-C  Marine pollutant : no |
| **SECTION 15. REGULATORY INFORMATION**  **Inventories**  1907/2006 (EU) : This mixture contains only ingredients which have been subject  to a pre-registration according to Regulation (EC) No. 1907/2006 (REACH).  US. Toxic Substances : On TSCA Inventory Control Act  Australia. Industrial : On the inventory, or in compliance with the inventory Chemical (Notification and  Assessment) Act  Canada. Canadian : All components of this product are on the Canadian DSL list. Environmental Protection  Act (CEPA). Domestic Substances List (DSL). (Can. Gaz. Part II, Vol. 133)  Japan. Kashin-Hou Law : On the inventory, or in compliance with the inventory List  Korea. Toxic Chemical : On the inventory, or in compliance with the inventory Control Law (TCCL) List  Philippines. The Toxic : On the inventory, or in compliance with the inventory Substances and Hazardous  and Nuclear Waste Control Act  China. Inventory of Existing : On the inventory, or in compliance with the inventory Chemical Substances  NZIOC - New Zealand : On the inventory, or in compliance with the inventory |
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| **National regulatory information**  **SARA 311/312 Hazards** : Acute Health Hazard  Sudden Release of Pressure Hazard  **California Prop. 65** : WARNING! This product contains a chemical known to the  State of California to cause cancer. Dichloromethane 75-09-2  : WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.  Chloromethane 74-87-3  **Massachusetts RTK** : Dichloromethane 75-09-2  **New Jersey RTK** : Difluoromethane 75-10-5  **Pennsylvania RTK** : Difluoromethane 75-10-5  **WHMIS Classification** : A  This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information  required by the CPR.  **Global warming potential** : 1,975  **Ozone depletion potential** : 0  **(ODP)** |
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| **SECTION 16. OTHER INFORMATION**  **HMIS III NFPA**  Health hazard : 1 2  Flammability : 1 1  Physical Hazard : 0  Instability : 0 |
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