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| **University of Macau**WORK INSTRUCTION |

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| TITLE | Laboratory Environmental Management |
| DOCUMENT NO. | WI-ICMS-001 |
| REVISION | 003 | EFFECTIVE DATE | 30/6/2021 |
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| EFFECTIVE DATE | REVISION | REVISION CONTENT |
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| 1/12/2015 | 000 | First Release |
| 10/5/2016 | 001 | Refine the points of 5.1.1, 5.1.3, 5.2.3, 5.2.5 & 5.6.4 |
| 30/6/2019 | 002 | Refine the points of 5.1.2 and 5.2.3 and add 5.3, 5.4 |
| 30/6/2021 | 003 | Added 5.1.4, 5.1.5, 5.3.5; Refine 5.3.3 |

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Content:

**1. PURPOSE**

*1.1 To ensure that environmental aspects related to the laboratory activities are carried out in a proper and well coordinated manner.*

**2. SCOPE**

*2.1 This procedure is applicable to the management of specified laboratory activities mentioned here which impose impacts on the environment.*

**3. RESPONSIBILITIES**

*3.1 ICMS is responsible for ensuring the implementation of this procedure and monitoring environmental performance of ICMS laboratories.*

**4. RELATED DOCUMENTS**

*4.1 NA*

**5. REQUIREMENTS**

***5.1 Chemical Solid Waste Handling***

*5.1.1 Solid**waste should be segregated and stored properly and disposed of by contractor to landfill*

*5.1.2 Sharp waste (such as syringe needles, razor blades, etc.) should be collected and stored in sharp box and disposed of to landfill*

*5.1.3 All broken glass should be collected and stored in sharp box. Because the broken glass may contain small amount of chemical waste, they should be handled and collected separately, then disposed by contractor for incineration.*

*5.1.4 All plastics, non-glass containers, gloves, tools for chemicals, and other potentially chemical-contaminated wastes (but not identified as Highly Hazardous Materials, including explosives, flammable gases, toxic gases, spontaneously combustibles, infectious substances and radioactive materials), should be collected and stored in yellow hazardous bag or yellow hazardous waste box. They should be handled and collected separately, then disposed by contractor for incineration.*

*5.1.5 All glass containers that used to be chemical containers, should be placed in ventilated space such as fume hood to empty all the remaining volatile substances, or rinsed the bottle with plenty of water then discard all water, then close the empty bottles, handled and collected separately. They will then be disposed by contractor for incineration.*

***5.2 Chemical Liquid Waste Handling***

*5.2.1 Organic solvent waste should be collected and stored in specific container and disposed of by collector.*

*5.2.2 Wasted oil should be collected and stored properly, and disposed of by contractor for incineration or for recycle.*

*5.2.3 Hazardous liquid waste should be collected and stored properly, and disposed of by contractor for incineration.*

*5.2.4 Heavy metal waste should be collected and stored properly, and disposed of by contractor for incineration.*

*5.2.5 Acid (PH<6) and base(PH>8) waste should be stored properly and neutralized before discharged to foul sewer via building treatment plant.*

*5.2.6 Other waste water generated from laboratory should be stored properly and discharged to foul sewer.*

***5.3 Biological Solid Waste Handling***

*5.3.1 Solid**waste should be segregated and stored properly and disposed of by contractor. After properly sterilization, such as autoclave or disinfection, the bio-hazard waste can be landfill. Bio-hazard waste without sterilization should be collected for incineration.*

*5.3.2 Sharp waste (such as syringe needles, broken lamps) should be collected and stored in sharp box. Bio-hazard waste without sterilization should be collected for incineration.*

*5.3.3 All broken glass should be collected and stored in sharp box. Because the broken glass may contain small amount of biological waste, they should be handled properly by sterilization such as autoclave or disinfection, the bio-hazard waste can be landfill. Bio-hazard waste without sterilization should be collected for incineration.*

*5.3.4 Bio-hazard waste such as animal carcasses, microbial culture waste should be collected and stored properly. After properly sterilization, such as autoclave or disinfection, the bio-hazard waste can be landfill. Bio-hazard waste without sterilization should be collected for incineration.*

*5.3.5 All plastics, non-glass containers, gloves, tools for potentially biological-contaminated wastes (but not identified as Highly Hazardous Materials, including explosives, flammable gases, toxic gases, spontaneously combustibles, infectious substances and radioactive materials), should be collected and stored in red/clear auto-clavable biohazardous waste bag. They should be handled and collected separately, then disposed by contractor for incineration.*

***5.4 Biological Liquid Waste Handling***

*5.4.1 Liquid waste should be collected and stored properly. After properly sterilization or disinfection treatment, the waste can be discharged to foul sewer via building treatment plant.*

***5.4.1.1 Disinfection for Biological Liquid Wastes (Virkon Powder SOP)***

1. *Place the Powder into water to form a 1% Virkon solution (e.g. 1g powder in 100ml water). Stir it until the powders has dissolved and formed a clear yellow solution.*
2. *Spray or wipe the contaminated surface with the solution, leaving a contact time of 20-30 minutes for disinfection. Dry with paper towel to remove any remaining.*
3. *Soak contaminated materials with the solution in a “Liquid waste collection bottle”, leaving a contact time of 20-30 minutes for disinfection.*
4. *A freshly prepared solution is stable for up to 7 days. Replace the solution weekly or when the color fades.*
5. *The used and expired solution can be discharged to foul sewer after dilution or neutralization.*

***5.5 Air Emission***

*5.5.1 All testing that will generate hazardous emission should be performed in appropriate fume cupboard or a well-ventilated area.*

*5.5.2 Use environmentally friendly refrigerants as far as possible.*

***5.6 Chemical Handling***

*5.6.1 Maintain MSDS of chemicals in appropriate locations if necessary.*

*5.6.2 Check the compatibility of chemicals prior to any chemical mixing or testing.*

*5.6.3 Drip trays should be used for chemical storage if necessary.*

*5.6.4. Chemical should be stored, handled and with label properly.*

***5.7 Gas handling***

*5.7.1 Gas cylinder should be wall-mounted or placed in gas cabinet for storage.*

*5.7.2 Gas cylinder should not be placed near any hot spot.*

*5.7.3 Gas generator should be maintained and leakage -checked routinely.*

*5.7.4 Other potential dangerous gas material used in lab, such as compressed gas, vacuum pump oil should be stored properly, and follow the similar emergency procedure of Chemical in the event of spillage and/or leakage of the material.*

***5.8 General Requirements***

*5.8.1 Conserve resources including consumable and electricity as far as practicable.*

*5.8.2 Chemical waste should be stored and disposed of properly.*

*5.8.3 Laboratory equipment should be maintained properly and calibrated in accordance with specified environmental requirements.*

*5.8.4 Emergency Preparedness and Response (WI-GEN-001) should be followed in the event of spillage and/or leakage of chemical/chemical waste.*

*5.8.5 Spill control kits should be placed near either chemicals or chemical waste storage area.*

***5.9 Monitoring of Environmental Performance***

*5.9.1 ICMS is responsible for checking the compliance with the above environmental requirements of the laboratories once every six months.*

*5.9.2 Result of compliance checking shall be submitted to the EMS Workgroup for evaluation.*

**6. RECORDS**

*6.1 Compliance checking records*

*6.2. MSDS of chemicals*

*6.3 Equipment maintenance and calibration records*

**7. OTHERS**

*7.1 NA*