Activity 2: Teacher notes

# Containment levels

Containment measures necessary for the four hazard groups are detailed here.

**Containment Level 1**

* Usual good aseptic techniques (links to A10.8)
* Usual good microbiological techniques
* Usual good laboratory practice
* Basic safety measures, such as safety glasses, lab coats and good  
  handwashing techniques

**Containment Level 2**

* Same as Containment Level 1 but with additional measures
* Access is restricted to authorised persons only
* There is a specific disinfection procedure
* Control systems to limit movement of pathogen vectors (e.g. animal containment)
* Bench surfaces impervious to water, easy to clean, and resistant to acids, alkalis, solvents and disinfectants
* Safe storage procedures needed for biological agents
* Infected materials where aerosols are produced are to be handled in a safety cabinet
* An accessible incinerator for disposal of animal carcasses
* Viable microorganisms should be contained in a system which physically separates the process from the environment (closed system)
* Release of exhaust gases or microorganisms from the closed system are minimised
* Clothing is work clothing
* Only inactivated bulk culture fluids are permitted to be removed
* Decontamination and washing facilities provided
* Seals are designed so as to minimise release

**Summary:** Same as Containment Level 1 but with additional measures, such as some control over the movement and release of possible pathogen vectors, a separate controlled working area with limited access to authorised personnel only, viable microorganisms are contained within a closed system, some decontamination, and more in-depth cleaning facilities.

**Containment Level 3:**

* Same as Containment Level 2 but with additional measures
* Workplace needs to be separated from any other activities in the building
* Extract air to be filtered using HEPA or equivalent
* Workplace is sealable to permit disinfection
* Workplace is under negative air pressure
* Floor also impervious to water, easy to clean, and resistant to acids, alkalis, solvents and disinfectants
* Observation window is present so occupants can be seen
* Labs contain their own equipment
* Release of exhaust gases or microorganisms from the closed system is prevented
* Seals are designed so as to prevent release
* Personnel wear protective clothing
* Optional showering when leaving the controlled area
* Optional waste (effluent) from sinks and showers is collected and inactivated   
  before release
* Optional sealable controlled area to permit fumigation

**Summary:** Same as Containment Level 2 but with additional measures, such as stricter limits on what may leave the controlled working area, including HEPA filtered extract air and no release of microorganisms from the closed system. The workplace is under negative air pressure, personnel wear protective clothing and there is optional showering. There should also be an observation window so occupants of the working area can be seen, and the workplace should also be sealable to permit disinfection and/or optional fumigation.

**Containment Level 4:**

* Same as Containment Level 3 but with additional measures
* Air is filtered using HEPA or equivalent on input, and doubly on extract air
* Access is restricted to authorised persons via air-lock key procedure
* Ceiling also impervious to water, easy to clean, and resistant to acids, alkalis, solvents and disinfectants
* Secure storage necessary for safe storage of biological agents
* Infected materials are to be handled in a safety cabinet
* An incinerator for disposal of animal carcasses must be present on site
* Closed systems are present within a controlled area which is purpose built
* Workers undergo complete change of clothing into protective clothing
* Showers when leaving the controlled area
* Waste (effluent) from sinks and showers is collected and inactivated before release
* Sealable controlled area to permit fumigation

**Summary:** Same as Containment Level 3 but with additional measures, such as complete control over what goes into and out of the controlled working area. Negative air pressure (links to A4.10 but it is not covered explicitly here) with air being filtered with a HEPA or equivalent filter on input and then doubly filtered on extract, personnel completely change their clothes to protective clothing and then shower when leaving the controlled area, so all waste from sinks and showers is collected and inactivated before release, access to the controlled area is restricted to authorises persons via air-lock key procedure, and biological agents are stored securely. The controlled area must also be sealable to permit fumigation.