

Biosafety Level 2 (GM-BSL2)

General

A laboratory classified as GM-BSL2 is appropriate for conducting activities listed below:

- Research involving the introduction of naked nucleic acids into RG 2 microorganisms that has moderate potential hazard to personnel, community and the environment
- Experiments with LMO and related materials, harboring DNA from a RG 2 microorganism.

A GM-BSL2 laboratory is not appropriate for the following:

- Activity with any LMO and related materials that requires a higher BSL than GM-BSL2 for containment
- Housing/keeping/rearing of any animals, arthropods, or aquatic organisms for longer than the minimum time required to complete laboratory procedures on them
- Growing of any plants except those in tissue culture, or contained in a plant growth chamber
- Activity with LMO cultures greater than 10 L when a large scale facility is required

Laboratory Facility (GM-BSL2)

In addition to the facility design features specified for GM-BSL1, following additional features are essential:

a) A hazard warning sign incorporating the universal biohazard symbol and the level of containment together with access restrictions should be displayed on the access door to the laboratory work area. The hazard warning sign may also identify the agent and the name and telephone number of the Laboratory Supervisor or other responsible persons.

b) The ceilings, walls and floors of the laboratory should be smooth, easy to clean, impermeable to liquids, and resistant to commonly used reagents and disinfectants. Floors should be coved to walls to facilitate cleaning.

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c) A dedicated hand basin of the hands-free operation type should be provided within each laboratory, near each exit.

Hand basin facility at CSIRO

d) Windows in the laboratory should be closed and sealed.

e) An autoclave should be located within the building. Autoclaves should be certified annually by the Department of Occupational Safety and Health/DOSH (*Jabatan Keselamatan dan Kesihatan Pekerjaan*).

f) Freezers, refrigerators or other storage units used for GM-BSL2 microorganisms located outside the designated laboratory should be posted with the appropriate signage.

Laboratory ventilation (GM-BSL2)

The laboratory should be well ventilated. If required an inward flow of air should be maintained by extracting room air using mechanical ventilation to ensure directional airflow.

Large Scale Facility (GM-BSL2)

A laboratory classified as a GM-BSL2 Large Scale Facility is appropriate for the conduct of activity involving culture volumes greater than or equal to 10 L of culture of any LMO.

A GM-BSL2 Large Scale Facility is not appropriate for the following: Biosafety Guidelines for Contained Use Activity of LMO 15

- activity with any LMO and related material that requires a higher BSL for containment than GM-BSL2
- the housing/keeping/rearing of any animals, arthropods or aquatic organisms for longer than the minimum time required to complete the experiments
- the growing of any plants except those in tissue culture, or contained in a plant growth chamber

Work Practices (GM-BSL2)

In addition to the work practices described in GM-BSL1, the following work practices should be observed:

- a) The Laboratory Supervisor establishes policies and procedures whereby access is restricted to persons who have been advised of the potential hazard and who meet specific entry requirements (e.g. immunisation).
- b) Laboratory personnel should receive appropriate training on the potential hazards associated with the work involved and the necessary precautions to prevent exposures. Personnel should receive annual updates, or additional training as necessary for procedural or policy changes.
- c) Procedures which produce infectious aerosols should be conducted in biological safety cabinets or other physical containment equipment.
- d) Experiments of lesser biohazard potential can be carried out concurrently in carefully demarcated areas of the same laboratory.
- e) An institutional biosafety manual is prepared or adopted for use in the laboratories. Personnel are advised on special hazards and are required to read and follow the instructions on practices and procedures.
- f) Goggles, mask or face shield should be used for anticipated splashes or sprays of infectious LMO and materials originated from these materials to the face, when handling microorganism outside the biological safety cabinet.
- g) Respiratory protection should be worn when aerosols cannot be safely contained.
- h) All solid wastes from GM-BSL2 laboratories, including infectious waste should be decontaminated by autoclaving for at least 30 minutes at a pressure of 15 psi and 121 °C.
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- i) Liquid wastes generated during GM-BSL2 activities are to be decontaminated immediately by mixing with a suitable disinfectant (refer to Section 12).
- j) Extreme caution should be observed when handling needles and syringes to avoid accidental needle-stick injury and generation of aerosols during use and disposal. Needles should not be bent, sheared, replaced in the needle sheath, guard or removed from the syringe following use. Only needle-locking syringes or disposable syringe-needle units (e.g. needle is integral to the syringe) should be used for injection or aspiration of fluids from LMO or materials originating from these organisms. The needle and syringe should be promptly placed in a sharps container. Broken glassware should not be handled directly by hand, but should be removed by mechanical means, such as a brush and dustpan, tongs, or forceps, before discarding into sharps containers.
- k) Spills and accidents that may cause over-exposure to LMO and materials originating from these organisms should be immediately reported to the Laboratory Supervisor and the IBC. Management of spills should follow biosafety procedures outlined in the institutional biosafety manual. An Emergency Response Plan should be documented and personnel should be trained in these procedures which include, spill management as well as incident reporting system. Medical evaluation, surveillance and treatment are provided as appropriate.
- l) A record book should be maintained to provide an up-to-date inventory of the procedures performed.

Containment Equipment (GM-BSL2)

Work with specimens containing microorganisms transmissible by the respiratory route or work producing a significant risk from aerosol production should be conducted in a Class II biological safety cabinet.

Proper containment should be applied when procedures with a high potential for creating aerosols are conducted. These may include centrifuging, grinding, blending, vigorous shaking or mixing, sonic disruption, opening containers of materials whose internal pressures may be different from ambient pressures, inoculating organisms and harvesting infected tissues from organisms or other samples. A centrifuge fitted with either sealed rotors or sealed buckets should be used where large volumes or high concentrations of infectious materials are used.