THE NATIONAL BIOCONTAINMENT LABORATORY

The National Biocontainment Laboratory, MPI's high-level biocontainment laboratory, is under construction in Upper Hutt. It will be the only one of its type in the country, and has an important role in protecting New Zealand from infectious diseases in animals and humans.

The new laboratory has a number of design features unique to high-level containment facilities. High-risk samples or infectious organisms are handled inside biosafety cabinets which provide the first layer of protection. Other features, shown here, provide a secondary layer of containment.

Air Handling System

The laboratory will have a complex air handling system that holds the whole laboratory at negative pressure and cleans all the air moving through the building. High efficiency filters are used to prevent any viruses or bacteria escaping containment in the air. Air pressure is kept low so that air always moves into the building.

Autoclave

Autoclaves are used to sterilise solid materials by exposing them to heat and steam. The new facility will have four autoclaves to sterilise clothing, lab waste, and other items. Each load is carefully monitored and confirmed sterile before the waste is removed for disposal.

High Biosafety Laboratory

Occasionally, New Zealand has suspect cases of very high-risk diseases in either animals or humans. The high biosafety laboratory provides a safe space where these samples can either be re-packaged to send to other laboratories off shore, or they can be treated to kill any viruses or bacteria (inactivation). Once inactivated, samples can be safely handled in the new lab to provide quicker test results. The high biosafety laboratory includes extra features such as increased security, a shower airlock and a Class III biosafety cabinet which fully contains all diagnostic material.

Flexible Laboratory Spaces

The new facility has been designed with multiple laboratory rooms for different types of testing. It includes high-containment suites and bespoke designed medium-containment laboratories that with minor changes can be converted to high-level containment labs in the event of a national emergency.

Earthquake Protection

Earthquakes have the potential to damage laboratories, making them unusable and potentially breaching containment. The National Biocontainment Laboratory has been designed to withstand up to a "one in 2500 year" earthquake. This level of safety has been achieved through base isolation and detailed structural design by leading New Zealand engineers.

Building Management System (BMS)

A complex building management system controls all aspects of the facility's systems, including temperature, air pressure, air change rates, fire systems, lighting, etc. There are over 1100 sensors in the building that monitor the containment systems. Alarms are immediately raised if anything goes outside pre-determined limits.

Entry and Exit Protocols

All personnel entering and leaving the laboratory follow stringent procedures to maintain the containment barrier. When staff enter the high-containment areas clothing, jewellery and all other possessions are left outside. They then pass through an airlock and dress in specially provided laboratory clothing. On exit, staff leave all their laboratory clothes inside the containment area then shower, including washing their hair, before dressing in their street clothes again.

Effluent Decontamination System (EDS)

The new facility will produce wastewater from showers, laboratory sinks and toilets. A bespoke effluent decontamination system has been designed to sterilise this liquid effluent. Heat treatment is the primary sterilisation method, but a chemical sterilisation method can also be used in the event of higher volumes of effluent production such as during a biosecurity or health response (where more people would be working inside the building).

The new lab is expected to open in 2019

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