

Case Study: Bio-decontamination of a biomedical research room using gaseous hydrogen peroxide

Site:	<i>Imperial College, Central Biomedical Services</i>
Location:	<i>Hammersmith, London</i>

Overview

A single 166m³ room at the Imperial College, Central Biomedical Services research facility was believed to be contaminated with “Tyzzer’s” disease (*Clostridium piliforme*) which can infect laboratory subjects. The room also contained equipment including cages, two large isolators and electrical equipment, so would have presented a difficult challenge to conventional decontamination methods.

Solution

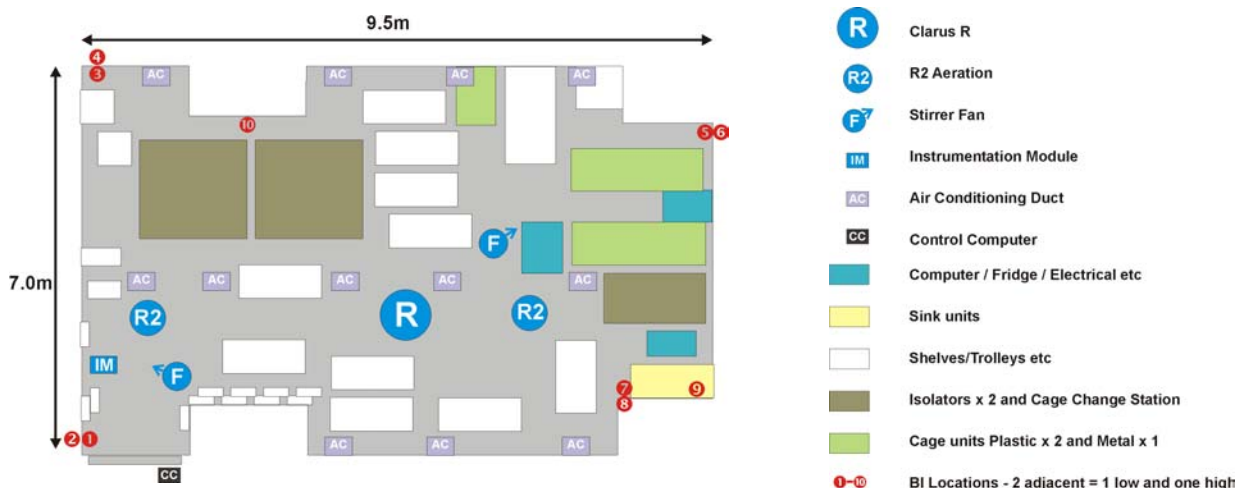
Imperial College selected BIOQUELL’s Room Bio-decontamination Service (RBDS) to treat the area. A Clarus™ ‘R’ hydrogen peroxide gas generator was strategically placed in the room along with two stirring fans to ensure even gas distribution and two R2 aeration units to remove the H₂O₂ gas. An instrumentation module was also included in the room to monitor the key parameters and link the equipment to the

external control computer. The room was then sealed before being conditioned, gassed and aerated to remove the hydrogen peroxide gas. The entire process was monitored and controlled from outside the room via the control computer.

Gassing Cycle Validation

Bacillus stearothermophilus spores dried onto metal carriers at an inoculum of 10⁶ were used as biological indicators (BIs) to validate the gassing cycle. Two BIs were set up in all four corners of the room. Additionally, two ‘challenge’ BIs were positioned behind one of the large isolators and under the sink. A BI map was generated for the target room to trace BI locations (see diagram below).

Gassing Parameters:	
Starting Atmospheric Temp:	22.0°C
Starting Relative Humidity:	34.5%
Room Volume:	166m ³
Gassing time:	1 hour (25g/min)
Dwell period:	40 mins
Airflow:	60m ³ /h
Aeration time:	3.50 hours



Results

The BIs were retrieved after aeration and incubated for seven days at 60°C. Three control BIs were also incubated that were not exposed to the gassing process. All three control BIs grew successfully. **None of the BIs from the test room grew.**

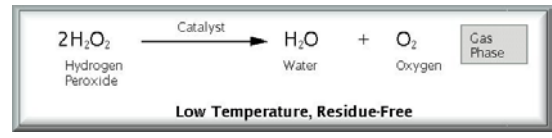
Conclusion

The bio-deactivation target of a 6-log reduction in *B. stearothermophilus* spores was demonstrated in the target room. The Clarus™ R provides a very rapid and effective bio-decontamination system, which combined with the rapid aeration method produces a minimal complete cycle time. The total cycle time was less than 6 hours, which considerably exceeded the customer's expectations.



Clarus™ R gas generators and R2 aeration unit

Background: Bio-decontamination within a room or chamber is achieved by depositing an even layer of 'micro-condensation' of H₂O₂ over all surfaces. The term 'micro-condensation' may be defined as a microscopic film of H₂O₂, which being at a sub-micron level is invisible to the naked eye. Scientific research has proven that it is this low temperature, residue-free deposit that actually deactivates micro-organisms during the gassing process.



This system can be used in many other applications such as bio-decontamination of specific problem-causing micro-organisms or for general bio-decontamination of laboratories, including CL3 facilities, cleanrooms, pharmaceutical manufacturing plant, etc. The Clarus™ R system is infinitely scalable so that very large areas and entire suites can be rapidly and effectively bio-decontaminated.

For further details of H₂O₂ bio-decontamination solutions including equipment and room services, please contact BIOQUELL.

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