ClorDiSys

*"The Chlorine Dioxide People"*

**Providing you with gaseous chlorine dioxide solutions for your decontamination needs**

# ClorDiSys Minidox-M gas generator in conjunction with the Allentown, Inc Bio-Containment Unit

## Objective

This study was designed to validate the use of a Clordisys Solutions, Inc chlorine dioxide gas (CD) generator to decontaminate the Allentown Inc Bio-Containment Unit (BCU) rack and cages in a room both with and without bedding inside the caging.

## Background

Due to chlorine dioxide gas' superior distribution and penetration as a true gas, decontaminating the BCU itself was thought to be an easy task. It was also thought that chlorine dioxide gas would be able to penetrate through the bedding and decontaminate it as well. To test the efficacy of CD on a BCU with bedding filled caging, nine different types of bedding were added to the cages.

## Equipment

1. Allentown 42-cage BCU Mouse rack with full complement of cages
2. Nine different cage bedding types
    a. Three paper based beddings
    b. Two corncob based beddings
    c. One paper, corncob mixed bedding
    d. Three wood shavings based beddings
3. Clordisys Minidox-M Portable CD generator
4. SGM Biotech, Inc *Bacillus Atrophaeus* 1x10^6 Biological Indicators

## Setup

1. The BCU was placed into a room that would be sealed for decontamination
2. Biological indicators were placed in each cage of the rack (42 total)
3. Biological Indicators were also placed in each supply and exhaust plenum (14 total)
4. Biological Indicators were placed inside the battery housing, blower housing, exhaust flex hose, vertical main supply and vertical main exhaust (5 total)
5. Biological Indicators were placed inside empty water bottles in every other cage (21 total)
6. The BCU was plugged in such that it was in run mode, and would pull the CD gas which was to be injected into the room through its entirety.
7. The room that the BCU was in was sealed for decontamination
8. Cycle parameters were loaded into the Minidox-M:

    For decontamination of BCU without bedding, cycle parameters were:
    a. 65% RH humidity level set point, 5 minute condition time
    b. 1 mg/L CD gas concentration set point, 2 hour exposure time

    For decontamination of BCU with bedding, cycle parameters were:
    a. 65% RH humidity level set point, 5 minute condition time
    b. 2.5 mg/L CD gas concentration set point, 12 hour exposure time

## Procedure

1. The cycle was started on the Minidox-M which then controlled the decontamination cycle by:
   a. Raising the humidity level to 65% in the Pre-condition step.
   b. Holding the humidity level at 65% for 5 minutes in the Condition step.
   c. Injecting CD into the room during the Charge step, bringing the concentration up to the correct set point.
   d. Holding the concentration level at at the correct set point for the proper length of time in the Exposure step.
2. Aeration of the CD gas upon completion of the exposure step.
3. All Biological Indicators were collected from the BCU and placed in growth media using aseptic techniques. Biological indicators were then incubated for seven days. An unexposed positive control biological indicator was also placed in growth media and incubated for seven days.


**Bedding 1**


**Bedding 2**


**Bedding 3**


**Bedding 4**


**Bedding 5**


**Bedding 6**


**Bedding 7**


**Bedding 8**


**Bedding 9**

## Results

### BCU without bedding:

The Minidox-M precisely controlled the entire cycle up to aeration, raising both the relative humidity and CD concentration to the correct levels and holding them at the selected levels for the proper amount of time.
After seven days, there was no growth exhibited from any of the exposed biological indicators. Growth was seen within twenty-four hours from the unexposed positive control biological indicator.

### BCU with bedding:

The Minidox-M precisely controlled the entire cycle up to aeration, raising both the relative humidity and CD concentration to the correct levels and holding them at the selected levels for the proper amount of time.
After seven days, there was growth exhibited in only biological indicators buried underneath one type of bedding. The biological indicators underneath all eight other bedding types showed no growth after seven days. Growth was seen within twenty-four hours from the unexposed positive control biological indicator.

## Conclusion

Based on the results, chlorine dioxide gas achieved full 6-log sporicidal kill throughout the entire rack, including the cages themselves when the cages were empty. As such, chlorine dioxide gas was shown effective in decontaminating Allentown Inc's Bio-Containment system when cages were empty.
Results of the decontamination cycles when bedding was inside the cages were mostly successful, with biological indicators underneath eight of the nine different bedding types exhibiting no growth after seven days of incubation. With the added organic material, the standard chlorine dioxide gas cycle would not be enough to provide kill beneath the bedding. An extended cycle was developed that was able to kill BI's underneath eight of the nine types of bedding tested. Only one of the less popular beddings (dense wood shaving based Bedding 9) did not have full 6-log sterility. The cycle consisted of an exposure of 2.5 mg/L of chlorine dioxide gas for 12 hours. Due to the increased CD exposure to materials within the BCU, Clordisys does not recommend such a cycle to be run routinely. However, Clordisys does see the extended cycle to be an effective method in non-routine cases where caging shouldn't be removed and handled under normal circumstances.

## Future Testing

Additional testing by injecting gas directly into the BCU system is also planned. Information will be updated when available.