

**Overview**

The Department of Health (Health) and the University of Vermont (UVM) have worked on a collaborative project resulting in a new State-owned laboratory that is connected to the existing University of Vermont Colchester Research Facility (CRF) located at the Colchester Business and Research Park.

This project is a collaborative partnership; the research facility contains space that is dedicated to Health, space that is shared between Health and UVM, and space that is dedicated to UVM. The CRF building is owned, maintained and managed by UVM and consists of labs, offices, an animal care facility and conference rooms. The new building will be owned and managed by the State, and is sited on land leased from UVM.

HDR, an architecture and engineering firm was selected for the design and planning and PC Construction built the laboratory. The construction project is managed by Buildings & General Services (BGS) with assistance from UVM under a contract with the state and in collaboration with representatives from BGS and Health. The construction of the laboratory began with the ground breaking in April 2013, with projected completion of the laboratory over an 18 to 24 month period. The building is considered one of the three most complex and technical buildings in the state.

**Construction and Commissioning Process**

The construction of the laboratory was completed in fall of 2014 with commissioning of the building to provide an organized, documented and systematic process of testing and analyzing the facilities, building systems and equipment to ensure that they perform as designed. This is particularly important for a laboratory that is technically complex. To perform this service, the State (BGS) contracted with Integrated Project Services, Inc. (IPS).

In preparation for the commissioning process by IPS, Health contracted with Global Biohazard Technologies (GBT) to provide a “third party” verification of the Biosafety Laboratory 3 (BSL-3). This is an important aspect as GBT is very familiar with the Centers for Disease Control (CDC), Select Agent Program review and Biosafety Lab-3 (BSL-3) verification requirements.

This verification process is based on the Centers for Disease Control (CDC) and the National Institutes of Health (NIH) published guidelines, Biosafety in Microbiological and Biomedical Laboratories (BMBL), 5th Edition. These guidelines require that the facility and the procedures for operating the facility be appropriate for that facility’s biosafety level. Biosafety is the application of safety precautions that reduce a laboratorian’s risk of exposure to a potentially infectious microbe and limit contamination of the work environment and, ultimately, the community.

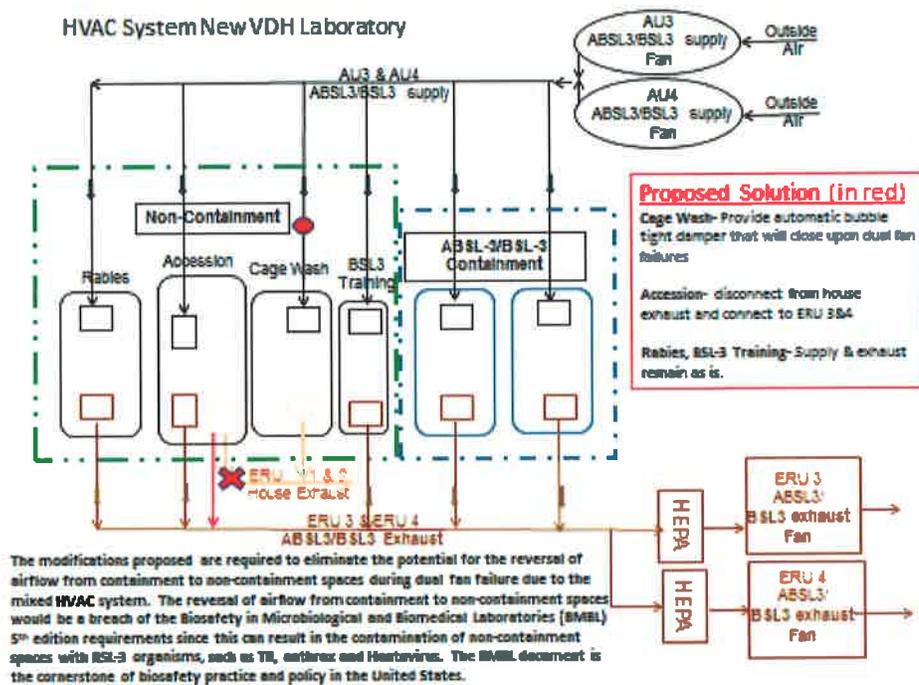
**Issues and Setbacks**

As a result of the BSL-3 commissioning process, several issues emerged that requires a design solution and mechanical modifications. The diagram can be viewed on the next page.

- 1- The rabies lab, accessioning lab, and a training room were incorporated into the HDR design as containment rooms resulting in HVAC duct work configuration connecting to BSL-3/ABSL-3. As a result of this design strategy, the Differential Pressure Indicators (DPIs) which are intended to monitor the differential pressure between clean areas and potentially more contaminated areas showed that the pressure readings and transient reversals (going positive) at laboratory doors in containment rooms. A visual negative pressure reading is required prior to entry into these spaces.
- 2- The cage wash room is considered outside of containment. Even though considered outside of containment, the cage wash air supply is provided by AHU 3&4, which is the same HVAC system that supplies air to the BSL-3/ABSL-3 laboratories. Since the room’s exhaust is on the house (ERU 1 & 2) exhaust system, this has resulted in a mixed HVAC system that can lead to potentially contaminated air entering non-contaminated spaces upon fan failure.

From a commissioning standpoint, IPS and GBT both maintain that the duct work configuration for the BSL3/ABSL3 should be isolated and not connected to non-containment spaces such as rabies, accessioning, cage wash and the training room. Safety concerns include the potential for reversal of airflow from potentially contaminated spaces to non-containment rooms during dual fan failures.

The diagram below illustrates the new design solution and mechanical modifications that will address the safety concerns outlined above.



- 3- A strobe light system will be added within the BSL-3/ABSL-3 as a visual indicator for staff working in the rooms. The current design is an audible alarm system located outside of the rooms that cannot be heard due to the noise level of the Bio-Safety Cabinets and when Purified Air Personal Respirators are worn. The addition of the strobe light is a safety measure to warn the laboratorian's of a failure of the exhaust systems while working within the containment labs.

**Solution and Timeline**

The solution agreed upon by PC Construction, BGS, UVM Facilities, IPS and GBT that is underway and to be completed in April and May is as follows:

1. As designed by HDR, perform the following BSL-3 HVAC modifications:
  - Convert from manual to automatic the bubble tight damper on the air supply duct in the cage wash room creating automatic closure upon dual fan failures.
  - Disconnect the accessioning room from the house exhaust and connect to BSL-3/ABSL-3 exhaust ducts ERU 3 & 4.
  - Supply and exhaust for the rabies and BSL3 training room will not be modified.
2. Installation of strobe light notification system in the BSL3/ABSL3 rooms.

February	March	April	May	June	July	August
<ul style="list-style-type: none"> <li>▪ Funds identified for modification.</li> <li>▪ Change Order submitted by BGS with approval for HDR to modify design (two weeks).</li> <li>▪ Change order is under review.</li> </ul>	<ul style="list-style-type: none"> <li>▪ HDR to design modification (two weeks)</li> <li>▪ PC const. to review modification and produce pricing and timeframe to BGS (two weeks).</li> </ul>	<ul style="list-style-type: none"> <li>▪ BGS gives notice to proceed on BSL revisions</li> <li>▪ PC const. and sub-contractors to begin work within the laboratory (two months April and May)</li> </ul>	<p>PC construction and sub-contractors complete work within the laboratory.</p>	<ul style="list-style-type: none"> <li>▪ IPS performs commissioning with revised failure scenarios (two weeks).</li> <li>▪ PC const. resolves issues if failure scenario(s) and commissioning do not pass. IPS repeats testing (TBD if needed).</li> <li>▪ Dept. of Health submits failure scenario results to CDC Select Agent Program.</li> <li>▪ Uninterrupted BSL-3 systems trending (two weeks)</li> <li>▪ GBT repeats failure scenarios from IPS, verifies BSL-3 lab spaces.</li> </ul>	<ul style="list-style-type: none"> <li>▪ GBT produces BSL-3 verification report.</li> <li>▪ Approval from CDC Select Agent Program</li> </ul>	<p>Relocation of laboratory barring any schedule issues.</p>