Tradeline Publications: Battelle Increases BSL-3 and ABSL-3 Research Space

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Since the September 11 attacks in 2001, Battelle, with the nation’s largest privately owned BSL-3 laboratory, has seen continuous and substantial growth due to an increased interest in Select Agent research. Battelle conducts the bulk of this type of research at its 183,000+sf Biomedical Research Center (BRC) in West Jefferson, Ohio, 17 miles from the organization’s headquarters in Columbus.

Research at the BRC focuses on developing medical countermeasures against pathogens, decontamination of toxic materials, and threat assessment. The facility now houses more than 180 scientific and support personnel, up from only 61 staff members five years ago. The BRC is just one of several BSL-3 facilities in the country capable of studying aerosolized biological agents in living organisms.

The newest addition to Battelle’s BRC is a 53,000-sf, three-story facility connected to three other existing research buildings by airlocks and hallways. The latest facility includes six new ABSL-3 animal holding rooms, bringing the total for the entire complex to 15, and 10 new BSL-3 labs, increasing the total to 22. Office space in the new facility is wrapped along the outside corridor, providing cubicle or office space for 90-plus staff members.

The Schedule

“We were in a good position to accelerate this project schedule since the new facility was built to complement and expand on existing facilities,” says John Henneman, coordinator for Battelle’s BRC Biofacilities, who served as onsite project director for construction of the new facility. “We knew our equipment requirements upfront and had a good idea of what we wanted in terms of structural components.”

The project took approximately 20 months from initial design to occupancy. In March of 2005, Battelle hired the Gilbane Building Company of Columbus, Ohio, to serve as construction manager. Construction started in January of 2006, with occupancy and move-in beginning in August of that same year.

“Most likely we shortened the normal process by about three or four months by establishing Gilbane as CM-at-risk as the first step, before even selecting a project architect,” says Henneman. “It was a departure from the traditional design process, but for this project it made sense since it allowed Gilbane to start buying major equipment right away that we knew we needed such as decontamination autoclaves and cage washing systems.”

“Even after the full team was in place we tried to incorporate strategies throughout the construction process to keep the project schedule ahead of pace,” says Jeff Schramm, vice president of Gilbane and project executive for the project.

“For example, instead of having traditional submittals merely forwarded to our office, we threw what we called ‘submittal parties’ at the construction site where vendors and subcontractors could submit their bids in person,” says Schramm. “This let us go through submittals immediately and respond to subcontractors right away.”

Facility Highlights

“In contrast to our existing labs, individual holding areas in the new facility are located directly across the hall from six of the BSL-3 labs,” says Henneman. “It is also designed so that each end of the facility has its own changing rooms, autoclave, and cage washing areas to address redundancy issues.”

While Battelle prefers to keep most of its actual laboratory configurations and practices proprietary, Henneman was able to describe several unique safety features within the labs.

“The Class-III biosafety cabinets in use within the new BSL-3 labs were developed specifically for Battelle in 2004,” says Henneman. “They were the first ever Class-III biosafety cabinet to be produced with mobile transfer carts.

“Over the years we have made modifications to the original design including the addition of rapid transfer ports that allow us to conduct aerosol research within the cabinets in addition to low-containment studies.”

Henneman points to the facility’s underground access tunnel as another distinctive feature of the new facility.

“We minimized the space underneath the building by only allowing access to the piping and the critical areas that lead to our effluent decontamination system,” says Henneman. “The utility tunnels are positioned directly below corridors that service holding rooms and labs providing easy access to the pipes for maintenance.”

Large viewing windows were added to six of the new
labs so that other researchers or visitors can observe lab activities from the hallway. Of these labs, three also have a wireless intercom system that enables tours to also hear what is happening in the lab and enhances communications between technicians and project leaders.

Animal holding areas in the new facility all use continuous sealed MMA flooring and have sloped trench drains along the floor level of the interior walls. The drains are protected by a rail system to ensure that animal racks cannot roll into the drains. In addition, the animal holding rooms have adjacent 8’ x 12’ anterooms to further isolate animals from the facility’s clean corridor.

**CDC Approval**

The new labs and containment areas are currently operating as a BSL-2 facility since the results of Battelle’s CDC Select Agent inspection that took place in October of 2006 are still pending.

“We fully expect to be operating as an enhanced BSL-3 by the middle of 2007 once the paperwork and CDC registration is complete,” says Henneman. “We designed the facility to meet all requirements of enhanced BSL-3 laboratories as defined by CDC’s guidelines in the *Biological Safety in Microbiological and Biomedical Laboratories (BMBL)* publication.”

These enhanced requirements include security access control and monitoring, gowned areas for labs and shower out capabilities, autoclaves for solid waste, liquid effluent decontamination systems, and gas decontamination capabilities for entire labs.

The new facility has pass-through autoclaves that are eight feet long, 50 percent larger than autoclaves in use in other areas of Battelle’s BRC. In addition, the new facility has hydrogen peroxide vapor (HPV) ports in the ceiling so that the entire lab can be decontaminated with peroxide gas. Over the last 11 years, Battelle has used validated HPV technology to safely remove critical equipment from the containment laboratory.

“In addition to meeting the CDC’s Select Agent requirements, every decision we made was related to the science of the building,” says Henneman. “As we continue to expand our work with Select Agents and vaccine research, we needed this new facility to be able to handle any animal research requirements related to rodents, non-human primates, and poultry.”

**Lessons Learned**

“Integrated involvement between the owner and among all team members from the very beginning of the project is what allowed us to accomplish what we did in such a short period of time,” says Schramm. “It is also what helped us ensure that no major shutdowns took place in the adjacent BSL-3 animal facility that stayed in operation during the entire construction process.”

He adds that even the independent commissioning agent was brought on board at the very beginning of this project. It is a strategy he recommends for all major projects, rather than reserving commissioning as an end-of-construction task.

“Having the commissioning agent attend our monthly planning and update meetings ultimately saved an immense amount of time,” says Schramm. “Originally we planned that commissioning would take a couple of months at the end of the job. In reality it took only two and a half weeks because we had worked so collaboratively throughout construction.”

Schramm also recommends working closely at the start of each project with mechanical and electrical subcontractors to coordinate utility issues including critical elements such as where ductwork will be positioned, how conduit will be mounted, how light fixtures will be mounted, how supply air will be diffused, and how all of those things will tie together.

“All conduit in Battelle’s new facility, including lighting, is surface mounted which saved us time during construction because we did not need to coordinate with mechanical engineers about placing and sealing the conduit within the walls,” says Schramm. “Surface mounting is equally effective and more efficient when timing is an issue.”

Henneman feels that a key element to this project’s success was that the final building design is flexible enough to respond to evolving scientific programs and equipment upgrades.

“We wanted a facility that can easily adjust to future research needs,” says Henneman. “Our current researchers have exactly what they need now, but we also added things like extra utilities, drainage, and plumbing so that the rooms are flexible enough to accommodate different types of equipment, if necessary. We can easily switch gears for different research needs.”

**Biographies**

John Henneman serves as coordinator of special facilities for Battelle’s BRC. He has more than 25 years of experience in scientific research of which the last 12 have been managing biofacility operations of the BRC. He began his career as a lab technician and research associate for the National Cancer Institute. In his current position, Henneman controls facility access, coordinates numerous maintenance contracts, supervises water testing, manages infectious waste facility operations, and chairs the BRC Environment, Safety, Health and Security Committee. Henneman has a Bachelor’s degree in biology from Mansfield University, Mansfield, Pennsylvania, and a Master’s degree in environmental biology from Hood College, Frederick, Maryland.

Jeff Schramm is a vice president and principal of Life Sciences COE (Center of Excellence) for the Gilbane
Building Company. Schramm has worked in the construction industry for 23 years. He is responsible for Gilbane’s Life Sciences Center of Excellence, which serves clients that are constructing biocontainment, high-tech laboratory, pharmaceutical and biotechnology facilities in the private, public, and university sectors.

This article is based on a presentation given by Henne man and Schramm, along with David Duthu, at the Tradeline Animal Research Facilities conference in November 2006.

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**Figure 1**

Battelle Memorial Institute, which conducts $3.7 billion in annual research and development, recently opened this new BSL-3 lab and animal holding facility at its Medical Research and Evaluation Facility (MREF) in West Jefferson, Ohio, 15 miles from the organization’s headquarters in Columbus. (Photo courtesy of John R. Henneman, Battelle.)

**Project Team**

- Architect: Flad & Associates, Madison, WI
- Biosafety Cabinets: The Baker Company, Sanford, ME
- Civil Engineer: URS, Columbus, OH
- Commissioning Agent: URS, Columbus, OH
- Construction Manager: Gilbane Building Co., Columbus, OH
- Fire Protection Engineer: ccrd partners, Houston, TX
- Laboratory Planner: Flad & Associates, Madison, WI
- MEP Engineer: ccrd partners, Houston, TX
- Structural Engineer: Flad & Associates, Madison, WI

**Figure 2**

These mobile Class-3 biosafety cabinets include glove ports and rapid transfer ports so that Battelle researchers can conduct both low-containment studies as well as high-containment aerosol research studies. (Photo courtesy of John R. Henneman, Battelle.)

**Pandemic Flu Epidemic Web Site**

Managed by the United States Department of Health and Human Services, the following web site provides information to assist individuals and communities in preparing for a pandemic flu epidemic:

www.pandemicflu.gov/take theleadindex.html