

# **BEST-IN-CLASS CL-3 / BSL-3 MECHANICAL DESIGN FOR LABORATORY OPERATIONAL EFFICIENCY AND SUSTAINABILITY**

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## **Background**

Merrick, founded in 1955, is an employee-owned, multidisciplinary professional services firm specializing in engineering and architectural design, custom equipment design-build, procurement, construction management, and geospatial services. Merrick Life Sciences supports complex laboratory and research & development projects with a focus on high containment for human, plant, aquatic and animal health. Specialties include facility programming, design, commissioning, operations, RG 2-3-4 validation and biosafety/biosecurity. Merrick is leveraging this experience as the engineers and architects-of-record for more than 200 CL3 / (A)BSL-3 facilities around the world to present preferred technical solutions and impacts recommendations for life cycle cost efficiencies and sustainable laboratory functions throughout a 30-50 year lifespan.

## **Learning Objectives**

Following this course participants will improve their understanding of:

- The current best-in-class MEP design principals for CL-3 / BSL-3 laboratories, Options will be shown
- The linkage between design and laboratory operations
- Lessons-learned from many laboratories
- How compromises in design can lead to operational challenges and increased operational costs
- Beyond flexible casework – how to ensure your laboratory has the flexibility to adapt to your changing program
- Influence of Risk Analysis on design and operations
- The linkage between design, commissioning, and laboratory performance
- How to improve the function of an already operating laboratory
- Safe, Smart Sustainability – Sustainable & Energy efficiency opportunities that lead to real savings without compromising performance or safety
- Project Delivery Models and influence on quality of Containment Solutions

## **Discussion**

This course is intended for facility directors, managers, lead investigators, biosafety officers, and O&M staff who have an existing CL-3 / BSL-3 facility or will be building one in the future. Using real life examples of successes and failures, the course will discuss topics including ventilation rates and convective patterns, filtration, control strategies and automation, emergency power requirements, fire alarm and fire protection integration, engineering for failure scenarios, energy recovery options, right sized redundancy, and commissioning based on hard performance targets. Rather than focus solely on parties considering new facilities, the course will also discuss minor renovation options, non-invasive changes that can be implemented as part of your annual PM routine, and optimizing how your SOPs and facility work together to benefit most owners/users who are working with existing facilities. The course

is intended to be collaborative with the participants contributing to the direction of the course to ensure areas of specific interest are adequately addressed, ideas are exchanged, and at the end of the day participants leave with concrete design options, opinions, and recommendations that they can apply to their facility.

**Proposed 8-hour Course Agenda:**

1. Introductions and confirmation of course objectives
2. Influence of Architecture, Structure and Electrical services on Mechanical Systems
3. Lessons-Learned from built facilities  
Break
4. Influence of Redundancies and Risk Analyses
5. Impact of Standards, Guidelines and Design Codes
6. Connection of Design to Program and Operations, now and into the future  
Lunch (by Merrick)
7. How to measure and calculate system sizing
8. Technical Examples of HVAC designs
9. Technical Examples of Plumbing Designs and Liquid Treatment System Options
10. Implications of BAS control systems and alarm management  
Break
11. Commissioning for performance and validation
12. Operations Costs and Sustainable Practices
13. Technical HVAC Exercise
14. Project Delivery Models; What's best for Containment Projects