

1 Executive Summary

The purpose of this report is to provide a clear, concise summary of the EMD Serono Research Center – existing building’s mechanical system. Design requirements, external influences on design, major equipment, system configuration, control logic and operating characteristics of this building are evaluated in this report.

One of the main objectives of the mechanical system design is to provide safe and healthy indoor air quality to its occupants. AHU-1 serves the research and development laboratories, AHU-2 serves vivarium rooms, and AHU-3 serves administrative offices. Since laboratories and vivarium rooms are critical spaces that generate potential hazardous contaminants, both AHU-1 and AHU-2 provide 100% outdoor air to these spaces. Those critical spaces also use high efficiency filters (MERV15) and have 100% exhaust air rate. As a result, the HVAC system ensures that contaminated air does not recirculate and transfer inside the building.

The mechanical system of the EMD Serono Research Center – existing lab building has a chilled water cooling plant and a gas fired central heating plant. The cooling plant consists of a water cooled centrifugal chiller, a cooling tower, and an air cooled chiller. The heating plant consists of two low pressure steam boilers and two heat exchangers. Air is distributed throughout the building by variable and constant volume terminal boxes in each space. There are three air handling units in this building. Inside each air handling units, there is low pressure steam pre-heat coils to precondition the outside air in the winter time, cooling coil are located downstream of the preheat coil to cool the air in the summer time. Conditioned air is then distributed into the spaces. In the winter season, pre-conditioned air from AHUs is conditioned again by the hot water heating coils in the terminal boxes prior to entering the space. Hot water inside the heating coils is coming from the heat exchangers.

The overall construction cost of this building is approximately 15 million. The cost of the HVAC system and control system is about 3.2 million. When accounting the plumbing and fire protection systems, the total mechanical cost is about 4.6 million which is 29% of the total construction cost.

A LEED analysis for the mechanical system was also performed in this report. LEED 2009 for New Construction and Major Renovations rating system was used. According to the analysis, 2 credit points were earned from the Energy and Atmosphere section and 3 credit points were earned from the Indoor Environmental Quality section. The United States Green Building Council (USGBC) began LEED certification in 1998. Since this project was started in 1999, LEED certification was a fairly new concept at the time of design so that it was not considered in the design process. Undoubtedly

many more credits would have been achieved if LEED accreditation standard was utilized during the design process.

Overall, the mechanical system designed for this building responds well to the objectives and challenges presented in this project. Great efforts were made to minimize contaminated air's recirculation and transfer inside the building in order to provide safe and healthy indoor air quality to its occupants. The reports to follow will attempt to continue investigating the mechanical system, and improving system design to reduce energy consumption of this building.