



UNIVERSITY of MARYLAND
UPPER CHESAPEAKE MEDICAL CENTER

MEMBER OF UPPER CHESAPEAKE HEALTH

Cogeneration

Combined Heat and Power (CHP) Systems



University of Maryland Upper Chesapeake Medical Center
500 Upper Chesapeake Drive
Bel Air, MD 21014



Overview

The Upper Chesapeake Medical Center contains a 200 bed state-of-the-art general medical and surgical hospital and medical complex, serving the residents of northeastern Maryland. The Medical Center sits on a campus in Bel Air, housing the hospital itself, two medical office buildings (MOB) Pavilion I and II, a parking garage, and the Klein Ambulatory Care Center of Harford County, which contains outpatient laboratory, testing, and surgical spaces as well as the administrative offices for Upper Chesapeake Health. The Hospital was constructed in 2000 and underwent an expansion in 2008 which included an expanded Emergency Department and the addition of a new parking garage and medical office building (Pavilion II). A new 75,000sf multidisciplinary Cancer Center was constructed on the campus and opened October 2014.

Electrical Distribution

Electrical service to the campus is delivered via a pair of 34.5 kV feeders and a main 34.5 kV/600A service station. This service station feeds three substations located in the main building and three outdoor pad-mounted transformers serving the Klein Ambulatory Care Center, Pavilion 2, and the Kaufman Cancer Center. Substations “USA” and “USB” are 2000 kVA each and deliver 480V power to a mixture of normal, critical, life safety, and equipment loads. Substation “USC” is 3000 kVA and delivers 480V power to the central plant.

Emergency Power is provided by one 1500KW Diesel-fired Emergency Generator located adjacent to the central plant in the rear mechanical pit. This generator feeds 6 automatic transfer switches throughout the facility which feed emergency power to various distributed emergency switchboards and panels.

Central Plant

Adjacent to the Main Building is a Central Plant which produces and distributes steam, heating hot water, domestic hot water, and chilled water to the campus.

The Central Plant contains:

- Four (4) 500-ton water-cooled chillers
- Four (4) 1000-1100 gpm constant speed primary chilled water pumps
- Three (3) 2250 gpm variable speed secondary pumps
- Four (4) 1500 gpm cooling tower cells
- Four (4) 1500 gpm constant speed condenser water pumps
- (3) fire-tube steam boilers producing 100 psi steam.
- One (1) 65 psig High Pressure Steam (HPS) line serves decontamination and sterilization equipment
- 20 psig Low Pressure Steam (LPS)
- Four (4) steam-to-hot-water heat exchangers provide hot water to the building VAV box reheat coils
- Three (3) steam-fired domestic water heaters

Central Plant continued

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- Four (4) steam-to-hot-water heat exchangers provide hot water to the building VAV box reheat coils
- Three (3) steam-fired domestic water heaters also exists at the central plant

CHP Major Components

➤ Power Generation and Distribution

- One (1) Caterpillar G3516H, 2.0 MW, Natural Gas generator set
- PLC controller for generator
- Siemens Apogee graphical user interface and computers

➤ Chilled water production

- One (1) Broad Model BHS106X, 350 ton Steam and Hot water fired Absorption chiller
- PLC controller for absorption chiller
- Pumps, Valves, Control Valves and Variable-Frequency Drives (VFDs)
- Alarm system

➤ Heat Rejection

- One (1) EVAPCO Model UT112 500 ton Stainless Steel Cooling Tower
- One (1) Cain engine heat recovery steam generator
- One (1) Engine jacket water plate heat exchanger
- One (1) Heating hot water plate heat exchanger
- Two (2) Engine jacket water radiators
- Pumps, Valves, Control Valves, and VFDs

CHP Major Components continued

- Engine Room Space Cooling
 - Three (3) Roof mounted Exhaust Fans
- Sump Pump Station
 - Sump Pump system
- Medium voltage switchboard/circuit breakers (CHP)
 - Protective relays (CHP and Main Central Plant)
 - Synchronization systems (CHP)
 - Meters and Instrumentation (CHP)
 - Batteries and chargers (CHP)
- Electronic Systems:
 - Electronic Controls (CHP)
 - PLCs for Engine and Absorption Chiller
 - Direct Digital Control (DDC) system field devices
 - Square D Power Monitoring Control System

CHP Major Components continued

- Field devices installed and utilized specifically for the CHP System operation. This includes items such as:
 - Natural gas meters
 - Heating and cooling system flow meters
 - Valves, actuators, temperature and pressure sensors.





