

1.0 INTRODUCTION

1.1 System Purpose

The primary functions of the Chilled Water System are to circulate cold Chilled Water from the Chillers in the University of Pittsburgh Medical Center's (UPMC) new Uptown District Energy Center, or UDEC, for use in air conditioning and other cooling applications and to return the warm Chilled Water to the Chiller. The purpose of this document is to provide plant operations personnel with a standard operating procedure for operating the Chilled Water System at the UDEC.

The Chiller System has the following major components:

- Chilled Water Pumps (CHWP-1, -2, -3)
 - Variable Frequency Drives (VFD-1, -2, -3)
 - CHW Chiller Bypass Valve
 - Chilled Water Booster Pump (CHWP-4) and Variable Frequency Drive
- Chilled Water End Of Line (EOL) Bypass Control Valve
- Air Separator (AS-1)
 - Expansion Tank (ET-1)
- Makeup Water Regulator
- Corrosion Monitoring and Control System
 - Inhibitor Chemical Feeder, Storage Tote, and Pump
 - Corrosion Monitoring Coupon Rack
- UPMC Heat Exchangers

The following systems, subsystem and major components interface with the Chilled Water System:

- Chiller System
- UPMC Existing Cooling Loop
- Integrated Controls System
- Electrical Distribution System
- HVAC System for use by Air Handling Unit 1 (AHU-1) and the Fan Coil Units in the Utility and Emergency Electrical Switchgears (FCU-1 through -FCU-6) in the UDEC
- Compressed Air System for use in the Air Coolers and Oil Coolers of the two Air Compressors in the UDEC.

1.2 Operational Outline

The Chilled Water System is operated to support the operation of the Chillers. The operator should monitor the Chilled Water System during the startup and shutdown sequences to verify proper system operation. During normal operation, the Chilled Water System equipment must be routinely monitored, both in the field and from ICS. Normally, the Chilled Water System will remain in service with at least one pump running at all times.

Operators must be aware of another aspect of Chilled Water System operation that is relevant when there is a refrigerant leak in the Chiller. As refrigerant leaks from the Chiller, the Chiller pressure and thus its temperature falls. In this situation, the Chiller refrigerant temperature can quickly fall below 32°F, which will cause Chilled Water in the Evaporator to freeze. Water freezing in the tubes can result in the tubes bursting. Therefore, it is important to maintain Chilled Water flow through the Chiller in the event that there is a shutdown due to a refrigerant leak, until water temperatures in the tubes are above freezing.

Typically, the startup of the Chilled Water System is accomplished through the ICS, using an automated procedure controlling the Chillers, Chilled Water System, and Condenser Water System. In a startup sequence, the ICS will modulate the Chilled Water and Condenser Water motor-operated flow-control valve(s) to the Chiller position; start the Condenser Water Pump; verify Condenser Water and Chilled Water flow; start the Chiller; send a Chilled Water temperature setpoint to the Chiller; and send a current limit setpoint to the Chiller. There is no automated shutdown sequence for the Chilled Water System; if it is desired to shut down the entire Chilled Water System, all three Chilled Water Pumps must be stopped manually (from ICS or the appropriate MCC controllers).

Operators may perform manual startups and shutdowns through the ICS or they may start and stop Chilled Water Pumps at their local controllers. Manual startups and shutdowns through the ICS are performed through the appropriate ICS System screen. Operators open the Chilled Water valves, start a Heat Exchanger, then start a Chilled Water Pump and monitor system flow and differential pressure. During a manual shutdown from ICS, after the Chiller is stopped and the appropriate time has elapsed, the operator may stop the Chilled Water Pump and close the Chilled Water valve to the Chiller, then select the operating Heat Exchanger and stop it (which will automatically close the associated Chilled Water System valve in the Heat Exchanger Building).

When performing a manual start at the equipment controllers, the operator starts a Chilled Water pump at the MCCs/Local Control Panel by rotating the HOA switch to the HAND position. They operate the Chilled Water valve by removing air signals (valve fails open to the Chiller position). Local manual shutdown requires the operator to stop the Chilled Water Pump by rotating the HOA switch to the OFF position. The Chilled Water valve to the Chiller must be closed by restoring its air signal.