

## **CHAPTER 5 - ELECTRICAL AND INSTRUMENTATION / CONTROL FACILITIES**

The following report gives an assessment on the existing condition of the electrical and instrumentation/controls facilities at MBC with recommendations for improvement.

### **5.1 ELECTRICAL FACILITIES**

#### **5.1.1 ELECTRICAL – General (E-6.1, 6.2, 6.3)**

In analyzing the existing power capacity from the San Diego Gas and Electric (SDG&E) incoming feed and the energy generated from the CoGeneration Facility (COGEN), it appears that the existing services have sufficient capacity to handle the maximum demand for MBC. However, the power system tends to be unreliable. When the utility power feed from SDG&E goes down, the COGEN tries to feed the grid but trips off due to overload. Thus, the COGEN similarly goes down resulting in a complete power outage for the facility. Consideration needs to be given for the overall reliability of the entire distribution system. Consideration should be given to reconfiguring the existing switchgear to provide COGEN a direct connection to SDGE without using the MBC's "A" side bus facility-wide standby diesel engine-generator sets (E-6.2)

In addition to the above, the reliability on the Utility side should be discussed with SDG&E as necessary upgrades need to be considered on the SDG&E side of the equipment. (E-6.3)

Reliability of the existing UPS needs to be determined and necessary upgrades need to be considered particularly for the UPSs in Areas 51, 60, 70 and 80. (E-6.1)

#### **5.1.2 OPERATIONS BUILDING – AREA 51 (E-1)**

##### **Problem**

The facility's existing Uninterruptible Power Supply System (UPS) that feeds the Distributed Control System (DCS) and the fiber optic hub needs to be supported through the existing emergency power generator located in Area 51. A power outage can result in loss of critical data to COMC. This task shall be accomplished in the near future by O&M staff.

##### **Recommendation**

Connect the 3 UPSs in Area 51 to the existing emergency power generator as planned under the M&E contract.

### 5.1.3 DIGESTERS COMPLEX- AREA 80 (E-2.1)

#### **Problem**

The gas flares become inoperative during a power outage.

#### **Recommendation**

The panel that feeds the gas flares needs to be connected through the existing emergency power generator in Area 76. This panel is presently connected to Bus "A" of the plant's electrical system, which is connected to SD&E. This task shall be accomplished in the near future by either O&M staff or the GRC contractor.

### 5.1.4 CENTRIFUGE BUILDING- AREA 76 (E-2.2)

#### **Problem**

There is a concern with possible interruption of ventilation air supply into the Area 76 Control Room during a power outage. It is suggested to provide a new external air supply fan in Area 76 Control Room independent of the room's existing Air Handling Unit. This new air supply fan needs to be connected through the generator panel for back-up power. The available capacity of the existing back-up generator in this area has to be determined for this new electrical load.

#### **Recommendation**

The UPS that feeds Work Station Drops 210 and 220 needs to be connected through the emergency power generator for this area to provide extended power to these drops during a power failure.

### 5.1.5 CENTRIFUGE BUILDING –AREA 76 (E-2.3)

#### **Problem**

The UPS that feeds the DCS bridge Work Stations Drop 210 and Drop 220 is not supported by the emergency generator in this building.

#### **Recommendation**

Connect the UPS that feeds Drops 210 and 220 to the power generator in this area.

### 5.1.6 BIOSOLIDS THICKENING – AREA 76 (E-2.4)

#### **Problem**

There are no existing lights for the thickened biosolids wetwell in the Centrifuge Building.

#### **Recommendation**

Provide lighting for the wetwell as planned and designed under the M&E Contract.

### 5.1.7 WASTEWATER PUMP STATION – AREA 94 (E-3)

#### **Problem**

No back-up power is available for the 15 hp wastewater pumps in Area 94. A power outage (planned or unplanned) can flood the drywell and can result in an on-site sewage spill.

#### **Recommendation**

To avoid costly sewage spills, it is recommended to install a small emergency generator to provide back-up power to the 15-hp pumps.

## **5.2 INSTRUMENTATION AND CONTROLS**

### 5.2.1 DISTRIBUTED CONTROL SYSTEM (DCS)

#### **Description of Design and Capacity**

- 3 data highways, #1&2 are full with no more expansion possible, #3 has a lot of space.
- #1 is totally maxed-out on I/O and DPU programming space
- #2 has minimum I/O & DPU space available

#### **Problems**

- I/O limitations, highways #1 & #2 cannot be expanded.
- Attempts to clean-up the programming and to retrieve I/O space is a lengthy process that will generate uncertain results.
- Impact on upgrades (manual alternatives considered, selection, design).
- DPU database limitations

- Historian optical drive is needed; however the new drives are not compatible with the existing software. A full operating system is therefore needed.
- DCS reprogramming clean-out will cost a lot of time and money
- DCS graphics need to be updated to reflect changes in the plant.
- The alarms and points disabled are still in the system using space in the I/O & DPU.

### **Recommendations**

- Recover unused or bypassed SID's. Note: This involves high cost, man-hours, and down time.
- Database recovery from cleaning-up DPU by reprogramming.
- If the recovery is not sufficient for the expansion needs of the plant, an upgrade to Ovation is recommended as the best solution.
- If the testing of the Octopus system by Alfa Laval for the centrifuge is successful, this system can be easily incorporated into OVATION.

### 5.2.2 VALVE MASTER STATIONS

- Description of what exists/types/compatibility
- Advantages/Disadvantages Limitorque vs. Rotork and other brands.
- Support/Installation/Program availability/Reliability/Parts/Maintenance.
- Relocate the Valve Master Station from Area 76 Centrifuge level to Area 76 MCC Room.

### **Problems**

- Limitorque vendors not responsive/lack of support & software not readily available
- System not compatible.
- Excessive use of valve actuators
- Installation location of actuators (inside chemical containment area)
- Unreliability of Limitorque (lack of support from the dealers and manufacturer)
- Limitorque Valve Master Station does not have HMI to quick change settings, addressing, and manipulating the valves
- The Valve Master Station located at Area 76 Centrifuge level creates frequent problems due to bad atmospheric conditions and water wash downs.

### **Recommendations**

- Remove the valve master station then direct connect to the DCS or use the DCS as valve master station (Limitorque).
- Relocate the valve actuators above or outside the chemical containment area.
- Remove the unneeded valve actuators then clean-out the control loop/wiring/etc.

- Upgrade to Ovation.
- Relocate the Valve Master Station to Area 76 MCC room for better condition and eliminate water wash down problems. Running the cables/conduits to the new location should be done by an electrical contractor and should be connected by Rotork to the VMS.

### 5.2.3 SIEMENS CONTROL SYSTEM

#### *(STAEFA-Building Controls & HVAC)*

- Description of HVAC, PRW (including AGT inlet valves & levels), HW, CW, PA, Chemical Leak Detection, Eyewash Stations, Interlock of smoke detectors to dampers, AHU's & EF's.
- BCU program is MS1800 (DOS based – Not user friendly and not standard to PLC).
- The network front-end program is INSIGHT.
- Uses telephone wires (very slow).

#### **Problems**

- STAEFA Systems product line discontinued.
- Not all is monitored or controlled by the DCS.
- Ethernet link needed to upgrade to newer version of INSIGHT telephone line will not work.
- MS1800 support is limited due to lack of Siemens staff that is familiar with the program.

#### **Recommendations**

- Change BCU's to Allen-Bradley PLC
- Replace telephone link with Ethernet.
- Add monitoring and control to the DCS.
- Upgrade to OVATION

***NOTE: MWWD has decided to upgrade the existing MBC control systems to OVATION. Upgrade will be completed by FY 2009.***

