

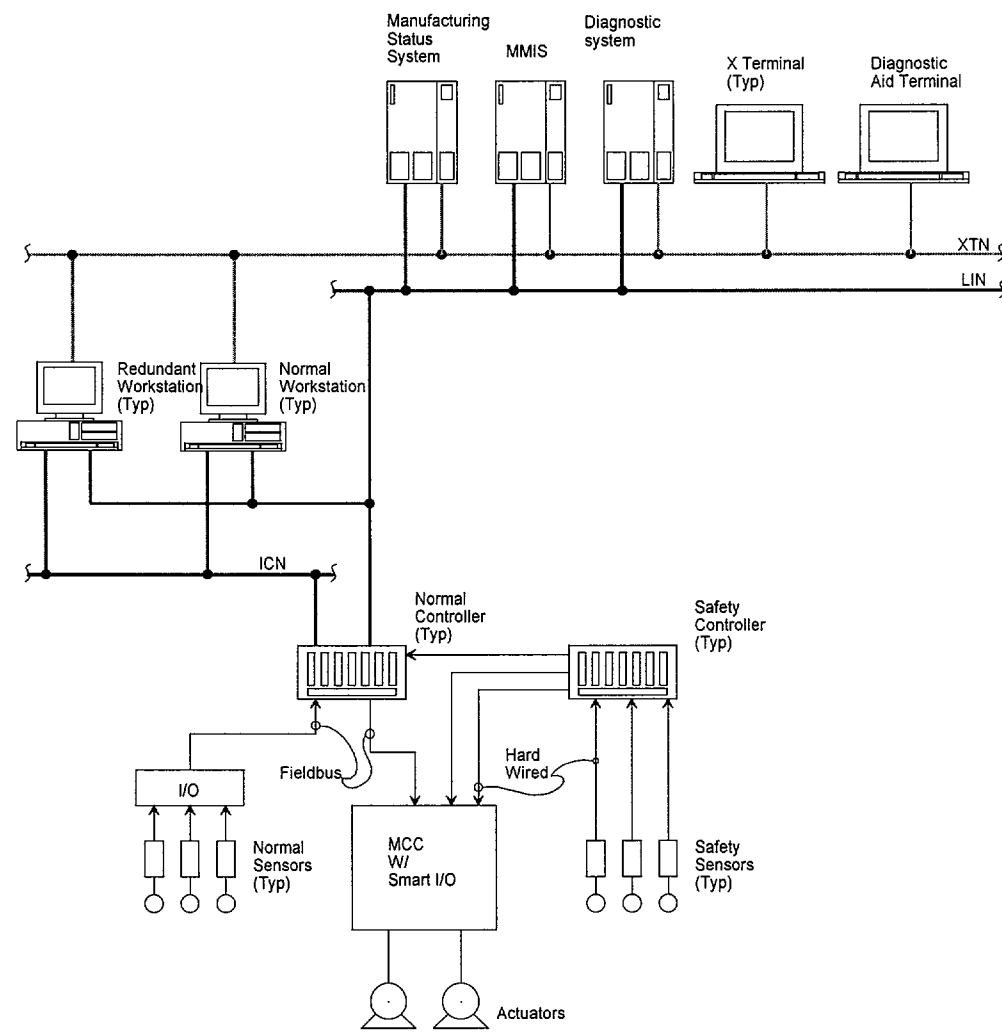
ATTACHMENT 5

DCS I&C Slides



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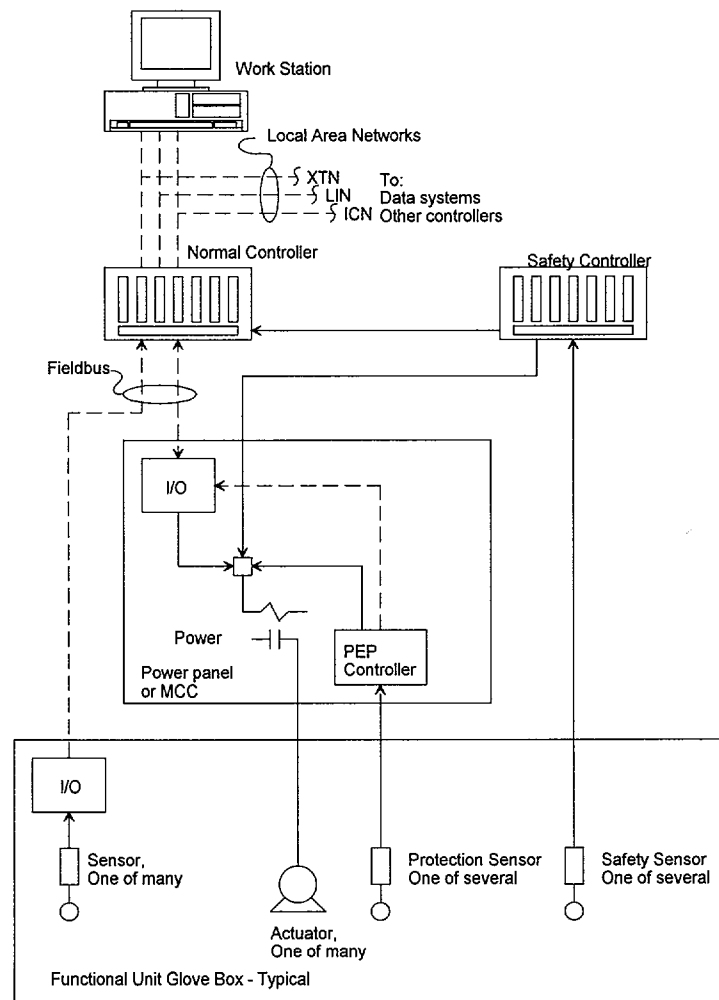
Process & Manufacturing Control Network





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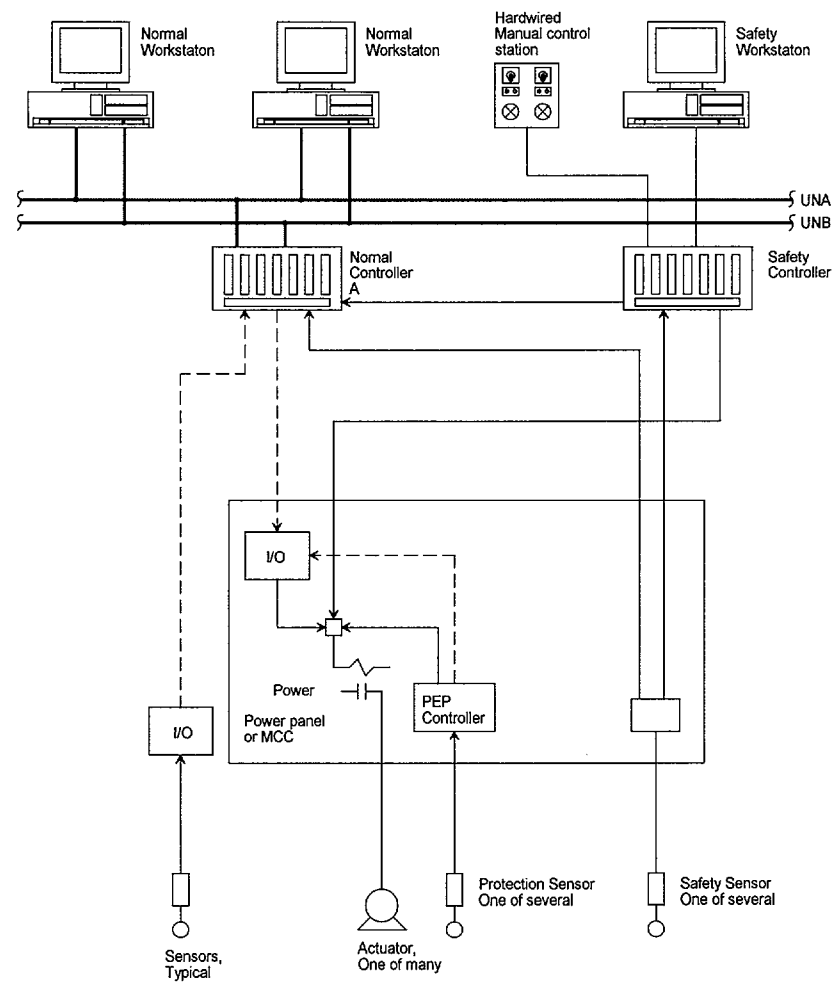
Normal and Safety Controller





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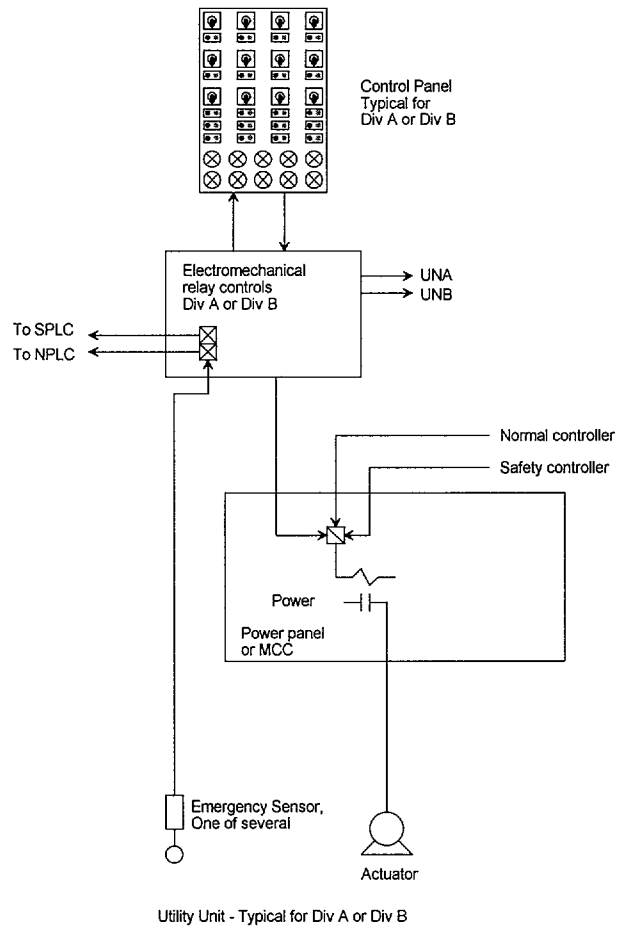
Utility Control With Safety Controller





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Emergency Control





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INTRODUCTION

- ELECTRICAL DISTRIBUTION
 - 13.8kV/4.16kV
 - 480V
 - 120 V AC UPS



Design Basis

NUREG - 1718

- * Sufficient Capacity and Capability
- * No Single Failure Vulnerability
- * Electrical and Physical Separation
- * Adequate Protective Relaying and Breaker Control
- * Status Monitoring Capability



Design Basis

- * Test, Calibration and In-service Surveillance Capability
- * Proper Equipment Qualification , Quality Assurance and Reliability
- * Adequate Design for Natural Phenomena



Capacity and Capability

- Two Physically Independent 100% Capacity Feeders from SRS
- Medium Voltage Distribution Sized for 100% Capacity
- Three Potential Power Sources
 - Normal Off Site Source (Redundant 100%)
 - Standby Diesel Generators (Two 50%)
 - Emergency Diesel Generators (Redundant 100%)



Capacity and Capability

- High Resistance Grounded Wye 480 V System
 - Allows Continued Operation With Single Ground Fault
 - Limits Ground Fault Current Magnitude
 - Limits Transient Overvoltages



Capacity and Capability

- Standby Diesel Generators
 - Non-IROFS Critical Electrical Loads
 - *Sintering Furnace
 - *C2 Ventilation
 - *Life Safety Loads
 - All Emergency Loads
 - 24 Hour Storage Tank Capacity
 - Automatic Start on Loss of Voltage



Capacity and Capability

- Emergency Diesel Generators
 - Loading
 - * IROFS Loads
 - * Vital UPS
 - * HD Fans
 - Automatic Start After Time Delay on Loss of Voltage or Degraded Voltage
 - 7 Day Storage Tank Capacity



Capacity and Capability

- Dedicated 480 V VHD Fan UPS
- Vital UPS
- Normal UPS
- 125 VDC Normal Batteries
- 125 VDC Emergency Batteries



Single Failure Criteria

- Emergency Systems are Redundant
- Physical Separation
- Electrical Independence
- Support Systems Redundant and Separate



Electrical and Physical Separation

- Minimum Criteria IEEE 384-92
 - Separation Distance Determined by Area Hazards
 - Barriers Used Where $<$ Minimum Separation
- Redundant Electrical Equipment in Separate Rooms and Areas



Minimum Separation Distance

Non-Hazard Area

Open Tray - 1ft. Horizontal and 3ft. Vertical

Enclosed Raceway - 1 inch

Limited Hazard Area

Open Tray - 3 ft. horizontal and 5ft. Vertical

Enclosed Raceway - 1 inch

Hazard Area

Only a Single Division of Class 1E Circuits Allowed
in the Area



Adequate Protective Relaying and Breaker Control

- **Protective Philosophy**
 - Remove Faulted Equipment
 - Automatic Supervision of Manual/Automatic Operations
 - Initiate Automatic Operations or Switching for Shutdown or Continued Safe Operation
- **Local and Remote Distribution System Control and Monitoring**



Test, Calibration & In-Service Surveillance

- Diesel Generators
 - Synchronized to Source and Fully Loaded
 - Redundant Emergency Diesels
 - Two Standby Diesels, One in Service During Maintenance
- Switchgear/MCCs
 - Drawout Construction
 - Redundant Loads Dispersed Between Buses
 - Alternate Feeds for Non-Emergency Buses



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Test, Calibration & In-Service Surveillance

- UPS
-Manual Bypass for Maintenance



Equipment Qualification

- IROFS Equipment Provided Under 10 CFR 50 Appendix B QA Program
- Seismic Qualification per IEEE 344-87
- Environmental Qualification per IEEE 323-83 (Mild Environment)



Natural Phenomena

- Emergency System
 - Qualified to Design Basis Earthquake per IEEE Standards
 - Installed in Seismically Designed Building
 - Protected from Tornado and Missile Damage
- Standby Diesel Generator
 - Designed for UBC Seismic Requirements