Electrical System Reliability

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Plant Manager
No Power
No Water
Terms

- Distribution Line: 13,200 volts
- Transmission Line: 69,000 volts
- Sub Station: Outdoor structure where voltage is stepped down or up
- Switching station: power is only switched
- Metal Clad Switchgear: High voltage (13.2kv) breakers
- Recloser: Circuit breaker in a sub station
Customer to rural COOP
Single feed to plant
Outdated and undersized substation
1985 BWD electrical fire caused rationing

1986 BWD staff had concerns for the reliability of the electrical system
System Improvements

- 1987 electrical upgrade Allgeier Martin
- 1st 480v generator and emergency connection for intake
- 1st underground high voltage feeders
- New Switching Station #1
Need for WTP expansion

- 1989 conducted interviews for consultant for a 40MGD Plant Expansion
- MWH new design engineers
- Very competent electrical engineer
- Brought in a new concept: true redundant power
- Emphasis put on redundancy and robustness
Next Phase

- Combined effort BWD and MWH push CEC for more reliable source
- 2000 addition of three 2MW generators and underground feed to intake
- Allowed for load more efficient shedding program
2004 CEC built Beaver Sub

BWD sold a corner tract at minimal cost

2005 added SS1A and 2nd feed (underground) to a 2nd intake structure
New SUB Adjacent to Plant
2005 New 60MDG Plant
2006 Reconfigured generators to feed SS#1
2008 2nd 69kv line to Beaver Sub to complete loop
Underground Pros and Cons
Current System

- Very reliable system
- Very complicated
- Takes a high skill level to operate and maintain
- Assures we are prepared to stay up and running
2015 Adding additional generator capacity to ensure an average day’s need can be met
Where We Are Now
Intakes
Don’t overlook

- After Significant upgrades or changes need for updated coordination study
- Revise plant one-lines
- Update Arc Flash program
Several Small 480V Generators on AutoStart
➢ BWD has 3 Electricians certified in Thermography
➢ Looking into Ultrasonic detection
➢ Performs Extensive Preventive Maintenance
Replacement
What’s Next
Questions?