# BEST PRACTICES FOR PLANT ORGANIZATION AND OPERATIONS

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AIA Continuing Education Provider

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

This course provides an overview of key performance indicators for managing utility plants. Examples of specific practices are provided for each key performance indicator.

Learning Objectives

1. Learn best practices related to generating and distributing utilities
2. Review activities necessary for successful plant operation
3. Learn effective strategies for dealing with recent challenges in the utilities environment

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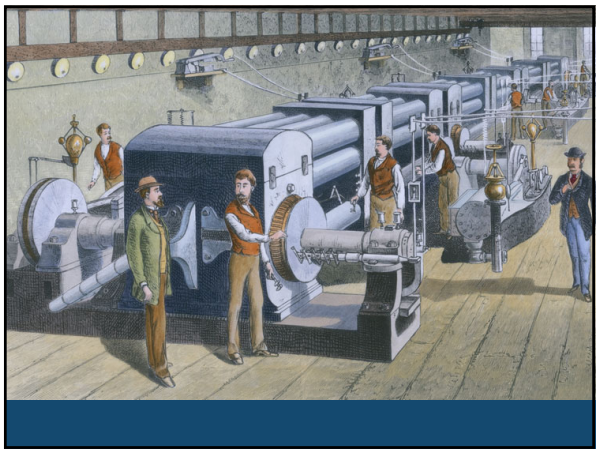
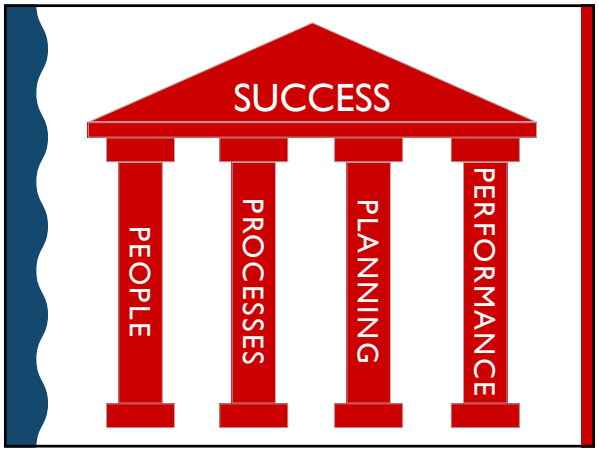


## OVERVIEW

Operations
Environmental Permits
Performance Measurement
Customer Connections
Human Resources
Budgeting
Emergency Preparedness
Domestic Water
Engineering
Local Utilities
Security
Grounds
Warehousing
Strategic Planning
Customer Service
Fuel Management
Project Management
Personnel
Scheduling
Document Control
Custodial
Public Relations
Housekeeping
Water Chemistry
Labor Relations
Maintenance
Safety
Data Management
Procurement
Fire Prevention



PEOPLE

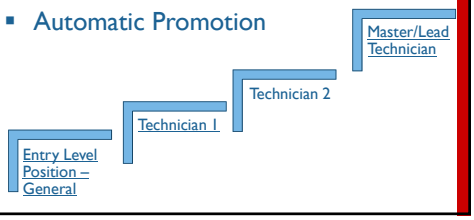
PURPOSE + KNOWLEDGE + RESOURCES + APTITUDE + MOTIVATION

# PERSONNEL

How to Hire and Retain the Best Employees?

Career Ladder

- Training Manual
- Testing/Certification
- Automatic Promotion




# CERTIFICATION PROGRAM

UK - Utilities and Energy Management — Policies and Procedures

HC 01 – *Revised 6/26/18*

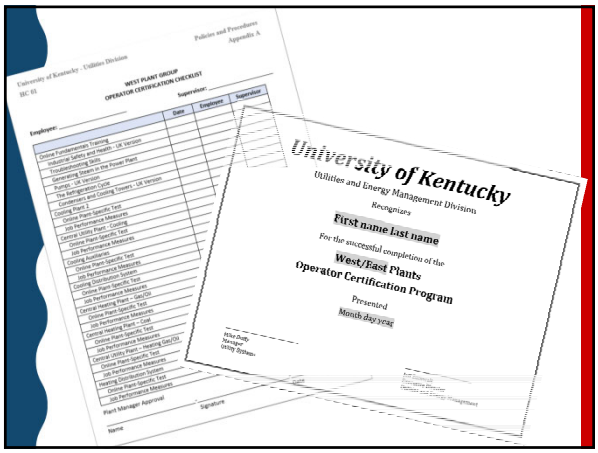
**OPERATOR CERTIFICATION PROGRAM**

**GENERAL**

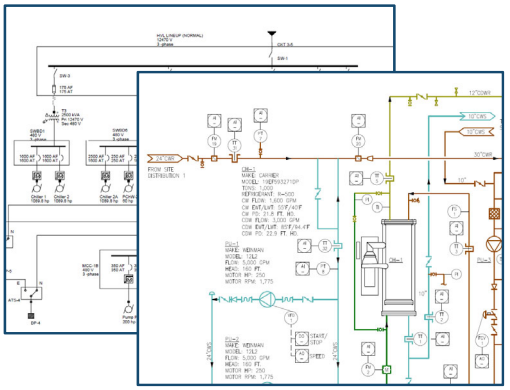
Utility plants are comprised of numerous systems working in unison to provide continuous service to the campus. These systems have multiple high-energy components which must be operated correctly to:

- Provide a safe working environment
- Deliver reliable utilities
- Conform with environmental regulations
- Minimize costs

- System Description
- Standard Operating Procedures
- Online Fundamentals Training
- Online Plant-Specific Training
- Job Performance Measures (practical exams)




## ONE LINES AND P&ID'S



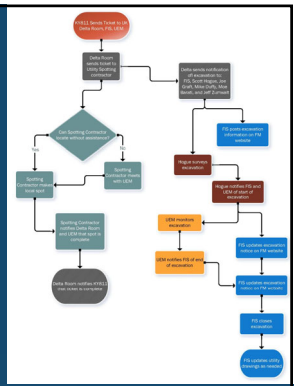
## ONLINE TRAINING

Training Vendors
- TPC
- Red Vector

Free Training
- Armstrong University
- Schneider University

DIY
- Moodle

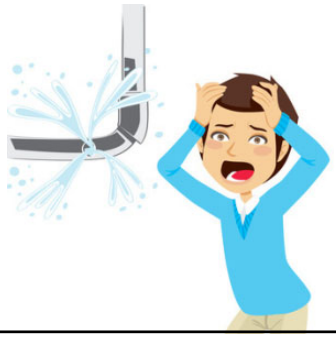
# PROCESSES



- EFFICIENT
- EFFECTIVE
- SELF-CORRECTING

# UTILITY BOUNDARIES

Who's responsible for that section of pipe?

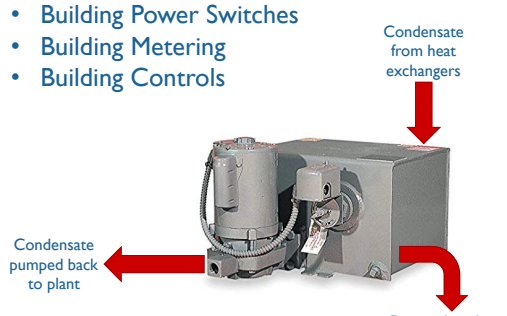


# UTILITY BOUNDARIES

- The physical line of ownership from beginning to end
  - Steam in and condensate out
  - Chilled water supply and return
  - Domestic water in and sanitary out
  - Building switch or main panel?
- Align impact with control

# UTILITY BOUNDARIES

- Condensate Return Systems
- Building Power Switches
- Building Metering
- Building Controls

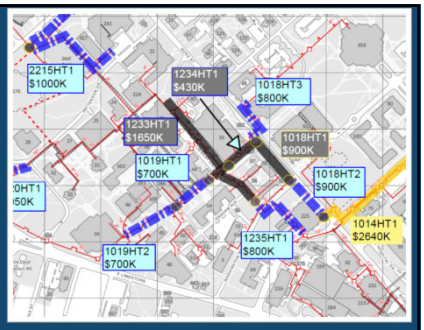



# DATA ARCHIVE

What caused that to trip?

- Troubleshooting and root cause analysis
  - Synchronized timestamp
  - Better sequence of events
- Training – simulate operator screens
- Automated reporting
  - Efficiency
  - Reliability
  - Air permits
- Tailored screens for customers

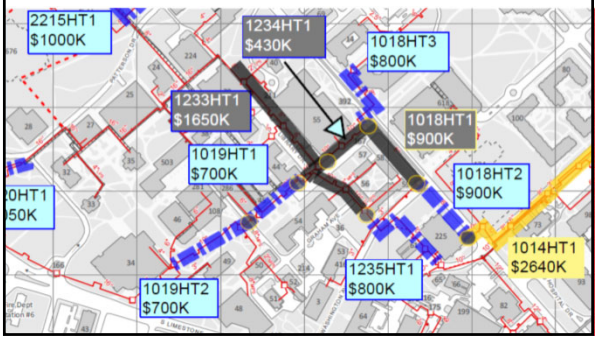
# PLANNING




- CONDITION
- CAPACITY
- LOAD GROWTH

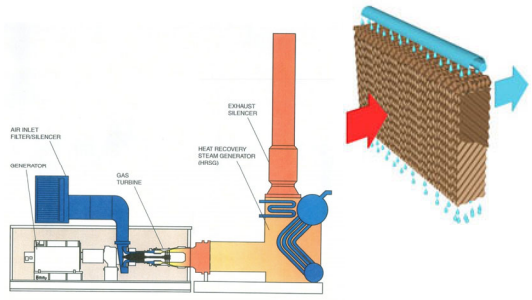
## LEVERAGE NEW CONSTRUCTION

Why are we digging up the new landscaping?

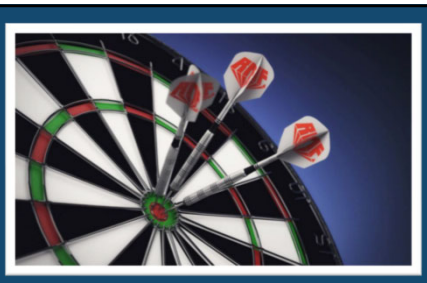



## HOLISTIC DESIGN

Are there opportunities to synergize future equipment with existing systems?




## PERFORMANCE



- QUANTIFIABLE
- INSPIRATIONAL – NOT STIFLING
- FOCUSING

## PERFORMANCE

How well do you operate your utility system?

What's your proof?

## KEY PERFORMANCE INDICATORS


What are your utility KPI's?

# KPI'S - MONITORING

UK Utilities Monthly Performance Report — March-19

| | Goal | Month Perf. | CYTD Perf. | Month | CYTD | Description |
|---|---|---|---|---|---|---|
| **Safety - Mike Duffy** | | | | | | |
| OSHA Recordable Accidents | <2 | 0 | 0 | 0 | 0 | National average for Utilities is 2.1 |
| Training Completion | 100% | 97% | 98% | 69/71 | 78/80 | |
| Director Team | 100% | 100% | 100% | 9/9 | 9/9 | |
| Heating/Cooling Team | 100% | 96% | 96% | 46/48 | 55/57 | |
| High Voltage Team | 100% | 100% | 100% | 4/4 | 6/6 | |
| Controls Team | 100% | 100% | 100% | 4/4 | 4/4 | |
| **Environment - Joe Graft** | | | | | | |
| Formal Notices of Violation | 0 | 0 | 0 | 0 | 0 | |
| Training Completion | 100% | 100% | | 0/0 | 0/0 | |
| Director Team | 100% | 100% | | 0/0 | 0/0 | |
| Heating/Cooling Team | 100% | 100% | | 0/0 | 0/0 | |
| High Voltage Team | 100% | 100% | | 0/0 | 0/0 | |
| Report Completion | 100% | 100% | 100% | 6/6 | 16/16 | Percentage of reports completed on time |
| **Reliability - Moe Barati** | | | | | | |
| Availability | 1 - (unplanned outage min/total min in period) | | | | | requires 24 hour "notice" |
| Steam | 99.9% | 100% | 100.00% | 0 | 0 | |
| Chilled Water | 99.9% | 100% | 100% | 0 | 0 | |
| Electricity | 99.9% | 100% | 100.00% | 0 | 0 | |
| Domestic Water | 99.5% | 100% | 100.00% | 0 | 0 | |
| Preventive Maintenance | | | | | | Percentage of PM work orders completed on time |
| Heating/Cooling | 99% | 100% | 100% | 0/0 | 16/16 | |
| High Voltage | 99% | n/a | n/a | 0/0 | 0/0 | |

# KPI'S ➡ OBJECTIVES

5/2/2019

Stopped
Behind Schedule
On Schedule
Complete

| Strategic Focus | Objectives | Key Results | Target Date | Jul '18 | Oct '18 | Jan '19 | Apr '19 | Responsible Party |
|---|---|---|---|---|---|---|---|---|
| **Safety** | | | | | | | | |
| | **Create a safety first culture within utilities with a comprehensive safety program** | | | | | | | |
| | | Implement top 10 safety improvement opportunities in order of priority and with available resources. | Jun-19 | | | | | Mike Duffy |
| | **Improve documentation of plant and campus systems - accurate documentation is essential for safe and effective LOTO's and operation of the equipment** | | | | | | | |
| | | Develop a one-line diagram for the electrical systems for all of the utility plants with equipment numbers | Nov-18 | | | | | Ron Mercer |
| | | Develop a piping and instrumentation diagram for the steam and chilled water systems for each of the utility plants and add to plant manuals | Sep-18 | | | | | Mike Duffy |
| | | Review and update the schematic diagrams for the steam and chilled water distribution systems | Oct-18 | | | | | Mike Duffy |
| | **Renew the steam vaults on campus - the steam lines in vaults must be properly insulated, trapped, and vented to prevent high temperatures** | | | | | | | |
| | | Survey all steam vaults on campus and develop a renewal plan for the vaults that are in unsatisfactory condition. | Mar-18 | | | | | Mike Duffy |
| | | All vaults are properly insulated, trapped, and vented | Jun-19 | | | | | Mike Duffy |
| **Environment** | | | | | | | | |
| | **Enhance Environmental Performance** | | | | | | | |
| | | Develop plan to refurbish brick sanitary sewer manholes campus-wide | Aug-18 | | | | | Joe Graft |

# AERIAL INFRARED MAP

# GROUP DISCUSSION

- Water Treatment
- Utility Standards
- Strategic Planning
- Legislative and Regulatory Affairs

This concludes The American Institute of Architects Continuing Education Systems Course

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