# Lab Assessments Workshop

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plus Materials from University of Alaska – Brian Ellington

# Why Assess?

- Improve knowledge and skill set
- Provides documental proof of learning in lab
- Evaluation method to improve program
- Preparation for industrial training
- Will become a component of NAPTA Audit

# Lab Assessment

## Kenai Peninsula College

-- Jeffrey Laube

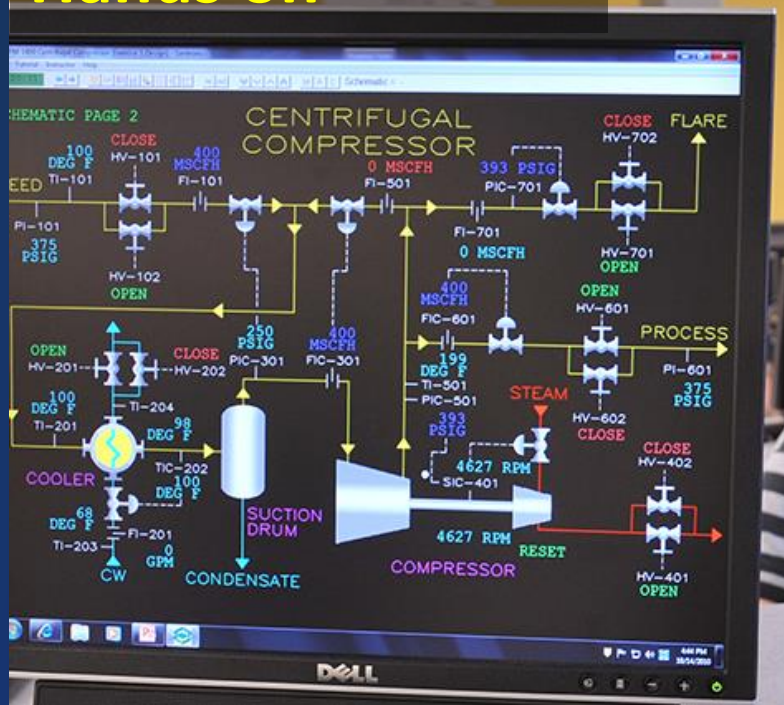
# Hands on

KPC -Kenai River Campus


- Understanding instrumentation
- Calibration

# Hands on

KPC - Anchorage Ext. Site

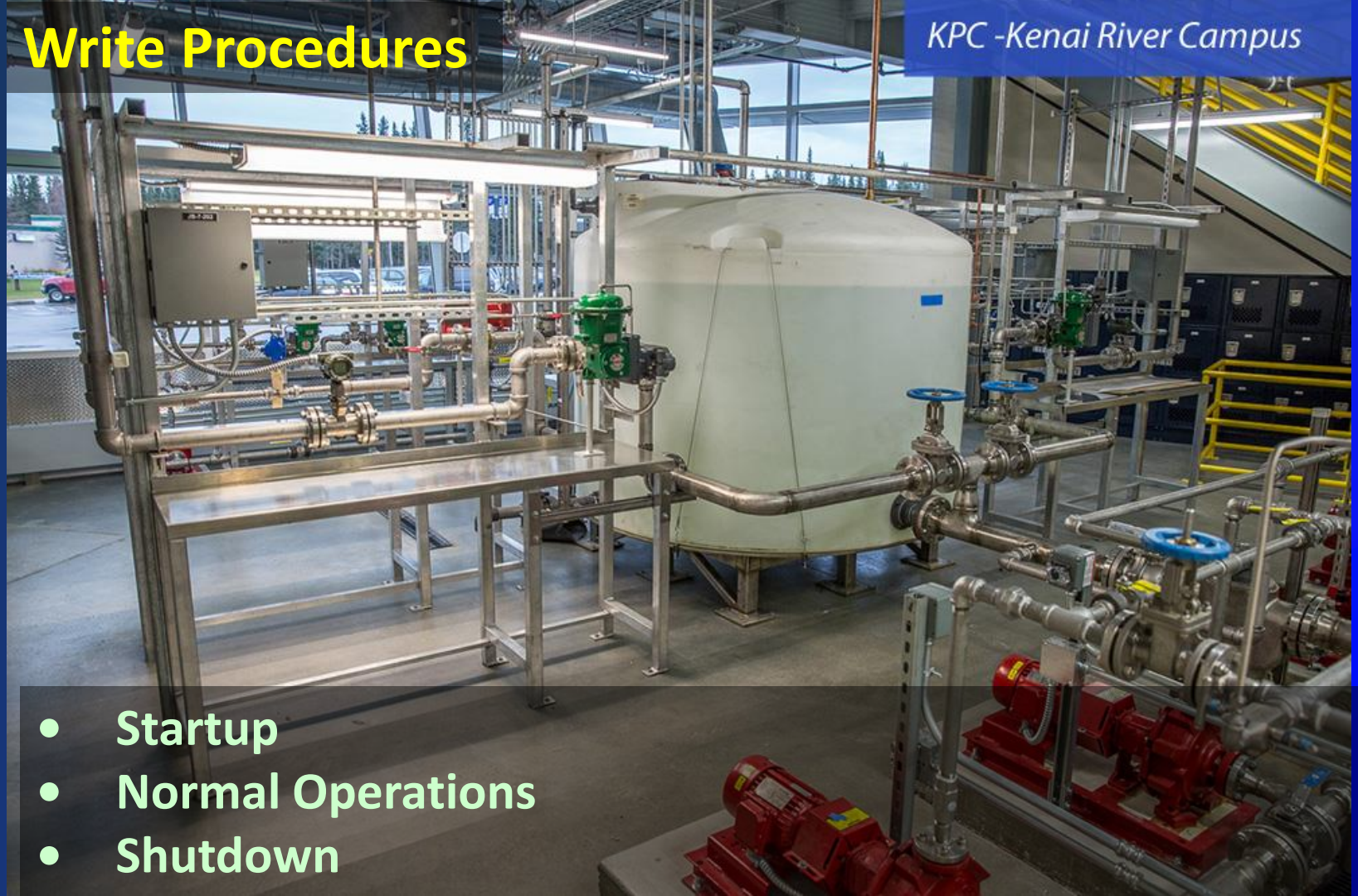



- Understanding DCS
- Making moves

# P&ID

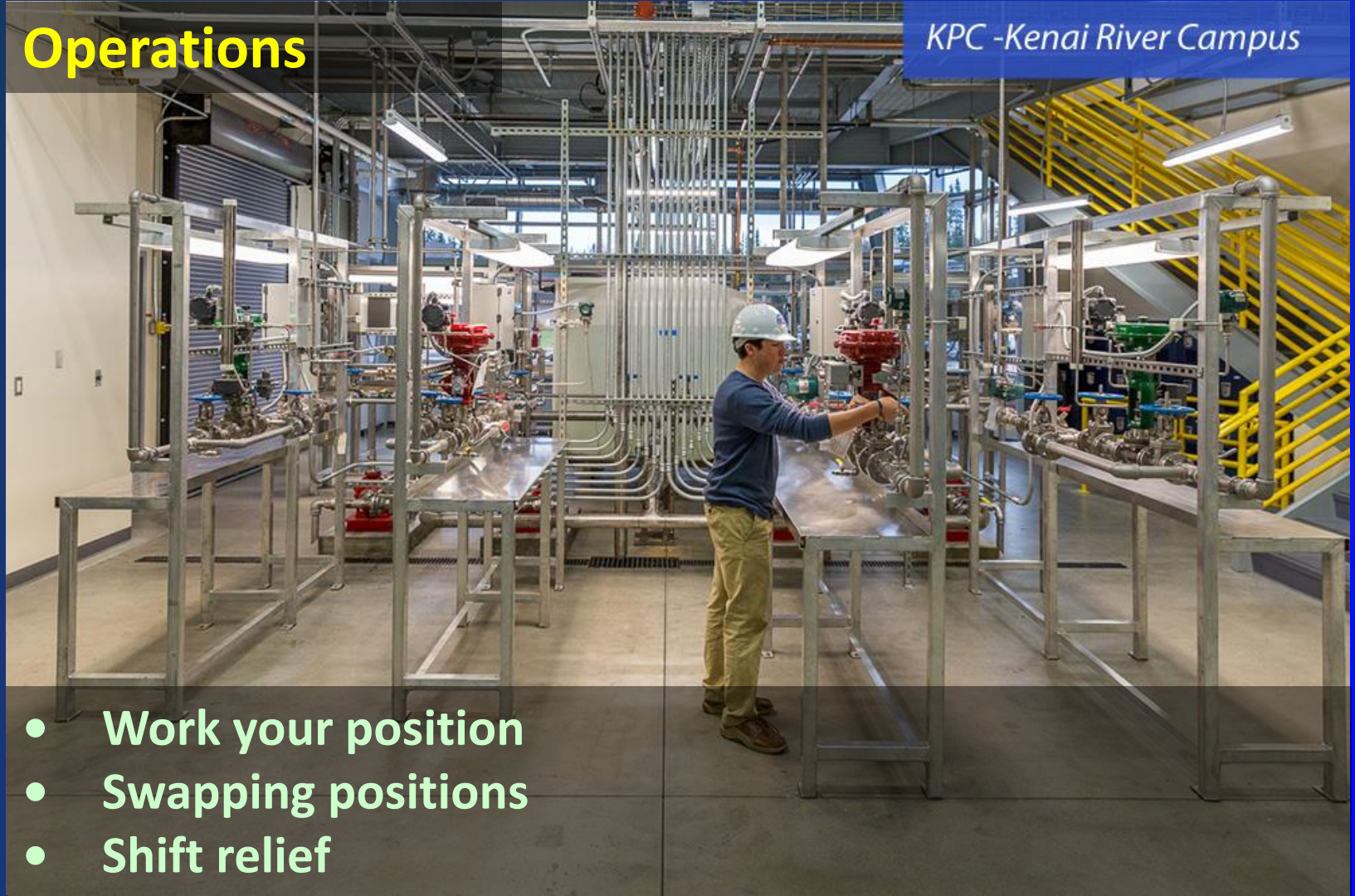

- Fire system
- Process

# Write Procedures




- Startup
- Normal Operations
- Shutdown

# Operations




- Work your position
- Swapping positions
- Shift relief

# Hands on

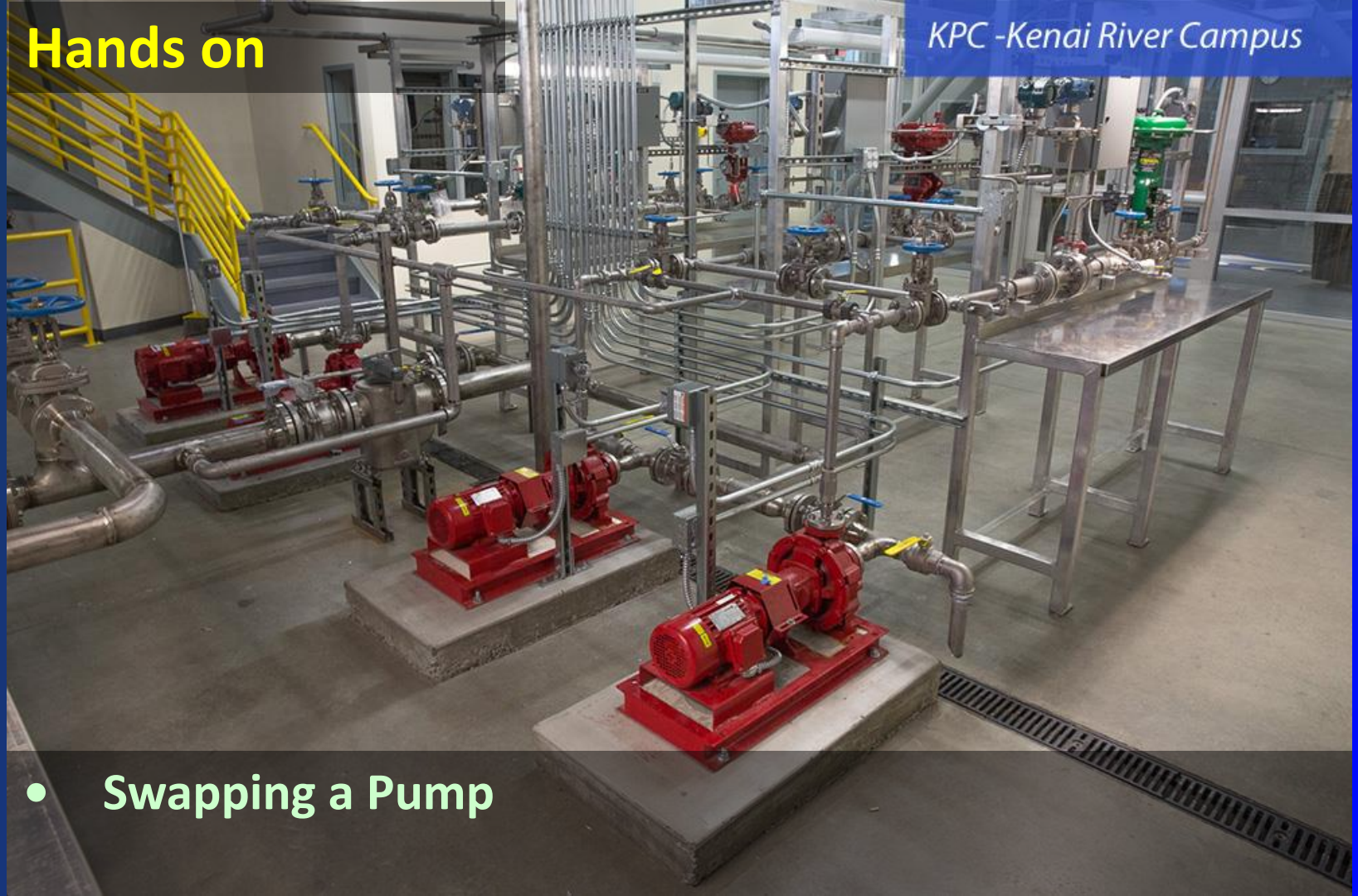

- Taking a Control Valve out of service for maintenance

# Hands on

KPC -Kenai River Campus

- Lock Out and Tag Out

# Hands on




- Swapping a Pump

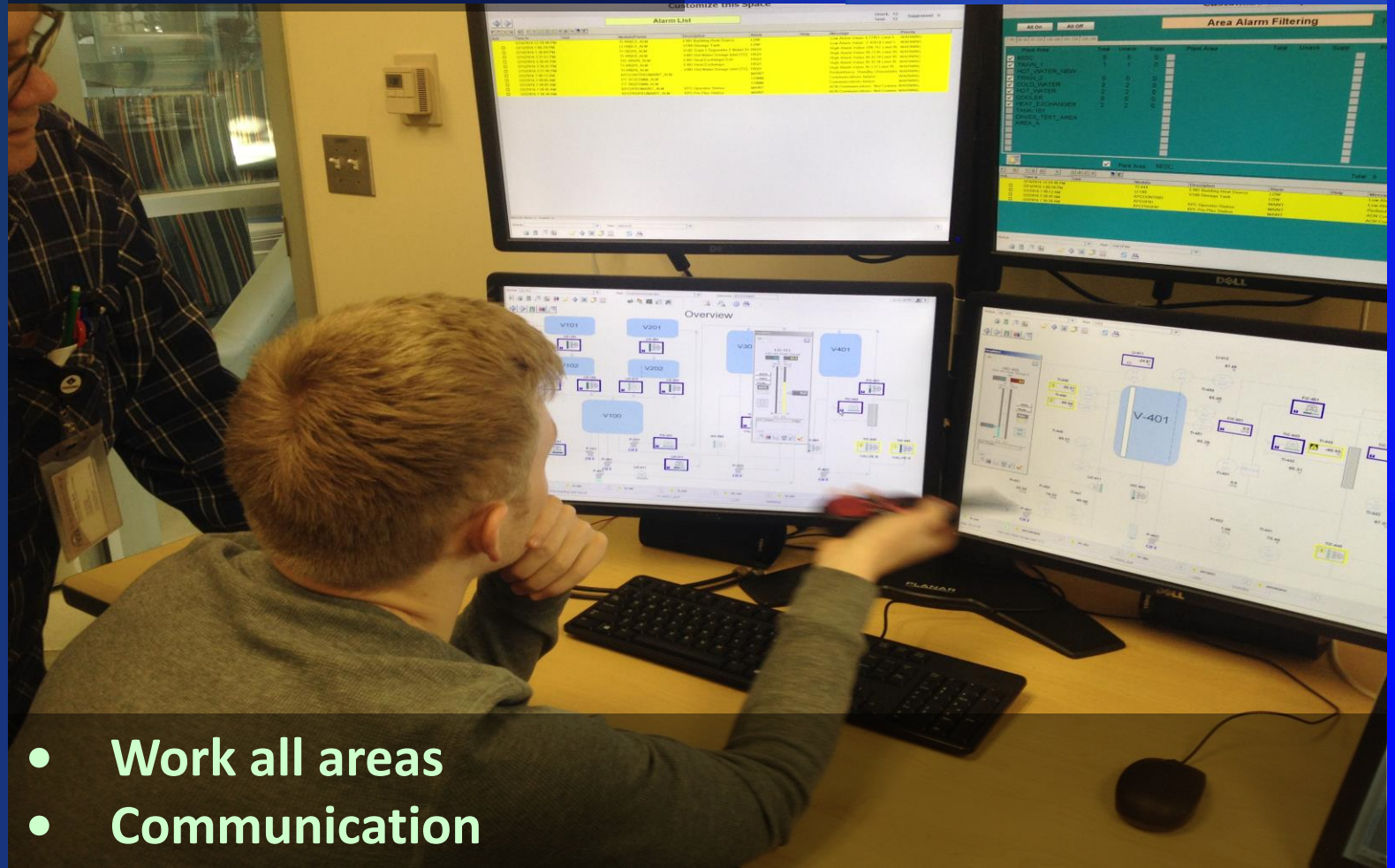
# Hands on

KPC -Kenai River Campus

- Field Adjustments

# Think like an Operator

KPC -Kenai River Campus




- Work all areas
- Communication

# University of Alaska Examples

- Job Permit
- Hot Work
- Job Hazard Analysis
- PPE Selection
- DAC Pump Trainer
- Safe Operating Procedure

# SKILLS ASSESSMENT

NAPTA ISC
9-27-2017
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# Equipment Skills Assessment

# Equipment Skills Test

| | | | Comments |
|---|---|---|---|
| Safety: | Correct | Missed | |
| What are the PPE requirements to work in the BASF building plant facilities? (Hard hat, side shield glasses, gloves, and hearing protection) | | | |
| | | | |
| Piping Assembly: | | | |
| Identify common pipe fittings: Tee, el, coupling, nipple, union | | | |
| | | | |
| Demonstrate Tool Operation: | | | |
| Wrap pipe threads with Teflon tape. | | | |
| Pipe Wrench (Screw Nipple into Tee/Loosen) | | | |
| Channel Locks (Screw Nipple into Tee/Loosen) | | | |
| | | | |
| Flange Gasket: | | | |
| Given a flange gasket identify the type of gasket. (Spiral Wound Gasket) | | | |
| | | | |
| Valve Identification: | | | |
| Identify common valves by design or function | | | |
| • Using cutaways on back porch ID: (Plug, Check, Diaphragm, Ball, Globe, Control Valve, Gate) | | | |
| • How do you tell when a ball valve is open? | | | |
| • How do you tell when a gate valve is open? | | | |
| | | | |
| Pumps: On the cutaway identify the mechanical seal | | | |
| | | | |
| Heat Exchanger: Identify the shell side and tube side of the cutaway heat exchanger. | | | |
| | | | |

# Equipment Skills Test

| Drawings: Using a P&ID Identify | | | |
|---|---|---|---|
| • Pump | | | |
| • Distillation Tower | | | |
| • Heat Exchanger | | | |
| • Drum | | | |
| | | | |

# Equipment Skills Test

| | | | Comments |
|---|---|---|---|
| **Safety:** | Correct | Missed | |
| **Locate safety equipment in the PET plant such as safety signage, wind sock, NFPA diamonds, eyewash stations, fire extinguishers ladder cages, swing gates, toe-boards, coupling guards, hose racks for housekeeping, insulation to prevent thermal burns.** | | | |
| **Operate safety shower and eyewash** | | | |

# Equipment Skills Test

| | | | |
|---|---|---|---|
| **Equipment Location:** | Locate | Purpose | |
| **Objective: Locate and tell the purpose of each of the following pieces of equipment and how they work:**<br>- **Pump**<br>- **Heat Exchanger**<br>- **Overhead Condenser**<br>- **Reboiler**<br>- **Cooling Tower** | | | |
| | | | |
| **Hoses:** | Correct | Missed | |
| **Demonstrate connecting and disconnecting different types of hoses (Dow - air, nitrogen)** | | | |
| | | | |
| **Pump Components:** | Locate | Function | |
| • **Locate the seal flush and oil pot on pumps in the PET/Boot Camp and describe their functions.**<br>• **Oil pot –(lube bearings)**<br>• **Seal flush – (flush, lubricate, and cool)**<br>**Locate pump suction, discharge and impeller location.** | | | |
| **What documents do I need to use for a Brazosport College PET plant pump maintenance activity:**<br>- **Procedure Pulled - Clearing/Isolation Procedure**<br>- **Verified Drawing**<br>- **Master Red Tag List**<br>- **Tags**<br>- **Permit** | Correct | Missed | |
| | | | |
| **Demonstrate Tool Operation:** | | | |
| • **Valve Wrench (Open/Close Valve)** | | | |

Name: _____

# Cooling Tower Start-up/Shutdown Procedure

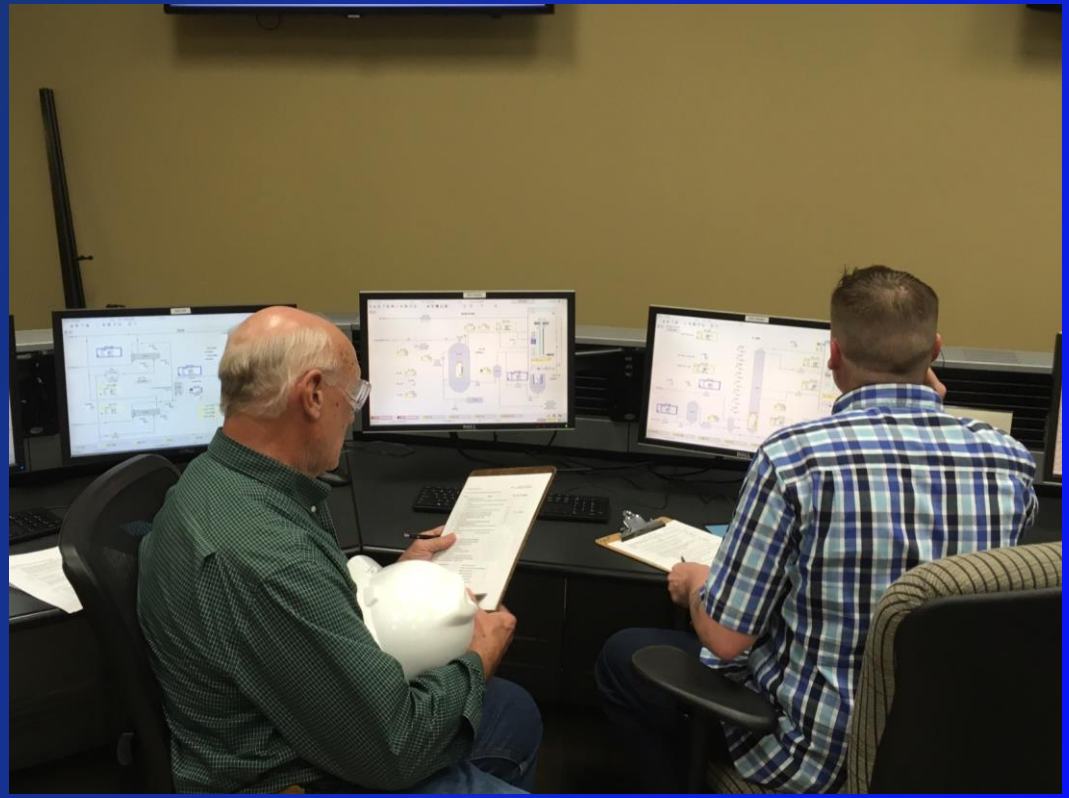
| Step | Action | Yes | No | Coaching |
|---|---|---|---|---|
| | Check PPE/ wind sock/EyeBath flush/ etc. safety (Bonus Point if mentioned) | | | |
| 1 | Check level cooling tower basin (LIT-905). Open 1" utility water supply line. | | | |
| 2 | Check pump oil level and add if necessary. | | | |
| 3 | Line-up suction valve. | | | |
| 4 | Line-up discharge valve. | | | |
| 5 | Line-up minimum flow header | | | |
| | -Why is the middle valve not opened on min. flow header? | | | |
| 6 | Line-up EX-201 cooling water bypass around (TIC-236) 1/8 turn. | | | |
| 7 | Turn on cooling water pump and observe discharge pressure. Listen for unusual noise. Pressure between 60 and 100 psig. (PI-901). | | | |
| 8. | Turn on cooling tower fan and listen for unusual noise. | | | |
| 9. | Set bypass flow to 8-10 GPM. | | | |
| 10. | On computer screen (ST-201) document (TV-236) cooling water bypass flow (FI-230). | | | |
| 11. | Maximize CTW flow (Using DCS manually open TV-236) | | | |
| | Shutdown: | | | |
| 1. | Turn off cooling tower fan. | | | |
| 2. | Turn off cooling tower pump. | | | |
| 3. | Close pump discharge valve | | | |
| 4. | Close pump suction valve. | | | |
| 5. | Close minimum flow valve(s). | | | |
| 6. | Close 1" utility water make up to cooling tower. | | | |
| 7. | Close bypass around cooling water station to EX-201 and block TV-236 Gate Valves. | | | |

Name: _____

# Start feed to T-100 and bottoms flow fromT-100 to DS-100

| Step | Action | Yes | No | Coaching |
|---|---|---|---|---|
| | Check PPE & Wind (Sock) | | | |
| 1. | Set DS-100 feed rate to T-100 at 400 lbs/hr. and automatic control (FIC-312) | | | |
| 2. | Set T-100 level control to automatic at a 50% set point. (LIC-311)<br>Turn 403 Cascade Control on. | | | |
| 3. | Verify that the instrumentation on DS-100 is open to the vessel. | | | |
| 4. | Line up flow from DS-100 to T-100 through EX-100. | | | |
| 5. | Check PF-100 oil pot level and add if less than 50%. | | | |
| 6. | Verify DS-100 level is above 10% (LR-504). | | | |
| 7. | Start PF-100. | | | |
| 8. | Check PB-100 oil pot level and add oil if less than 50%. | | | |
| 9. | Block flow from PB-100 to S-102. | | | |
| 10. | Start PB-100.(311 Line-up/Instrument Valves/EX-101 valves/valve into DS-100) | | | |
| 11. | Document and record tower feed rate and tower bottoms flow. (FIC-312 vs. FI-403). If they are different why? | | | |
| | | | | |
| | Shutdown: | | | |
| 1. | Turn off PB-100 and block in suction and discharge. | | | |
| 2. | Turn off PF-100 and block in suction and discharge. | | | |
| 3. | Close the valve to the DS-100 LSLL switch. | | | |
| 4. | Open PB-100 to S-102 | | | |
| 5. | Close manual valves LV-311 | | | |
| 6. | Close manual valves FV-312 and tray feed. | | | |
| 7. | Unblock slab drain. | | | |
| 8. | Set tower level control valve to auto & 0% output. | | | |
| 9. | Set tower feed control valve to manual & 50% output. | | | |

# DCS Operation



# Line Tracing

# Valve Line-up

# Pump Start-up

# Observer Grading Worksheet

- Initialed all Procedure Steps ____
- Walked out all lines ____
- Followed procedure ____
- Followed all steps in order ____
- Able to find all flows on screens ____
- Confident/sure ____
- PPE use ____
- Coaching (# boxes checked) ____
- Notes:
- _____
- SUM + ____
- SUM - ____
- Difference ____

Identify Shell Section of Heat Exchanger ____
Identify a Gate Valve ____
Identify a Globe Valve ____
Identify a Control Valve ____
Identify a Check Valve ____
Identify Pump Suction ____

Score _____

(+ is YES, - is NO)

# VIRTUAL REALITY (Systran)

# Recommendations

- Provide students with a guide in lower courses
- Consider using assessments in different courses – Intro, Equipment, Systems, Operations, Capstone or Internship (if offered)
- Increase the depth of assessment as students progress

# Intro to PTEC Examples

- Fittings & Valves
- Rotating Equipment
- Heat Exchanger

# Equipment Examples

- Valves practical
- Heat exchanger parts & assembly
- Grading matrix

# Operations / Internship / Capstone Examples

- HOT unit – Heat exchanger
- HOT unit – Pump skills

# Methods that work

- Make the assessment simple to mark
- Pattern it similar to methods your industry uses
- Ask industry to review  your assessment and/or for you to observe them during assessments
- Have a key or standard that the evaluator uses to ensure equal grading

# How to fit it in

- Have a lab activity that other students can work on while assessing each individual
- Limit the time – 5 minutes per student
  - Limit the complexity of the assessment
  - Limit how long student has to respond

# Questions?