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OPERATING MANUAL
OLD UNIT PVC REACTORS
ABERDEEN, MISSISSIPPI
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M. P. Blackwell
Vinyl Operations Engineer

APPROVED BY:

P. E. Markey
Vinyl Operations Supt.

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IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS

A. General Information

The lead operator uses the equipment on the control room panel to run the reactors and to monitor process conditions. This equipment includes switches on the panel that open and close valves or start and stop motors, process indicators, recorders, and controllers that show and control process conditions, and alarms that give warnings of abnormal conditions in the process. The lead operator must be familiar with the purpose and operation of each panel switch, indicator, and alarm to effectively perform his job. This section of the operating manual will cover each of these.

There are five categories of switches on the control panel.

They are:

1. OPEN/CLOSE Switch:

OPEN

CLOSE

This switch has two pushbuttons (open and close) and two indicating lights [green (G) and red (R)]. This switch operates one or more valves in the field. When the valve is open the

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

A. General Information (Continued)

1. OPEN/CLOSE Switch (Continued)

green light will be on. To close the valve, the CLOSE pushbutton is pushed. The valve should close and the red light will come on and stay on as long as the valve is closed. To open the valve, the OPEN pushbutton is pushed and the green light should come on showing that the valve is open.

2. START/STOP Switch:

START

MOTOR RUN

STOP

The switch has two pushbuttons and one green indicating motor run light. It is used to start and stop equipment motors. When the motor is off, the indicating light is off. To start the motor, push the START pushbutton. The green motor RUN light should come on when the motor starts and will stay on as long as the motor runs. To stop the motor, the STOP pushbutton is pushed and the light should go off.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARSM (CONTINUED)

A. General Information (Continued)

3. MODE ADVANCE Switch:

These switches give the Modicon programable controller signals which tell the Modicon to interlock certain valves, keeping them from opening or closing. The switch is a pushbutton which switches the light showing the operator which mode that the equipment is in.

4. Test and Acknowledge Switches:

The test pushbuttons are used to test the control panel lights. If the button is pushed, every operable panel light on that panel will come on. This must be done at least once per shift for each panel per the procedures given in Section B (below). Acknowledge switches are used to cut off the horn when an alarm sounds. Acknowledge switches must not be "pinned out", as this would keep the alarm horn for that panel from sounding when an alarm condition occurred.

5. Miscellaneous Specialized Switches:

There are various other special purpose switches on the control panel that will be described as each of the switches on each panel are described below.

Each of the control panel sections have indicators, controllers, and recorders. An indicator takes a signal from the field

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

A. General Information (Continued)

showing a level, pressure, flow, temperature, or amperage from the process. An indicator may or may not have an alarm setpoint such that when it reaches a given amount an alarm goes off. A recorder is used with some indicators to give a printout of the indication. A "controller" is an indicating controller which gives a process indication and manipulates automatic control valves in the field to control the process variable at a desired "setpoint", which can be adjusted by the operator. There will be at least two needles on the controller, one showing the setpoint and the other indicating the process condition.

Alarm lights on the panel may be activated by an indicator reaching a certain amount or by switches on the process equipment in the field. An alarm always indicates that some action must be taken by the operator to check or do something in the process or to correct an abnormal condition. An alarm condition will sound the alarm horn and alarm horn can be silenced by pushing the acknowledge button on the alarm panel. The light will then stay on as long as the alarm condition exists. The operator must immediately check the cause of the alarm and take corrective action if necessary. The lead operator must know what action to take anytime any alarm on the panel goes off. This is a very important part of the operator's job because an alarm often indicates an abnormal condition. The lead operator must be familiar with every alarm on the

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

A. General Information (Continued)

panel and be able to perform corrective action immediately upon acknowledging the alarm, if necessary.

A Modicon programmable controller controls actuated and automatic valve and equipment sequencing. The Modicon opens or closes valves automatically and turns on or shuts down pumps when it receives appropriate signals (such as opening valves and turning on pumps at various setpoints during charging). It will also not allow valves to open or close when certain conditions exist (such as not allowing reactor valves to open during polymerization). The Modicon can be bypassed by going to the EMERGENCY mode on the reactors or by charging manually instead of in AUTO.

NOTE: The Modicon should not be bypassed for any extended period of time. Contact the Shift Supervisor if this condition is necessary, and he will take corrective action such as obtaining instrument maintenance help.

B. Panel Light Test Procedure

Proper panel light indication is essential to safe and efficient operation of the reactor unit. Panel lights include both the alarm lights on the control panel and the indicating lights on the panel switches. Any light that malfunctions during the shift must either be replaced by the lead operator, put on the panel

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

B. Panel Light Test Procedure (Continued)

light list, or repaired using an emergency ("E") maintenance work order.

The following procedures must also be used by the lead operator at the beginning of his shift to check the panel lights for correct operation:

NOTE: All panel lights must be checked within the first two hours of every shift by the lead operator.

1. Panel Alarm Lights

- a. Push the test pushbutton on the alarm section on the control room panel to be tested. All of the lights that are hooked up must start flashing and the alarm horn must sound for the test to be completed.
- b. Visually check each alarm on the section to make sure the light is flushing, then push the acknowledge button.
- c. If any of the lights were not flashing, replace the bulb or have the light repaired on an emergency basis.
- d. The lights for the alarms that do not have an alarm condition existing will go off when the acknowledge button is pushed.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

B. Panel Light Test Procedure (Continued)

1. Panel Alarm Lights (Continued)

- e. Carefully check any alarm where the light does not go out to make sure an alarm condition did not occur while the alarms were being tested.
- f. All of the alarm sections on the old unit panel must be tested and all lights and horns must be working for the test procedure to be correctly completed.

If the alarm horn sounds and no light can be found flashing, the lead operator must immediately push the panel test buttons to find light(s) is not flashing. This will indicate which alarm condition(s) may have set off the horn, and corrective action can be taken. The lead operator must then replace the bulb or have the light repaired on an emergency ("E") work order basis for any panel alarm light not working.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

B. Panel Light Test Procedure (Continued)

2. Panel Switch Indicating Lights

NOTE: DO NOT guess at valve positions. Valve switches must indicate the valve position on the panel or the "A" operator must verify the valve position every time it is used.

- a. Push the lamp test pushbutton for the section of the panel to be tested. All of the indicating lights on the panel should come on.
- b. Check each light carefully to make sure it is on, then release the test button.
- c. Replace the light bulb on any FIELD CONNECTED light that did not come on. A new bulb should be tested to make sure it works before putting it into the light socket. Discard any burned out bulbs. Bulbs must be checked before replacing to make sure the replacement is the same size and voltage. This information is given on the bulb.
- d. If the light will not come on with a good bulb in it, check the panel light list for the old reactor unit. The panel light list shows any panel switch indicating lights that have been checked by operations and will not work. These are to be repaired by instrument maintenance personnel on a regular basis every week.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

B. Panel Light Test Procedure (Continued)

2. Panel Switch Indicating Lights (Continued)

- e. If the light that did not work is not shown on the panel light list, put it on the list. Notify the Shift Supervisor and have an emergency work order written for any panel light that is critical to proper operations and must be repaired immediately.

NOTE: Before placing a valve switch on the panel light list, the reactor "A" operator must check the valve to make sure it is in the correct position and that the limit switch appears to be in good condition. If the valve is not completely open or closed, the panel indicating light may not light and a hazardous situation could occur due to the valve being "cracked" open or closed. Follow the operating procedures given in Section III, V in this manual to correct or diagnose the problem with the valve. If the "A" operator can find no apparent problem with the valve, either put the light on the panel light list or have it repaired on an emergency maintenance work order.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

B. Panel Light Test Procedure (Continued)

2. Panel Switch Indicating Lights (Continued)

f. All of the panel sections for the old unit must be tested.

The panel switch indicating lights must all be working on the panel light list, or an emergency work order must be made out on them for the test procedure to be correctly completed.

Any time a light on the panel does not work during the shift, either replace the bulb or have the "A" operator check the valve. Either repair the light or valve, put it on the panel light list, or have an emergency work order made out on it.

C. Reactor Charge Panel

Switches

The following switches are located on the old unit reactor charge panel, listed according to the labels above the switches:

1. VCM Transfer

a. AUTO-MAN: A specialized switch and indicator light that allows fresh VCM transfer from the tank farm

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

1. VCM Transfer (Continued)

to be automatically controlled by the Modicon. When the ON pushbutton is pushed, the yellow AUTO light will come on showing that transfer is in the automatic mode. VCM will then be automatically transferred from the sphere to the fresh VCM receiver in the old module when the receiver level is below 60%. When 75% is reached in the receiver, the FVCM High Level Alarm will come on, the tank farm pumps will shutdown, and the on site valve will automatically close.

When the OFF pushbutton is pushed, the yellow AUTO light will go off showing that VCM transfer is not in automatic. VCM transfer must then be made manually by turning on the VCM transfer pumps.

- b. Off Sites Pumps - A specialized start/stop switch that allows manual control of the two VCM transfer pumps

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

1. VCM Transfer (Continued)

at the tank farm. The switch has two green lights (one for each pump motor) which comes on when the pumps are running. Normally both pumps will be used. If one green light does not come on, report the problem to the chief operator or Shift Supervisor. VCM transfer does not have to be taken out of AUTO to operate the pumps from the control panel.

- c. On Site Valve - The open/close switch that operates the actuated valve under the fresh VCM receiver that allows fresh VCM to flow into the receiver. It automatically opens when VCM transfer is in AUTO and the tank level falls below 60%, and automatically closes when the level reaches 75%. The valve can be operated manually if the VCM transfer is not in AUTO.

2. Recovered VCM Charge

- a. AUTO-MAN: A specialized switch and indicator light that allows recovered VCM charging or transfer to be

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

2. Recovered VCM Charge (Continued)

a time. At present, there is only one RVCM charge pump in the unit, but the primary pushbutton on the switch must be pushed for the RVCM charge pump to run.

d. Spare Pump: A start/stop switch that is disconnected from any field equipment.

e. Recovered VCM: The open/close switch that operates the actuated valve on the discharge of the RVCM pump.

3. Fresh VCM Charge

a. AUTO-MAN: - This pushbutton works for the fresh VCM charge system like the AUTO-MAN switch for the Recovered VCM Charge (2a above).

When the yellow AUTO Light is on, the Modicon will automatically open the valves and start the selected VCM charge pump(s) (if they are not already open and started) according to a Modicon setpoint. When the setpoint for total VCM is reached by the total VCM charge meter counter, the pump(s) will automatically shut down and the valves will close (if the pump is running or valves are open).

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

3. Fresh VCM Charge (Continued)

The primary and/or spare fresh VCM charge pumps and valves can be manually cut off and on as needed when the AUTO indicator light is on.

When the OFF pushbutton on the switch is pushed, the yellow AUTO light goes off indicating that the fresh VCM charge is not in automatic. The fresh VCM pumps and valves must then be manually operated from the panel if they are needed.

b. Primary Charge Pump: The start/stop switch for the primary (west) fresh VCM charge pump. This pump motor will not come on unless the limit switches on the following valves are showing open lights on the control panel:

- (1) Primary charge pump discharge valve.
- (2) Receiver outlet (primary charge pump suction valve.)
- (3) "A" VCM charge valve on the reactor charging.
- (4) "B" VCM charge valve on the reactor charging.
- (5) The reactor charge (main dump) valve on the reactor charging.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

3. Fresh VCM Charge (Continued)

- c. Pump Selector: A specialized switch used to select which fresh VCM pump is used for charging. It operates like the pump selector switch for the RVCM(2c above) except that the primary and spare push buttons are not interlocked and both may be pushed at the same time. In normal operation, only one pump is selected and used for charging.

- d. Spare Charge Pump: The start/stop switch for the spare (east) fresh VCM charge pump. The pump motor will not come on unless limit switches on the following valves are showing open lights on the control panel:
 - (1) Spare charge pump discharge.
 - (2) The spare charge pump suction valve (no label on the panel).
 - (3) "A" VCM charge valve on the reactor charging.
 - (4) "B" VCM charge valve on the reactor charging.
 - (5) The reactor charge (main dump) valve on the reactor charging.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

3. Fresh VCM Charge (Continued)

- e. Receiver Outlet: The open/close switch for the west fresh VCM charge pump suction valve.
- f. Primary Charge Pump Discharge: The open/close switch for the west fresh VCM charge pump discharge valve.
- g. (Spare Charge Pump Suction) - Not Labeled: This open/close switch is located directly under the fresh VCM charge pump selector switch on the panel. It operates the east fresh VCM pump suction valve.
- h. Spare Charge Pump Discharge: The open/close switch for the east fresh VCM pump discharge valve.

4. Hot Water Charge

NOTE: The hot water pump discharge valve must always be shut off before the corresponding pump is stopped and must always be opened after the corresponding pump is started. This momentarily deadheads the pump but prevents VCM from backing through the charge header and pump into the hot water tank (if the check valves should fail).

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

4. Hot Water Charge (Continued)

- a. AUTO-MAN: This switch works for the hot water charge like the AUTO-MAN switches for the RVCM and fresh VCM charge (2a and 3a above). When the yellow AUTO light is on, the Modicon will automatically open the valve and start the appropriate hot water charge pump, according to setpoints in the Modicon (unless the pumps are already on or the valves are already open). The pumps (and valves) will automatically shut down when the appropriate set points are reached on the water charge meter counter if they are running or are open.

Either charge pump and the corresponding discharge valve may be started or shut down during automatic charge, as needed, when the AUTO indicator light is on.

When the OFF pushbutton on the switch is pushed, the yellow AUTO light goes off indicating that hot water charge is not in automatic and the charge pumps and valves must be manually operated from the panel if they are needed.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

4. Hot Water Charge (Continued)

- b. Charge Pump "A": The start/stop switch for "A" hot water charge pump (south pump).
- c. Charge Pump "B": The start/stop switch for "B" hot water charge pump (north pump).
- d. Hot Water Charge: An open/close switch that is disconnected from any field equipment.
- e. Primary Pump Discharge: The open/close switch for the discharge valve on "A" hot water charge pump.
- f. Spare Pump Discharge: The open/close switch for the discharge valve on "B" hot water charge pump.

5. Water Charge

- a. Cold Water: An open/close switch that is disconnected from any field equipment.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

5. Water Charge (Continued)

- b. Hot Water Tank Makeup: This is an indicator for the hot water makeup to the hot water charge tank. The open and close pushbuttons are disconnected and the valves work automatically according to the level in the hot water charge tank. When the level in the tank drops to 70%, the process water and steam injection valves to the preheater open, heating the water and sending it to the hot water tank. When the tank level reaches 90%, the valves close.

NOTE: The process water valve should always open before the steam valve to prevent blowing steam into the hot water tank and "hammering" the tank. Any hammering in the tank must be reported to the Shift Supervisor immediately.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

5. Water Charge (Continued)

- c. Cold Water Swirl: An open/close switch that is disconnected from any field equipment.
- d. Rinse Water: The open/close switch that operates the valve between the charge water header and the rinse water header. This valve must be opened to rinse reactors using one or more charge water pumps. The water will be diverted into the rinse water header ahead of the charge water meter when the valve is open (the charge water temperature controller or counter will not be useful for monitoring flow and temperature).

- 6. Initiator Charge: This section of the panel includes five open/close switches, an AUTO-MAN switch, and an indicating light that are all disconnected from any field equipment.

7. Colloid Charge

- a. AUTO-MAN: This switch works similar to the AUTO-MAN switches above in 2a, 3a, and 4a. When the yellow

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IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

7. Colloid Charge (Continued)

AUTO light is on, the Modicon will automatically start the methocel charge pump and open the reactor methocel valve on the reactor that is charging according to setpoints in the Modicon. The valve will automatically close and the pump will shut down when the appropriate setpoints are reached on the methocel charge meter counter.

When the OFF pushbutton on the switch is pushed, the yellow AUTO light goes off indicating that methocel charge is not in automatic and the charge pump and valves must be manually operated from the panel if they are needed.

- b. Primary Charge Pump: The start/stop switch for the methocel charge pump.
- c. Primary Pump Discharge: The open/close switch for the actuated discharge valve on the methocel charge pump.

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

7. Colloid Charge (Continued)

- d. Pump Selector: This switch is disconnected. There is only one methocel charge pump in the old unit.
- e. Spare Charge Pump: A start/stop switch that is disconnected from any field equipment.
- f. Spare Pump Discharge: An open/close switch that is disconnected from any field equipment.

8. Colloid Transfer and Circulation

- a. This section of the charge panel has four open/close and two start/stop switches. All of these are disconnected from any field equipment except one, as given below.
- b. Transfer Pump: The start/stop switch for the methocel transfer pump. This pump shuts down when the high level alarm probe in the tank is reached.

9. Tank Farm Deluge Switches

- a. VCM Sphere FM Release: A special open/close switch with no indicating light that allows remote control of

IV. CONTROL PANEL SWITCHES, INDICATORS, AND ALARMS (CONTINUED)

C. Reactor Charge Panel (Continued)

Switches (Continued)

9. Tank Farm Deluge Switches (Continued)

the sphere fire monitors and releases firewater through the monitors when the OPEN pushbutton on the switch is pushed. The fire monitors should be kept pointed at the bottom half of the sphere so that remote operation will effectively protect steel on the sphere. The monitors can be shut off off remotely and reset by pushing the CLOSE pushbutton on the switch.

- b. VCM Bullet Deluge Release: A special open/close switch with no indicating light that allows remote control of the deluge system on the VCM storage bullets and compressor shed at the VCM tank farm. When the OPEN pushbutton is pushed, the supervisory air is released allowing firewater to flow through the deluge system. To shut off the deluge system, the water must be turned off at the tank farm and manually reset. The switch on the control room panel must be in the CLOSE position (which resets the air valve for the system) before the system can be manually reset. This deluge system is identical to all other plant deluge systems (in the past it was different).