

TITLE: R-1/R-2 NORMAL OPERATING CONDITIONS

HAZARDS TO BE AWARE OF:

SAFETY/HEALTH CONCERNS:

1. POOR POSITION WHEN OPERATING FLASH STEAM B/V
2. CAREFUL NOT TO SUCK AIR IN HYDROLYZER
3. TRIPPING THE 71 SIDE.
4. DRY CL2 REACTS WITH TITANIUM
5. WET CL2 REACTS WITH TITANIUM ABOVE 150 DEG C

ENVIRONMENTAL CONCERNS:

1. A CHLORINE OR PROPYLENE SPILL
2. BLOWING PSV'S
3. HIGH TOD OR PDC TO ENVIRONMENTAL OPERATIONS

SAFETY EQUIPMENT:

BLOCK SAFETY EQUIPMENT

RESPONSIBILITY:

1. SOS'S AND OS'S TO IMPLEMENT AND MAINTAIN THIS PROCEDURE.
2. IT IS THE SOS'S RESPONSIBILITY TO MONITOR ALL ALARMS, FLOWS, LEVELS AND PRESSURES DURING AND AFTER SHUTDOWN.
3. IT IS THE OS'S RESPONSIBILITY TO MAKE SURE EVERYTHING IN THE FIELD IS SECURED IN A SAFE MANNER.

PURPOSE: TO PROVIDE INSTRUCTIONS FOR NORMAL OPERATING CONDITIONS OF R-1/R-2D.

GLYCOL 1 PROCEDURE

TRIP	LIMIT	CONSEQUENCE	ACTIONS TO BE TAKEN
REACTOR PROP LOW DELTA P ACROSS C/V	10.75#	WATER BACKING INTO PROPYLENE HEADER	BLOCK PROPYLENE C/L IN THE FIELD. PULL AND FOLLOW REACTOR TRIP PROCEDURE. CHECK SYSTEM FOR PROBLEM. IS IT A SYSTEM PROBLEM OR TRANSMITTER FAILURE? GET PROBLEM FIXED, PRESSURE UP AND RESTART THE REACTOR.

DO A 045384
CONFIDENTIAL

TRIP	LIMIT	CONSEQUENCE	ACTIONS TO BE TAKEN
REACTOR CHLORINE LOW DELTA P ACROSS C/V	5#	WATER BACKING INTO CHLORINE HEADER	BLOCK CHLORINE C/L IN THE FIELD. PULL AND FOLLOW REACTOR TRIP PROCEDURE. IS IT A SYSTEM PROBLEM OR TRANSMITTER FAILURE. GET PROBLEM FIXED. CHECK CL2 C/L FOR WATER BEFORE START UP. RESTART REACTOR USING THE REACTOR START UP PROCEDURE.
REACTOR LOW WATER FLOW	700 KLB/HR	EXOTHERM, IMPROPER MIXING, TITANIUM AND CHLORINE REACTION	NEED TO MAINTAIN A MINIMUM FLOW OF 600 KLB/HR THROUGH E-70/E-3C THROUGH REACTOR. IF FLOW CANNOT BE KEPT, STOP ALL FLOWS IN AND OUT OF R-2D/R102D ON THE SIDE WE LOST WATER. REFER TO EMERGENCY REACTOR TRIP PROCEDURE.
D-102 HIGH/HIGH LEVEL	90 %	RUPTURE DISC WILL BLOW DUE TO HIGH PRESSURE AT 15#'S. HIGH PRESSURE IS DUE TO HIGH LIQUID LEVEL. LARGE PCH SPILL IF RUPTURE DISC BLOWS. R-101 WILL SHUTDOWN ON HIGH PRESSURE AT 12#.	CHECK THE PD-102AA/BB PUMPS, PCH C/LOOP TO R-102D AND MANUAL VALVES AT PUMP SUCTION AND DISCHARGE ADD AT PCH C/LOOP. SWITCH TO OFF LINE PUMP TO HELP BRING LEVEL DOWN, R-101 MAY HAVE TO BE SHUTDOWN AND WATER CUT OFF REACTOR AND MANUALLY BLOCKED AT C/LOOP AND 1" BYPASS, ALSO MANUALLY BLOCK IN SEAL FLUSHES AT PD-102AA/BB, S-71 FF, E-101 LIQUID DROPOUT, RECOVERY, T-400 F/F BV'S. ALSO IF R-101 GOES DOWN, MANUALLY BLOCK IN ALL FLOWS IN AND OUT OF R-102D AND D-102 ASAP. REFER TO EMERGENCY TRIP PROCEDURE.

DO A 045385
CONFIDENTIAL

TRIP	LIMIT	CONSEQUENCE	ACTIONS TO BE TAKEN
D-210 HIGH LEVEL	50% ON BOTH TRANSMITTER OR 50% ON ONE TRANSMITTER AND HIGH DEW POINT ON THE OTHER	LIQUID CHLORINE TO REACTORS, BLOW RUPTURE DISC AND HAVE A PCH SPILL	BLOCK CL2 REACTOR B/V'S PULL EMERGENCY REACTOR TRIP PROCEDURE AND FOLLOW PROCEDURE STEPS. GET CL2 PLANT TO SUCK THE HEADER BACK.
D-2 HIGH/HIGH LEVEL	98/75%	RUPTURE DISC WILL BLOW DUE TO HIGH PRESSURE AT 10.07#. HIGH PRESSURE IS DUE TO HIGH LIQUID LEVEL. LARGE PCH SPILL IF RUPTURE DISC BLOWS. R-1 REACTOR WILL SHUTDOWN ON HIGH PRESSURE AT 7.0#.	CHECK THE PD-2 AA/BB PUMPS, PCH C/L TO R2D AND MANUAL VALVES AT PUMP SUCTION AND DISCHARGE AND AT PCH C/L. SWITCH TO OFF LINE PUMP TO HELP BRING LEVEL DOWN. R-1 MAY HAVE TO BE SHUTDOWN AND WATER CUT OFF REACTOR AND MANUALLY BLOCKED AT C/L AND 1" BYPASS. ALSO MANUALLY BLOCK IN SEAL FLUSHES AT PD-2 AA/BB, S-70 FF, E-1 DROPOUT, RECOVERY AND T-400 FF B/V'S ALSO IF R-1 GOES DOWN, MANUALLY BLOCK IN ALL FLOW IN AND OUT OF R-2D AND D-2 ASAP. REFER TO EMERGENCY TRIP PROCEDURE.
D-2 HIGH PRESSURE	7.0#	RUPTURE DISC BLOWS AT 10.07#. WHEN RUPTURE DISC BLOWS A SPILL WILL OCCUR.	IS THE PRESSURE COMMON TO BOTH DEGASSERS? IF YES, CHECK FOR IMPURITIES IN THE INCOMING RAW MATERIALS(PROCESS WATER, PROPYLENE, CHLORINE). CHECK THE LEVEL IN THE DEGASSER, HIGH LEVEL WILL CAUSE HIGH PRESSURE. CHECK NITROGEN FLOW TO D-2, MAKE SURE THE C/V IS NOT STUCK OPEN. CHECK VENT SYSTEM OUT, COMPRESSOR AND VALVES. IS R-1 IN BALANCE. REFER TO EMERGENCY TRIP PROCEDURE.

DO A 045386
CONFIDENTIAL

TRIP	LIMIT	CONSEQUENCE	ACTIONS TO BE TAKEN
D-102 HIGH PRESSURE	12#	RUPTURE DISC BLOWS AT 50#. WHEN RUPTURE DISC BLOWS A SPILL WILL OCCUR.	IS THE PRESSURE COMMON TO BOTH DEGASSERS? IF YES, CHECK FOR IMPURITIES IN THE INCOMING RAW MATERIALS (PROCESS WATER, PROPYLENE, CHLORINE). CHECK THE LEVEL IN THE DEGASSERS, HIGH LEVEL WILL CAUSE HIGH PRESSURE. CHECK NITROGEN FLOW TO D-102. MAKE SURE THE C/V IS NOT STUCK OPEN. CHECK VENT SYSTEM OUT FOR ANY VALVES THAT ARE NOT WORKING. IS R-101 IN BALANCE? REFER TO EMERGENCY TRIP PROCEDURE.
CL2/PROP RATIO SET POINT DEVIATION	20%	OUT OF BALANCE, PRESSURE PROBLEMS, CL2 IN VENT	PULL UP REACTOR DIAGNOSTIC TROUBLESHOOTING CHECKLIST AND DETERMINE WHAT TRANSMITTER HAS DEVIATED. PULL EMERGENCY TRIP PROCEDURE. REPAIR AND START UP USING REACTOR START UP PROCEDURE.
D-102 HIGH TEMPERATURE	130 DEG C	POSSIBLE REACTION WITH WET CHLORINE AND TITANIUM AT 150 DEG C	INCREASE WATER SPRAY FLOW. COMPARE D102 TEMP AGAINST R-101 OUTLET TEMP TO SEE IF THERE IS A POSSIBLE TRANSMITTER FAILURE OR IS THE REACTION TAKING PLACE IN THE REACTOR. PULL EMERGENCY TRIP PROCEDURE. INCREASE WATER RATIO TO R-101. AFTER PROBLEM IS FIXED, STARTUP R-101 USING THE R101 START UP PROCEDURE.

DO A 045387
CONFIDENTIAL

TRIP	LIMIT	CONSEQUENCE	ACTIONS TO BE TAKEN
D102 LOW/LOW WATER SPRAY	5 GPM	CL2 AND TITANIUM REACTION	CHECK ALL WATER B/V'S IN THE FIELD TO VERIFY THEY ARE OPEN. CHECK THE CONTROL VALVE TO VERIFY IT IS WORKING PROPERLY. CHECK PROCESS WATER PRESSURE. CHECK FLOW TRANSMITTER. PULL R-101 EMERGENCY TRIP PROCEDURE. CORRECT PROBLEM AND RESTART R101 USING R-101 START UP PROCEDURE.
LOW NITROGEN FLOW TO DEGASSER	100 SCFH	NO CL2 SWEEP EXPLOSIVE ATMOSPHERE, REACTION WITH TITANIUM, FIRE	CHECK NITROGEN CONTROL VALVE TO SEE IF IT WORKS PROPERLY. CALL UTILITIES TO SEE IF THERE IS A PROBLEM WITH THE NITROGEN HEADER PRESSURE. LOOK TO SEE IF THERE IS A TRANSMITTER PROBLEM. PULL UP REACTOR EMERGENCY TRIP PROCEDURE. CORRECT THE PROBLEM AND RESTART THE REACTOR USING THE REACTOR START UP PROCEDURE.
D-102 LOW/LOW LEVEL PD- 102 AA/BB TRIP	10% ON BOTH LEVEL TRANSMITTER	REACTOR VENT VAPORS COULD BE SUCKED INTO R- 102D CAUSING A REACTIVE CHEMICAL INCIDENT.	CHECK THE PCH C/V INTO R-102 TO SEE IF IT STUCK OPEN ALSO SEE IF THE BYPASS IS OPEN. CLOSE BACK ON A PCH MANUAL B/V TO SEE IF THE LEVEL COMES UP. IF LEVEL COMES UP, THE C/V HAS PROBABLY BEEN EATEN AWAY. YOU WILL NEED TO RUN ON BYPASS UNTIL C/V CAN BE REPLACED.
THROX	SEQ 13 NOT IN RUN STEP	NO VENTING CAPABILITIES, THROX IS DOWN	START THE 70 SIDE VENT COMPRESSOR SYSTEM, START UP THROX USING THE APPROPRIATE START UP PROCEDURES.
THROX	SEQ 12 NOT IN RUN STEP	NO VENTING CAPABILITIES, THROX IS DOWN	START THE 71 SIDE VENT SYSTEM AND START UP THROX USING THE APPROPRIATE START UP

TRIP	LIMIT	CONSEQUENCE	ACTION TO BE TAKEN
D102 LOW TEMPERATURE	20 DEG C	CHLORINE AND TITANIUM REACTION	INVESTIGATE POSSIBLE TRANSMITTER PROBLEM. IS D-102 WATER COOL? PULL R-101 EMERGENCY TRIP PROCEDURE. FIX PROBLEM AND RESTART R-101 USING THE R-101 START UP PROCEDURE.
CL2 IN VENT ANALYZERS	25% CL2 FOR 3 MINUTES	CHLORINE REACTION IN VENT SYSTEM CAUSING FIRE OR EXPLOSION	PULL THE REACTOR DIAGNOSTIC TROUBLESHOOTING CHECKSHEET TO SEE IF THERE IS A TRANSMITTER PROBLEM. PULL REACTOR EMERGENCY TRIP PROCEDURE AND FOLLOW STEPS. ONCE PROBLEM IS IDENTIFIED AND CORRECTED, USE THE REACTOR STARTUP PROCEDURE TO BEGIN STARTING UP REACTOR.

ALARMS	LIMIT	CONSEQUENCE	ACTION TO BE TAKEN
PROP FLOW LOW DIFF ACROSS C/V	17#	POSSIBILITY OF WATER BACKING UP INTO THE PROPYLENE HEADER. TRIP IS 10.75#	CHECK E-150C PRESSURE, RAISE PRESSURE IF LOW, CUT LOAD TO BRING PRESSURE UP.
CL2 FLOW LOW DIFF ACROSS C/V	8#	POSSIBILITY OF WATER BACKING INTO CL2 HEADER CAUSING A REACTION. TRIP IS 5#	CUT LOAD TO BRING PRESSURE UP. CALL THE CHLORINE PLANT TO SEE IF THEY CAN RAISE THE HEADER PRESSURE.
REACTOR LOW WATER FLOW	1000 KLB/HR	POSSIBILITY OF EXOTHERM, IMPROPER MIXING, OR A TITANIUM AND CHLORINE REACTION. TRIP IS 700 KLB/HR	CHECK P-100 DISCHARGE PRESSURE PUT ON ANOTHER P-100 IF NEED. CHECK ON THE WATER C/V, MAKE SURE IT IS WORKING CORRECTLY. LOOK AT THE OH TRAIN AND CHECK THE VALVE POSITIONS. COULD IT BE AN INSTRUMENT PROBLEM? IF YES, GET FIXED.
DEGASSER HIGH LEVEL	50%	POSSIBILITY OF PRESSURING UP DEGASSER AND BLOWING RUPTURE DISC CAUSING A SPILL D-2 TRIP IS 98.75% D-102 TRIP IS 90%	START DOWN PUMP AND OPEN DISCHARGE VALVE. OPEN PCH C/L BYPASS. CHECK PCH C/V TO SEE WHAT POSITION IT IS IN. TREND THE PCH FLOW TO

ALARMS	LIMIT	CONSEQUENCE	ACTION TO BE TAKEN
D-2 HIGH PRESSURE	4#	POSSIBILITY OF BLOWING RUPTURE DISC WHICH BLOWS AT 10.07#	CHECK LEVEL, IF HIGH LOWER THE LEVEL. CHECK THE VENT FLOW, IF LOW CHECK OUT ALL THE VENT SYSTEM VALVES, BYPASS FLOW TRANS. IF VENT FLOW IS HIGH, THERE IS A PROBLEM WITH EITHER THE REACTOR OR DEGASSER. CHECK THE N2 FLOW TO D2, MAKE SURE THE C/V IS NOT STUCK OPEN. IS R-1 IN BALANCE? IS THE PRESSURE COMMON TO BOTH SIDES? IF YES, CHECK FOR IMPURITIES IN THE INCOMING RAW MATERIALS (PROCESS WATER, PROPYLENE, CHLORINE)
D-102 HIGH PRESSURE	6#	POSSIBILITY OF BLOWING RUPTURE DISC WHICH BLOWS AT 50#	CHECK LEVEL, IF HIGH LOWER THE LEVEL. CHECK THE VENT FLOW, IF LOW CHECK OUT ALL THE VENT SYSTEM VALVES, BYPASS FLOW TRANS. IF VENT FLOW IS HIGH, THERE IS A PROBLEM WITH EITHER THE REACTOR OR DEGASSER. CHECK THE N2 FLOW TO D2, MAKE SURE THE C/V IS NOT STUCK OPEN. IS R-101 IN BALANCE? IS THE PRESSURE COMMON TO BOTH SIDES? IF YES, CHECK FOR IMPURITIES IN THE INCOMING RAW MATERIALS (PROCESS WATER, PROPYLENE, CHLORINE)
DEGASSER LOW N2 FLOW	800 SCFH	POSSIBILITY OF AN EXPLOSIVE ATMOSPHERE TAKING PLACE IN THE DEGASSER DUE TO A LOW CL2 SWEEP	CHECK THE N2 HEADER PRESSURE IF LOW CALL UTILITIES TO SEE WHAT THE PROBLEM IS. CHECK N2 CONTROL VALVE TO SEE IF THERE IS A PROBLEM. IF THE PROBLEM IS NOT COMMON TO BOTH SIDES THERE COULD BE A TRANSMITTER PROBLEM . GET REPAIRED.

DO A 045390
CONFIDENTIAL

ALARMS	LIMIT	CONSEQUENCE	ACTION TO BE TAKEN
D-102 LOW WATER SPRAY		POSSIBILITY OF A CL2 AND TITANIUM REACTION	CHECK TREND ON FLOW TO SEE WHAT HAPPENED TO THE FLOW. CHECK ALL VALVES TO VERIFY THAT THEY ARE OPEN INCLUDING THE CONTROL VALVE. CHECK PROCESS WATER HEADER PRESSURE. START ANOTHER P-100 IF NEEDED. CHECK FLOW TRANSMITTER.
D102 LOW TEMP	30 DEG C	POSSIBILITY OF A CL2 AND TITANIUM REACTION	IS THE PROCESS WATER COOL? CHECK FOR POSSIBLE TRANSMITTER PROBLEM. COMPARE R-101 OUTLET TEMP TO D-102 TEMP. SHOULD BE CLOSE.
D-102 HIGH TEMP	120 DEG C	POSSIBLE REACTION OF WET CL2 AND TITANIUM AT 150 DEG C	INCREASE WATER SPRAY FLOW. INCREASE WATER RATIO TO R-101. COMPARE R-101 OUTLET TEMP TO D-102 TEMP TO SEE IF THE REACTION IS TAKING PLACE IN THE REACTOR OR D-102. POSSIBLE TEMP. TRANS. PROBLEM.
CL2 IN VENT ANALYZERS HIGH	7.5%	POSSIBILITY OF A CL2 REACTION IN THE VENT SYSTEM	CHECK THE CL2 AND PROPYLENE PRESSURES TO SEE IF THERE IS AN UPSET. PULL A REACTOR DIAGNOSTIC TROUBLESHOOTING CHECKSHEET TO SEE IF THERE IS A TRANSMITTER GOING BAD.
CL2 IN VENT ANALYZER	15%	POSSIBILITY OF A CL2 REACTION IN THE VENT SYSTEM.	CHECK THE CL2 AND PROPYLENE PRESSURES TO SEE IF THERE IS AN UPSET. PULL A REACTION DIAGNOSTIC TROUBLESHOOTING CHECKSHEET TO SEE IF THERE IS A TRANSMITTER GOING BAD.

GLYCOL 1 PROCEDURE

R-1B NORMAL OPERATING CONDITIONS

C2 FLOW RATE	17,000 TO 35,000 #/HOUR
CL2 FLOW RATE	28,000 TO 59,000 #/HOUR
H2O FLOW RATE	12,000 TO 18,000 #/HOUR
ORP	TRACKING
VENT READING	1,000 TO 4,000 SCFH
TEMP	80 TO 100 DEG C
INLET H2O TEMP	58 TO 65 DEG C

DO A 045391
CONFIDENTIAL

PCH YIELD
PRESSURE

>90%
4 TO 9 PSIG ON BOTTOM

R-2D NORMAL OPERATING CONDITIONS

FEED
STEAM RATE

TO MAINTAIN LEVEL IN D-2
AS NEEDED TO CONTROL PO IN R-2D
BTMS FLOW < 100 PPM

BOTTOMS TEMP.
OH TEMP
PRESSURE
CAUSTIC RATE

85 - 100 DEG C
70 - 95 DEG C
-9 TO -4 # VACUUM
TO HOLD .06 TO .12 EXCESS IN
BOTTOMS
25%

LEVEL

DO A 045392
CONFIDENTIAL