

- TRI-II SOP -

SOP#: 78

SOP TITLE: RESPONSE TO LOSS OF RECYCLE IN AN
OHC REACTOR

OPERATOR: _____

DATE: _____

written by: Art Reinhardt
date: 07/19/91

reviewed by: CONTROL ROOM
date: 01/01/92

approved by: Art Reinhardt
date: 02/18/92

CHECK ACTION STEPS AS THEY ARE COMPLETED

The loss of recycle to an OHC reactor is extremely serious. The amount of ethylene in the recycle stream represents a significant percentage of the total ethylene entering the reactor and reacting with HCl and oxygen. When this source is lost, the reactor vent will rapidly increase in oxygen concentration, easily reaching what is necessary to become explosive. If the shutdown system is functioning correctly, the reactor will shut itself down when the oxygen concentration rises to 6% for 20 seconds. In a real-life situation where there was actual loss of recycle and very little change was made to the reactor feed rates, after about four minutes the oxygen concentration in the vent began to increase rapidly. It continued to rise, past 10% and off the chart. At 6% the reactor shut itself down. Another five minutes passed before the vent composition was less than 10% oxygen and back on the chart! When recycle is lost, action must be taken quickly to replace the ethylene and inerts returning to the reactor in the recycle. Furthermore ALL board operators in the Control Room must be familiar with the procedure to be able to perform it if the Lead and OHC Operators are outside at the same time.

The procedure assumes that the ethylene concentration in the vent at the time of loss of recycle was 30% and that the recycle flowrate was equal to the amount shown on the feed chart. The ethylene that is lost with recycle failure will be made up for by increasing the ethylene feedrate. The remainder of the lost recycle will be replaced with nitrogen.

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The loss of recycle, and the subsequent addition of ethylene and nitrogen to the reactor, will result in the opening of the Large Pressure Control Valve, venting the reactor to the Plant Vent Scrubber. This represents a Bypass of Incineration and must be reported to Supervision.

If, during the operation of the #4 OHC reactor, recycle is lost there will be a low flow alarm displayed for the recycle flow, F-736. The low flow alarm point is 30,000 scfh. The status of the recycle anti-backup valve (HS-7385) will be displayed on a small panel on the East wall of the Control Room.

- ____ 1. If both the Lead and OHC Operators are outside, immediately notify them of the loss of recycle to the reactor. Unless they can positively identify the problem, continue with this procedure.
- ____ 2. If the anti-backup valve has closed, try to reset it. If it resets, notify the Lead and OHC Operators. Watch the Reactor to make sure that it resumes normal operation, while they check around outside to determine the cause of the trip. If it will not reset, continue through this SOP.
- ____ 3. On the MOD-III, call up page 25.
- ____ 4. On page 25, call up the HCl flow to the Reactor, F-658, and determine the HCl feedrate to the reactor. Remember, the flowrate displayed must be multiplied by 10 to get the actual HCl flowrate to the Reactor. This value will always be greater than 100,000 SCFH.
- ____ 5. On the Recycle Make-up graphs determine the correct flowrates for ethylene (C₂H₄) and nitrogen (N₂) to replace the lost recycle.

This graph displays the required ethylene and nitrogen flows necessary to replace a recycle flow of the volume calculated on the standard flow chart (appended), assuming the vent had 30% ethylene and 70% inerts in it. These are fail-safe approximations. The ethylene flow shown on the graph is the sum of the feedrate of ethylene for the HCl flowrate listed and the extra ethylene needed to make up for that ethylene normally returning to the reactor in the recycle.

- ____ 6. While still on page 25, take the ethylene flow, F-654, off of ratio control and put it on manual control.

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- _____ 7. Adjust the ethylene flow control valve, F-654, to obtain the flow value shown on the graph.
- _____ 8. Adjust the nitrogen flow control valve, H-650, to obtain the flow value shown on the graph.
- _____ 9. Continue to monitor reactor performance until the OHC or Lead Operator can return to the Control Room.
- _____ 10. If the Large Reactor Pressure Control Valve (P-729) opens, immediately start a water flow of approximately 120 gpm going to the Plant Vent Scrubber. This is done by opening valve F-772 on page 24 of the MOD-III System. (If the large Reactor Pressure Control Valve, P-729, does open, there will be a message displayed on the alarm typewriter in the Control Room.
- _____ 11. If the Large Reactor Pressure Control Valve opens, notify Supervision that a Bypass of Incineration has occurred.

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