

REACTORS AREA  
DRYING A WET REACTOR DOWTHERM SYSTEM

| CHECK | ACTION STEPS (All Caps) | COMMENTS (Below steps) |
|-------|-------------------------|------------------------|
|-------|-------------------------|------------------------|

At times the dowtherm side of a reactor can be contaminated with water. This water must be removed prior to being able to heat the dowtherm hot enough for a reactor startup. Water in the dowtherm system is removed by heating the system and then flashing off the water. Special attention must be given to the flashing task in order to protect employees and the environment. To assist you in this task, two tables have been included within the SOP. No dowtherm is to be drained to the pad. Dowtherm is a mixture containing 27% Biphenyl which is a chemical regulated by the Clean Air Act and the Superfund. If you experience a dowtherm spill, it must be reported according to the "Yellow Book" procedures. A quart of a gallon is the IRQ and half a gallon is reportable to the agencies. Refer to Appendix A in the yellow book.

We will abstain from pulling a vacuum on this system to prevent moving water from the barometric condenser into the system. If pulling a vacuum becomes necessary, we must block in the vacuum jet dowtherm valve.

This SOP applies only to cold dowtherm. Never mix cold and hot dowtherm.

- \_\_\_\_\_ 1. IF THE WATER PHASE IS SIGNIFICANT, PHASE AS MUCH WATER AS PRACTICAL TO A CONTAINMENT.

This can be done by draining the water from the sight glass nozzles if the level was controlled somewhat close to the nozzle. You may add or drain some dowtherm from or to the dowtherm storage tank. This means that we are working with cold dowtherm only. You must connect hoses from the sight glass drain into a collecting drum. The drum must be emptied into the water recycle tank after the task is completed. Under normal conditions this step will not apply.

- \_\_\_\_\_ 2. ONCE THE SYSTEM HAS BEEN DRAINED OF THE MAJORITY OF PHASE WATER CLOSE OFF THE BLEEDS ON THE DOWTHERM SYSTEM.

- \_\_\_\_\_ 3. CIRCULATE THE DOWTHERM SYSTEM AND LIGHT THE HEATER ACCORDING TO THAT SOP.

- \_\_\_\_\_ 4. HEAT THE SYSTEM UNTIL THE DOWTHERM CIRCULATION TEMPERATURE REACHES 300 DEGREES FAHRENHEIT.

Since the dowtherm system is pressurized to 75 lbs. the water will remain as liquid.

- \_\_\_\_\_ 5. LOWER THE DOWTHERM PRESSURE GRADUALLY. AT SOME POINT DEPENDING ON THE AMOUNT OF WATER IN THE SYSTEM, STEAM SHOULD START TO FLASH OUT OF THE ATMOSPHERIC VENT. CONTINUE TO LOWER THE PRESSURE UNTIL YOU REACH ATMOSPHERIC PRESSURE.

The pressure is decreased slowly to prevent dowtherm carryover as the water flashes off. Under these conditions no dowtherm vapors should be released since the boiling point of dowtherm is 497 degrees Fahrenheit at atmospheric pressure.

- \_\_\_\_\_ 6. REPRESSURIZE THE SYSTEM TO 75 PSIG AND KEEP THE CONTROLLER ON AUTOMATIC. IF CAVITATION AND FURNACE SHUTDOWN HAD OCCURRED DURING THE PREVIOUS STEP, RE-ESTABLISH CIRCULATION AND RE-LIGHT THE DOWTHERM HEATER.

With the system on automatic we should be able to purge the steam as it is formed. Observe for drastic pressure increase. The dowtherm SRV is set for 110#.

- \_\_\_\_\_ 7. HEAT THE SYSTEM UNTIL THE DOWTHERM CIRCULATION TEMPERATURE REACHES 330 DEGREES FAHRENHEIT.

If the pressure did not increase and the dowtherm pump did not cavitate, this is an indication that most of the water has been removed from the system. Repeat step 5 and step 6 if the heater shuts down.

- \_\_\_\_\_ 8. BECAUSE THE SYSTEM WAS "COLD" AT THE BEGINNING, THERE MAY BE SOME CONDENSATION TAKING PLACE IN THE DOWTHERM VENT RECEIVER. THIS WATER WILL ACCUMULATE IN THE SEAL LOOP AT THE BOTTOM OF THE VESSEL. DRAIN THE SEAL LOOP INTO THE BAROMETRIC CONDENSER USING THE LINE PROVIDED. DISCONNECT THE HOSE AT THE CONDENSER ONCE THE LOOP IS EMPTY.

Goggles and gloves are required to complete this task.

- \_\_\_\_\_ 9. SLOWLY, INCREASE THE TEMPERATURE TO 500 DEGREES. AT THIS TEMPERATURE THE DOWTHERM WILL VAPORIZE AT 2 PSIG.

If you lose the heater do not depressurize the system to less than 10 psig. Perhaps this the best

place for the water and dowtherm partial tables.  
 The pressure on this tables are in PSIG for water  
 and PSIA for dowtherm.

| WATER |       | DOWTHERM      |       |
|-------|-------|---------------|-------|
| PSIG  | TEMP. | PSIA          | TEMP. |
| 53.3  | 301   | 1.0           | 323   |
| 60.3  | 308   | 5.0           | 416   |
| 65.3  | 312   | 10.0          | 465   |
| 70.3  | 316   | 14.0 *        | 491   |
| 75.3  | 320   | 20.0          | 521   |
| 80.3  | 325   | 25.0          | 541   |
| 85.3  | 328   | 30.0          | 558   |
| 90.3  | 331   | * atmospheric |       |

10. NEVER PULL A VACUUM ON THE DOWTHERM SYSTEM IF THE TEMPERATURE IS ABOVE 450 DEGREES.
11. INCREASE SYSTEM PRESSURE TO 75 PSIG. CONTINUE TO HEAT UP THE REACTOR. IF THE SYSTEM TRIPS DUE TO CAVITATION THEN DEPRESSURIZE THE SYSTEM ACCORDING TO THE FOLLOWING TABLE AND REPEAT STEPS 5 AND 6 AS NECESSARY.

DOWTHERM CIRCULATION/DEPRESSURIZATION TABLE

| IF DT TEMP IS BETWEEN | DEPRESSURIZE TO |
|-----------------------|-----------------|
| 450-500               | 30 PSIG         |
| 500-550               | 45 PSIG         |
| 550-600               | 60 PSIG         |
| 600-650               | 75 PSIG         |

THESE DEPRESSURIZATION LIMITS ARE TO VAPORIZE ANY WATER THAT MAY BE IN THE SYSTEM BUT TO NOT VAPORIZE ANY DOWTHERM.

12. WHEN THE DOWTHERM IS ABLE TO BE CIRCULATED AT 650 DEGREES THE REACTOR SHOULD BE CAPABLE OF BEING HEATED TO THE 600 DEGREES START UP TEMPERATURE.

REVIEWED BY:

|         | OPERATOR SIGNATURE  | DATE            |
|---------|---------------------|-----------------|
| A-SHIFT | <u>Dean Landrey</u> | <u>18 FEB</u>   |
| B-SHIFT | <u>James Rogers</u> | <u>11-14-91</u> |
| C-SHIFT | <u>James Rogers</u> | <u>11-14-91</u> |
| D-SHIFT | <u>James Rogers</u> | <u>11-7-91</u>  |
| E-DAY   | <u>W. Quaker</u>    | <u>11-18-91</u> |
| RELIEF  | <u>H. Matlock</u>   | <u>9-15-92</u>  |
| RELIEF  |                     |                 |