



INDUSTRIES

PPG INDUSTRIES, INC.

INDUSTRIAL CHEMICAL DIVISION

P. O. BOX 1000

LAKE CHARLES, LA. 70601

P/T STILL LINE

S.O.P.

COMMENTS:

SL 020011

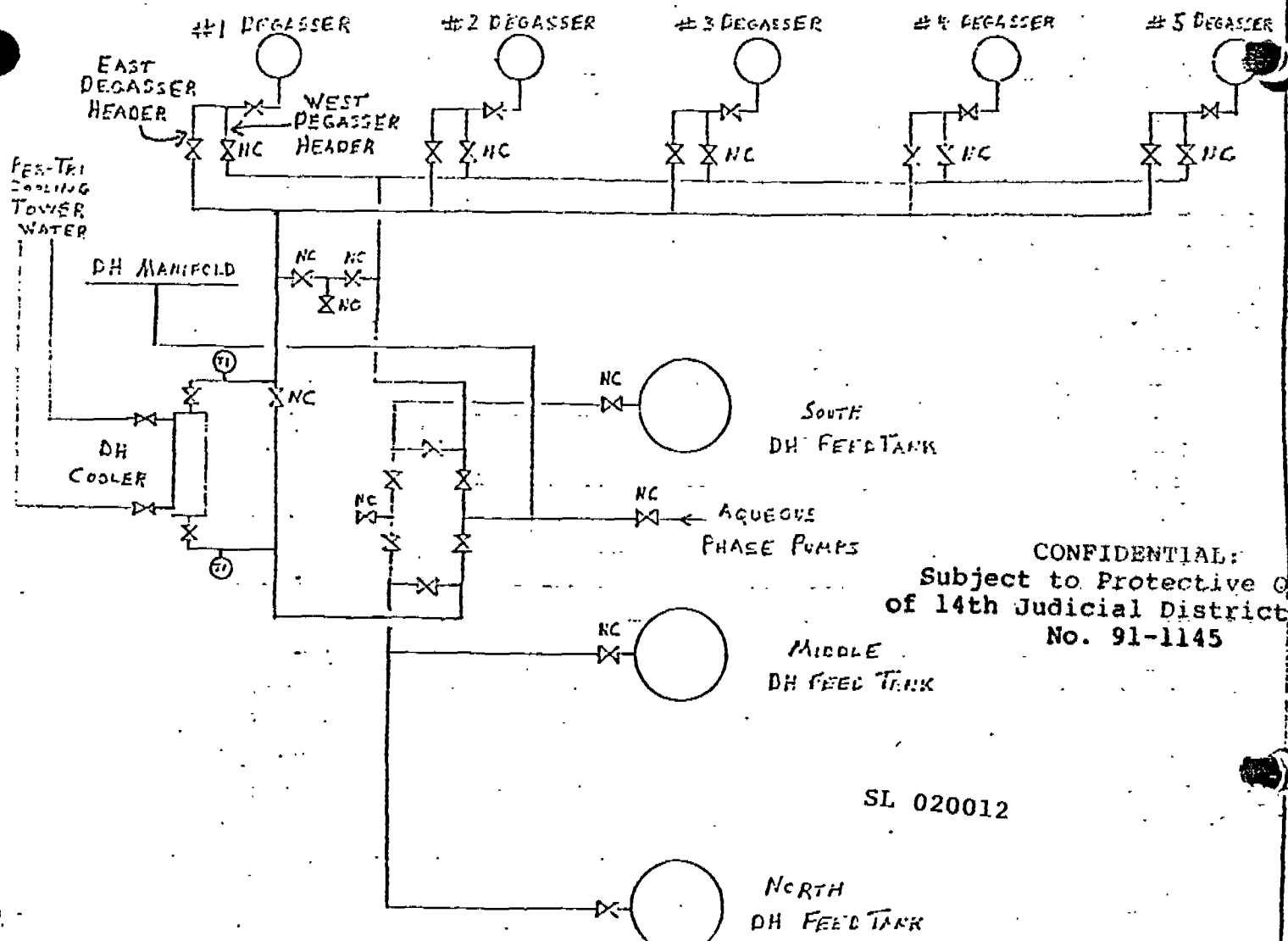
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IV. Standard Operating Procedures

DH Feed Tanks

Degasser Piping to the DH Feed Tanks

- A. Normal Operation: There are two headers from the degassers to the DH feed tanks. The east header should be used unless repairs on this header are necessary, because the west header bypasses the DH feed tank cooler. While in the east header, the crude is cooled in a Karbate shell and tube heat exchanger by water from the Per-Tri cooling tower. There is also a bypass around the cooler when repairs or cleaning are required. Depending on reactor rates, the normal crude temperature to the cooler is 160°F and the outlet is 130°F.

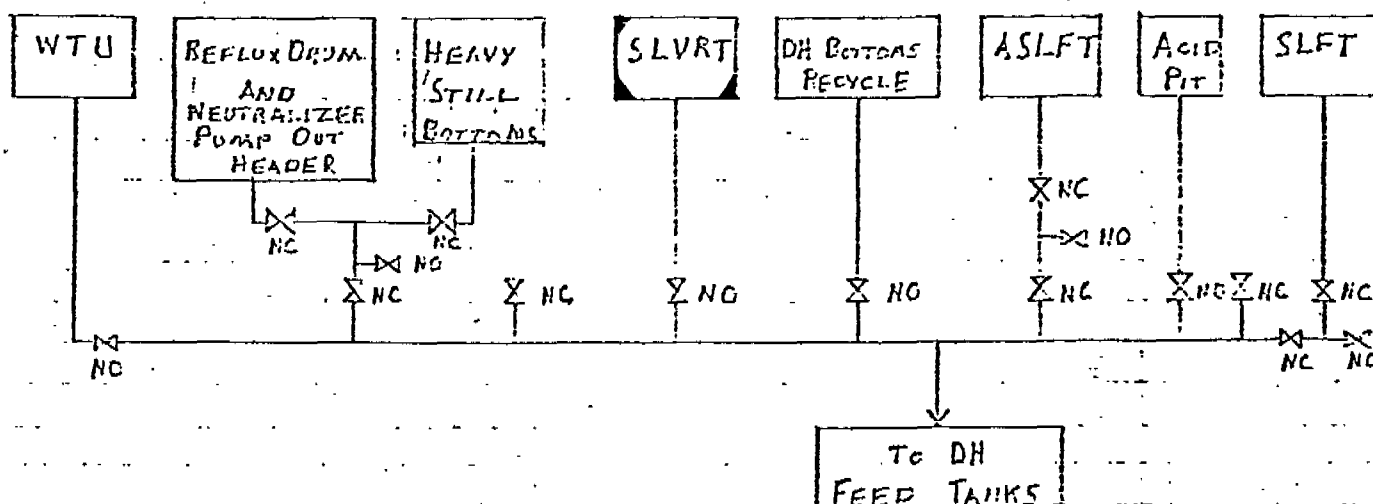


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DH Manifold

A. Normal Operation: The DH manifold is a recycle header for wet organics. The acid pit, still line vent recovery tank (SLVRT), etc., are pumped to the DH feed tanks when necessary.



Individual headers should be double blocked and bleeds open when headers are not being used.

<u>Source</u>	<u>Analysis of Materials</u>	<u>Problems Related to This Material</u>
Heavy Still Bottoms	Per, Unsym, Sym, Penta, Hexa, PCBD, HCBA, and other Heavies	Turn DH feed tank crude black.

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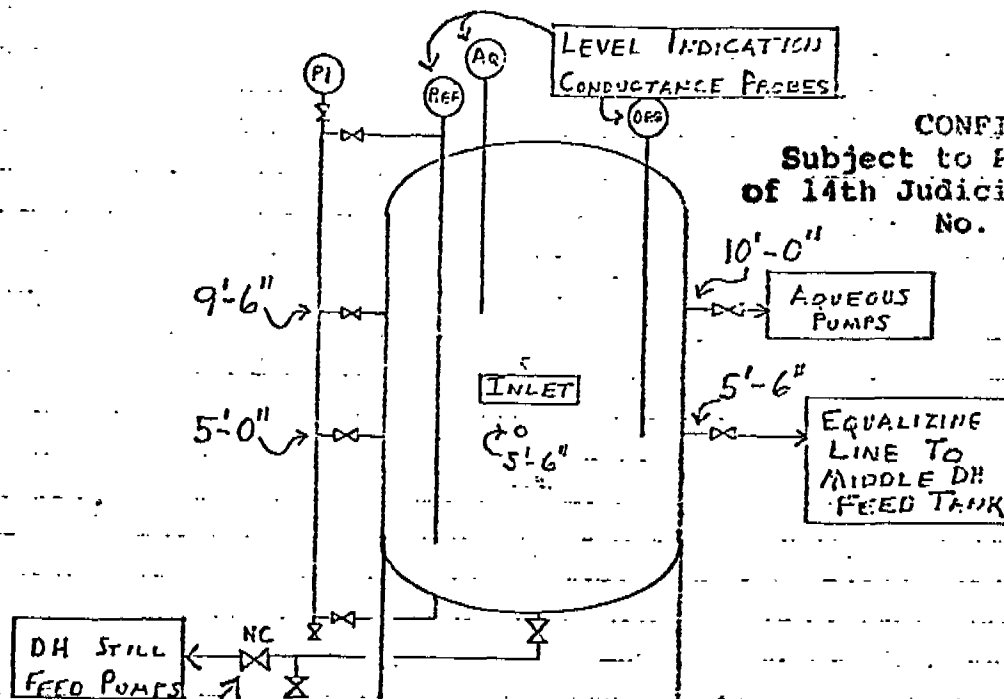
Source	Analysis of Material	Problems Related to This Material
Reflux drum and neutralizer pumpout header SLVRT	Depends on source of material. Could contain any organic compounds at Per-Tri.	1. Lights such as Tri reflux drum material could cause DH still pressure problems. 2. Change ratios which would change feed rates to all the stills. 3. High organic or total level in the north DH feed tank.
DH Bottoms	Any organic compounds at Per-Tri	1. This material bypasses the DH feed cooler and is hot material. This hot material could cause an increase in the DH tank pressures. 2. This could cause high DH feed tank levels.
ASLFT	1. DH Bottoms 2. P/T Bottoms 3. Tri Overheads 4. Tri Product 5. Per Product Any organic compounds at Per-Tri	1. <u>Never start reworking from the ASLFT without someone watching the control board.</u> 2. Any time material is being reworked to the DH feed tanks the whole still line is affected. Tri gives the most problems because the Per-Tri still reflux drum is small and will show a ratio change the fastest.
Acid Pit	Can be high in TCE or lights such as VDC, Cis, and Trans	1. Watch heavy still overhead and P/T overhead analysis for an increase in TCE. Make proper adjustments on these stills. 2. Lights can cause DH still pressure problems.

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DH Feed Tanks

North DH Feed Tank



THIS VALVE SHOULD NEVER BE OPENED UNLESS IT IS AN EMERGENCY. IF OPENED ALL THE SOLIDS IN THE BOTTOM OF THIS TANK WILL BE FED TO THE PULP MILL.

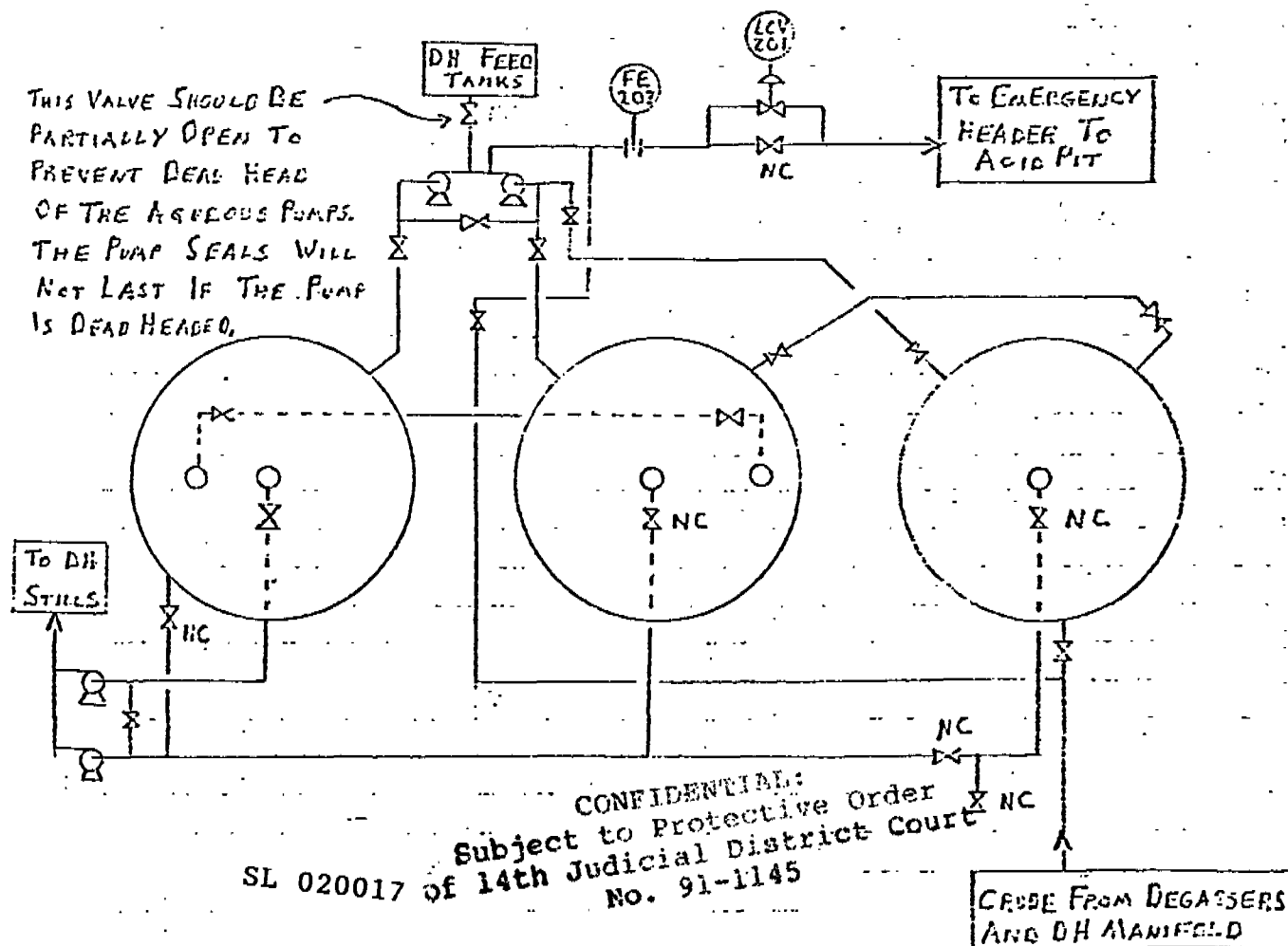
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<u>Source</u>	<u>Indication</u>	<u>Alarm</u>	<u>Problems</u>
DH Feed Tank Aqueous	High Level 11'4"	75% 11'1"	A liquid full DH feed tank will cause the rupture disc to blow.
	Low Level 10'4"	10% 10'5"	1. A low level will cause the aqueous pump to cavitate shortening the life of the seal. 2. A low level can also cause the organic sight glass level in the middle and south DH feed tanks to be wrong if the aqueous level is not above the third sight glass nozzle.
DH Feed Tank Organics	High Level 9'0"	70% 8'3"	A high organics level will result in the organics overflowing through the aqueous header to the acid pit.
	Low Level 6'6"	30% 7'3"	A low organics level will result in the interphase solids flowing to the middle DH feed tank. Also with very little and sometimes no organics going to the middle and south DH feed tanks, the aqueous phase could be fed to the DH stills. This would result in the whole still line getting wet.

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Since most of the solids should be removed in the north DH feed tank, the organics are equalized to the middle DH feed tank. This equalizing line is below the interphase control range in order to prevent interphase solids from going to the middle DH feed tank. The middle DH feed tank under flows to the south DH feed tank. Presently the south tank organics are pulled from the bottom to the DH still feed pumps. Once the level indication conductance probes are changed and made more reliable, there will be an organics probe installed on the south tank to record and alarm a low organics level. This will allow us to use the nozzle 4'0" from the bottom of the south tank to feed the DH still feed pumps without the chance of feeding aqueous (phase water) to the DH stills.



The aqueous of all three DH feed tanks are equalized and all should have the same total level. If the total levels are not equal:

Possible Problem

Possible Cause

1. The pressure on the tanks are different.

1. DH reflux drum or DH secondary aqueous overflowing light organics back to the DH feed tanks.

Restriction in the vent line or valve.

2. A sudden change in total feed (aqueous or organic).

2. See DH manifold writeup. Reactor startup, pumping back from the SLVRT, DH still on recycle, etc.

3. Restriction in the valves on the aqueous lines.

3. If it is a diaphragm valve, the teflon diaphragm may have broken away from the actuator leaving the valve partially opened or even closed.

There are two other sources of feeds to the middle and south DH feed tanks. It is the aqueous overflows from the DH secondary phase separator and the DH reflux drums. These lines should stay open into both tanks unless one is isolated.

B. Shutdown: The north DH feed tank should be cleaned about once a month.

The crude should never be put in the middle DH feed tank unless absolutely necessary (north and south tanks out of service) because the heavy solids will plug the equalizing line from the bottom of the middle tank to the bottom of the south tank. The middle and south DH feed tanks should never be taken out of service at the same time.

Shutdown.
North Tank
Middle
South Tank

Switch Crude to
South Tank*
South Tank
North Tank

Suction to DH Still
Feed Pumps From
South Tank*
South Tank
Middle Tank

*Block the equalizing valve between the south and middle tanks. Block the DH secondary and DH reflux drum aqueous overflow to the middle DH feed tank. The vent and aqueous valves should be left open.

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North DH Feed Tank Shutdow

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>	
_____		1. Switch feeds to :
_____		2. Make sure the suc open to the DH fe
_____	_____	3. Block and tag the _____ and middle DH feed ta
_____	_____	4. Blcok and tag the _____
_____	_____	5. Block and tag the equalizing line between the north and middle tanks.
_____	_____	6. Block and tag the valves from the DH secondary P/S and DH reflux drums to the middle tank.
_____	_____	7. Block and tag the equeous overflow valve on the north tank.
_____	_____	8. Tag the valve to the suction of the DH feed pumps.
_____	_____	9. Have a vacuum truck empty the tank to the east acid pit.
		10. After the tank is empty, tag the following:
_____		A. 2" valve to the suction of the aqueous pumps.
_____		B. Sight glass drain valve.
_____		C. Vent valve.
_____		11. Tag open the 4" drain valve on the suction line to the DH feed pumps.

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Middle DH Feed Tank Shutdown Checklist

A. Suction Valve Under Middle does not have to be Rolled

B. Clearing the Middle Tank with the Aqueous Pump to the DH feed Tanks

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>	
_____		1. Switch feeds to the south DH feed tank.
_____		2. Make sure the suction valve on the south tank is open to the DH feed pumps.
_____	_____	3. Block the equalizing line between the south and middle DH feed tank.
_____	_____	4. Block the feed valve to the north tank.
_____	_____	5. Block the equalizing line between the north and middle tanks.
_____	_____	6. Block the valves from the DH secondary P/S and DH reflux drums to the middle tank.
_____	_____	7. Block the aqueous overflow on the middle tank.
	_____	8. Tag the feed valve to the middle tank.
	_____	9. Tag the suction valve to the DH feed pumps on the north tank.
	_____	10. Use the west DH feed pump to the DH stills and tag the crossover valve between the pump suction.
_____	_____	11. Use the south aqueous pump to pump the aqueous to the acid pit. Tag the suction crossover valve at the north pump.
_____	_____	12. Use the 2" line from the bottom of the middle tank to the suction of the north aqueous pump. Line up the north aqueous pump through the 1 1/2" line to the feed line of the DH tanks. Tag the two discharge valves between the south and north aqueous pumps. Open the suction valve under the middle tank.

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	Lead
Still Line	Operator
<u>Operator</u>	<u>Tag</u>

13. When the pump cavitates, shut it down. Check the tank and the suction of the pump for organics. If there are more organics, restart the pump or call for a vacuum truck to suck out the remainder and put it in the east acid pit. If only aqueous remains, drain the remainder at the suction of the aqueous pump.

14. When the tank is empty, tag the following:

- A. The vent valve.
- B. The suction valve under the middle tank.
- C. Tag open the 3" valve on the bottom of the middle tank.
- D. Sight glass drain valve.
- E. 2" valve to the aqueous pump
- F. Untag the crossover valve at the aqueous pump suction.
- G. Untag the two discharge valves between the south and north aqueous pumps.

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Middle DH Feed Tank Shutdown Checklist

A. Suction Valve Under Middle Tank has to be Rolled

B. Clearing the Middle Tank with the Aqueous Pump

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>	
_____	_____	1. Switch feeds to the south DH feed tank.
_____	_____	2. Make sure the suction valve on the south tank is open to the DH feed pumps.
_____	_____	3. Block the equalizing line between the south and middle DH feed tank.
_____	_____	4. Block the feed valve to the north tank.
_____	_____	5. Block the equalizing line between the north and middle tanks.
_____	_____	6. Block the valves from the DH secondary P/S and DH reflux drums to the middle tank.
_____	_____	7. Block the aqueous overflow on the middle tank.
_____	_____	8. Tag the feed valve to the middle tank.
_____	_____	9. Tag the suction valve to the DH feed pumps on the north tank.
_____	_____	10. Use the west DH feed pump to the DH stills and tag the crossover valve between the pump suction.
_____	_____	11. Use the south aqueous pump to pump the aqueous to the acid pit. Tag the suction crossover valve at the north pump.
_____	_____	12. Use the 2" line from the bottom of the middle tank to the suction of the north aqueous pump. Line up the north aqueous pump through the 1 1/2" line to the feed line of the DH tanks. Tag the two discharge valves between the south and north aqueous pumps. Open the suction valve under the middle tank.
_____	_____	13. When the pump cavitates, shut it down. Check the tank and the suction of the pump for organics. If there are more organics, restart the pump or call for a vacuum truck to suck out the remainder and put it in the east acid pit. If only aqueous remains, drain the remainder at the suction of the aqueous pump.

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Still Line
Operator

Lead
Operator
Tag

14. When the tank is empty, tag the following:
- A. The vent valve.
 - B. The 2" valve to the aqueous pump.
 - C. The discharge valve on the east DH feed pump.
 - D. Tag open the suction bleed on the east DH feed pump.
 - E. Tag open the 3" valve on the bottom of the middle tank.
 - F. The sight glass drain valve.
 - G. Untag the crossover valve at the aqueous pump suction.
 - H. Untag the two discharge valves between the south and north aqueous pumps.
15. Have Maintenance install a 4" teflon blind in the east-west run of suction piping at the north-middle suction tee. Tag the blind.
16. After the blind is installed untag:
- A. Discharge valve on the east DH feed pump.
 - B. East DH feed pump suction bleed valve.
 - C. Crossover valve at the DH feed pump suction.

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Middle DH Feed Tank Shutdown Checklist

A. Suction Valve Under Middle Tank has to be Rolled

B. Clearing the Middle Tank with a Vacuum Truck

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>
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1. Switch feeds to the south DH feed tank.
2. Make sure the suction valve on the south tank is open to the DH feed pumps.
3. Block the equalizing line between the south and middle DH feed tank.
4. Block the feed valve to the north tank.
5. Block the equalizing line between the north and middle tanks.
6. Block the valves from the DH secondary P/S and DH reflux drums to the middle tank.
7. Block the aqueous overflow on the middle tank.
8. Tag the feed valve to the middle tank.
9. Tag the suction valve to the DH feed pumps on the north tank.
10. Make sure the suction valve under the middle tank is closed.
11. Use a vacuum truck to empty this tank to the east acid pit.
12. Use the west DH feed pump to feed the DH stills and tag the crossover valve between the pump suction.
13. When the tank is empty, tag the following:
 - A. The vent valve.
 - B. The 2" valve to the aqueous pump.
 - C. The discharge valve on the east DH feed pump.
 - D. Tag open the suction bleed valve on the east DH feed pump.
 - E. Tag open the 3" valve on the bottom of the middle tank.
 - F. The sight glass drain valve.

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<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>
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- | | |
|-------|---|
| _____ | 14. Untag and open the suction valve on the bottom of the middle tank. |
| _____ | 15. Have Maintenance install a 4" teflon blind in the east-west run of suction piping at the north-middle suction tee. Tag the blind. |
| _____ | 16. After the blind is installed untag: |
| _____ | A. Discharge of the east DH feed pump. |
| _____ | B. East DH feed pump suction bleed. |
| _____ | C. Crossover valve at the DH feed pump suction. |

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Middle DH Feed Tank Shutdown Checklist

A. Suction Valve Under Middle Tank does not have to be Rolled

B. Clearing the Middle Tank with a Vacuum Truck

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>	
_____	_____	1. Switch feeds to the south DH feed tank.
_____	_____	2. Make sure the suction valve on the south tank is open to the DH feed pumps.
_____	_____	3. Block the equalizing line between the south and middle DH feed tank.
_____	_____	4. Block the feed valve to the north tank.
_____	_____	5. Block the equalizing line between the north and middle tanks.
_____	_____	6. Block the valves from the DH secondary P/S and DH reflux drums to the middle tank.
_____	_____	7. Block the aqueous overflow on the middle tank.
_____	_____	8. Tag the feed valve to the middle tank.
_____	_____	9. Make sure the suction valve under the middle tank is closed.
_____	_____	10. Use a vacuum truck to empty this tank to the east acid pit.
_____	_____	11. When the tank is empty, tag the following:
_____	_____	A. The vent valve.
_____	_____	B. The suction valve under the middle tank.
_____	_____	C. Tag open the 3" valve on the bottom of the middle tank.
_____	_____	D. Sight glass drain valve.
_____	_____	E. 2" valve to the aqueous pump.

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South DH Feed Tank Shutdown Checklist

A. Suction Valve Under the South Tank has to be Rolled

B. Clearing the South Tank with the Aqueous Pump to the DH Feed Tanks

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>
--------------------------------------	--

- | | | |
|-------|-------|---|
| _____ | _____ | 1. Make sure the DH feed pump suction crossover valve is wide open. |
| _____ | _____ | 2. Open the suction valve under the middle DH feed tank. |
| _____ | _____ | 3. Close the suction valve slowly on the south tank while someone is watching the feed flow to the DH stills. |
| _____ | _____ | 4. Close the valve on the equalizing line between the south and the middle tank. |
| _____ | _____ | 5. Make sure the valves from the DH secondary P/S and DH reflux drums are open on the middle tank, then close both valves to the south tank. |
| _____ | _____ | 6. Block the aqueous overflow valve on the south tank. |
| _____ | _____ | 7. Tag the valve to the east suction header of the feed pumps. |
| _____ | _____ | 8. Tag the feed valve to the south tank. |
| _____ | _____ | 9. Use the east DH feed pump and tag the crossover valve between the pump suction. |
| _____ | _____ | 10. Use the north aqueous pump to pump the aqueous to the acid pit. Tag the suction crossover valve at the south pump. |
| _____ | _____ | 11. Use the 2" line from the bottom of the south tank to the suction of the south aqueous pump. Line up the south aqueous pump through the 1 1/2" line to the feed line of the DH tanks. Tag the two discharge valves between the south and north aqueous pumps. Open the suction valve under the south tank. |
| _____ | _____ | 12. When the pump cavitates, shut it down. Check the tank and the suction of the pump for organics. If there are more organics, restart the pump or call for a vacuum truck to suck out the remainder and put it in the east acid pit. If only aqueous remains, drain the remainder at the suction of the aqueous pump. |

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Still Line	Lead
Operator	Operator
	Tag

13. When the tank is empty, tag the following:

- A. The vent valve.
- B. The 2" valve to the aqueous pump.
- C. The discharge valve on the west DH feed pump.
- D. Tag open the suction bleed on the west DH feed pump. -
- E. Tag open the 3" valve on the bottom of the south tank.
- F. The sight glass drainvalve.
- G. Untag the crossover valve at the aqueous pump suction.
- H. Untag the two discharge valves between the south and north aqueous pumps.

14. Have Maintenance install a 4" teflon blind in the suction piping before the tee to the suction crossover valve. Tag the blind.

15. After the blind is installed, untag:

- A. Discharge of the west DH feed pump.
- B. West DH feed pump suction bleed.
- C. Crossover valve at the pump DH feed suction.

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South DH Feed Tank Shutdown Checklist

A. Suction Valve Under the South Tank has to be Rolled

B. Clearing the South Tank with a Vacuum Tank

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>
--------------------------------------	--

- | | | |
|-------|-------|--|
| _____ | _____ | 1. Make sure the DH feed pump suction crossover valve is wide open. |
| _____ | _____ | 2. Open the suction valve under the middle DH feed tank. |
| _____ | _____ | 3. Close the suction valve slowly on the south tank while someone is watching the feed flow to the DH stills. |
| _____ | _____ | 4. Close the valve on the equalizing line between the south and the middle tank. |
| _____ | _____ | 5. Make sure the valves from the DH secondary P/S and DH reflux drums are open on the middle tank, then close both valves to the south tank. |
| _____ | _____ | 6. Block the aqueous overflow valve on the south tank. |
| _____ | _____ | 7. Tag the valve to the east suction header of the feed pumps. |
| _____ | _____ | 8. Tag the feed valve to the south tank. |
| _____ | _____ | 9. Use a vacuum truck to empty this tank to the east acid pit. |
| _____ | _____ | 10. Use the east DH feed pump to feed the DH stills and tag the crossover valve between the pump suction. |
| _____ | _____ | 11. When the tank is empty, tag the following: |
| _____ | _____ | A. The vent valve. |
| _____ | _____ | B. The 2" valve to the aqueous pump. |
| _____ | _____ | C. The discharge valve on the west DH feed pump. |
| _____ | _____ | D. Tag open the suction bleed valve on the west DH feed pump. |
| _____ | _____ | E. Tag open the 3" valve on the bottom of the south tank. |
| _____ | _____ | F. The sight glass drain valve. |

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Still Line Operator	Lead Operator Tag
_____	_____
_____	_____
_____	_____

12. Open the suction valve on the bottom of the south tank.
13. Have Maintenance install a 4" teflon blind in the suction piping before the tee to the suction crossover valve. Tag the blind.
14. After the blind is installed, untag:
 - A. Discharge of the west DH feed pump.
 - B. West DH feed pump suction bleed.
 - C. Crossover valve at the DH feed pump suction.

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South DH Feed Tank Shutdown Checklist

- A. Suction Valve Under the South Tank does not have to be Rolled
- B. Clearing the South Tank with the Aqueous Pump to the DH Feed Tanks

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>	
_____	_____	1. Make sure the DH feed pump suction crossover valve is wide open.
_____	_____	2. Open the suction valve under the middle DH feed tank.
_____	_____	3. Close the suction valve slowly on the south tank while someone is watching the feed flow to the DH stills.
_____	_____	4. Close the valve on the equalizing line between the south and the middle tank.
_____	_____	5. Make sure the valves from the DH secondary P/S and DH reflux drums are open on the middle tank, then close both valves to the south tank.
_____	_____	6. Block the aqueous overflow valve on the south tank.
_____	_____	7. Tag the valve to the east suction header of the DH feed pumps.
_____	_____	8. Tag the feed valve to the south tank.
_____	_____	9. Use the east DH feed pump and tag the crossover valve between the pump suction.
_____	_____	10. Use the north aqueous pump to pump the aqueous to the acid pit. Tag the suction crossover valve at the south pump.
_____	_____	11. Use the 2" line from the bottom of the south tank to the suction of the south aqueous pump. Line up the south aqueous pump through the 1 1/2" line to the feed line of the DH tanks. Tag the two discharge valves between the south and north aqueous pumps. Open the suction valve under the south tank.

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When the pump cavitates, shut it down. Check the tank and the suction of the pump for organics. If there are more organics, restart the pump or call for a vacuum truck to suck out the remainder and put it in the east acid pit. If only aqueous remains, drain the remainder at the suction of the aqueous pump.

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Still Line Operator	Lead Operator Tag
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13. When the tank is empty, tag the following:

- | | |
|-------|--|
| _____ | A. The vent valve. |
| _____ | B. The 2" valve to the aqueous pump. |
| _____ | C. Tag open the 3" valve on the bottom of the south tank. |
| _____ | D. Sight glass drain valve. |
| _____ | E. Untag the crossover valve at the aqueous pump suction. |
| _____ | F. Untag the two discharge valves between the south and north aqueous pumps. |

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North DH Feed Tank Startup Checklist

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>
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- | | | |
|-------|-------|---|
| _____ | _____ | 1. Check for blinds in lines and that Maintenance has completed their job and untagged. |
| _____ | _____ | 2. Untag and close the 4" drain valve on the suction line to the DH feed pumps. |
| _____ | _____ | 3. Untag and open the vent valve. Look for leaks. |
| _____ | _____ | 4. Untag the following: |
| _____ | _____ | A. Sight glass drain valve. |
| _____ | _____ | B. Suction valve to the DH feed pumps. |
| _____ | _____ | C. 2" valve to the suction of the aqueous pumps. |
| _____ | _____ | 5. Untag and open the aqueous overflow valve on the north tank. Look for leaks. |
| _____ | _____ | 6. Untag and partially open the feed valve on the north tank. Look for leaks. Cut feeds to the DH stills and watch your south DH feed tank organic level and total level closely. Put a DH still on recycle if necessary. |
| _____ | _____ | 7. Once your organic level in the north DH feed tank gets above the equalizing line, untag and open the equalizing valve between the north and middle tank. |
| _____ | _____ | 8. Untag and open the DH secondary P/S and DH reflux drum valves to the middle tank. |
| _____ | _____ | 9. When the organics in the north tank is at the normal control level, open the north tank feed valve wide open. Untag and open the equalizing line between the south and middle tanks. |

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Middle DH Feed Tank Startup Checklist

Suction Valve Under the Middle Tank was Rolled

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>
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- | | | |
|-------|-------|--|
| _____ | _____ | 1. When Maintenance has put the suction valve back in place and is ready to pull the suction blind, use the west DH feed pump to feed the DH stills. Then tag the following:

A. Discharge valve on the east DH feed pump.

B. Tag open the east DH feed pump suction bleed valve.

C. Crossover valve at the DH feed pump suction. |
| _____ | _____ | 2. Have Maintenance pull the blind. |
| _____ | _____ | 3. Check for other blinds in lines and that Maintenance has completed their job and untagged. |
| _____ | _____ | 4. Untag and close the 3" valve on the bottom of the middle tank. Make sure the suction valve is closed to the DH feed pumps. |
| _____ | _____ | 5. Untag and open the vent valve. Look for leaks. |
| | | 6. Untag the following:

A. Sight glass drain valve.

B. 2" valve to the suction of the aqueous pump.

C. Discharge valve on the east DH feed pump.

D. Untag and close the east DH feed pump suction bleed valve.

E. Crossover valve at the DH feed pump suction.

F. Suction valve to the DH feed pumps from the north tank.

G. Feed valve to the middle tank. |

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Still Line	Lead
Operator	Operator
	Untag

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

7. Untag and open the aqueous overflow valve on the middle tank. Look for leaks.
8. Untag and partially open the feed valve on the north tank. Cut feeds to the DH stills and watch your south DH feed tank organic level and total level closely. Put a DH still on recycle if necessary. Shut down your aqueous pump if necessary to control your total level in the middle tank.
9. Untag and partially open the equalizing valve between the north and the middle DH feed tanks. Control the organic level in the north tank with the equalizing valve per S.O.P.
10. When the total level in the middle tank is up to the third sight glass nozzle, untag and open the equalizing line between the south and middle tanks.
11. Open the north tank feed valve wide open. Open the equalizing valve between the north and middle tanks wide open.
12. Close the feed valve to the south tank.
13. Untag and open the DH secondary P/S and DH reflux drum valves to the middle tank.

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Middle DH Feed Tank Startup Checklist

Suction Valve Under the Middle Tank was not Rolled

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>
--------------------------------------	--

- | | |
|-------|--|
| _____ | 1. Check for blinds in lines and that Maintenance has completed their job and untagged. |
| _____ | 2. Untag and close the 3" valve on the bottom of the middle tank. Make sure the suction valve is closed to the DH feed pumps. |
| _____ | 3. Untag and open the vent valve. Look for leaks. |
| | 4. Untag the following:
A. Sight glass drain valve.
B. 2" valve to the suction of the aqueous pump.
C. Suction valve to the DH feed pumps from the north tank.
D. Feed valve to the middle tank.
E. Suction valve to the DH feed pumps from the middle tank. |
| _____ | 5. Untag and open the aqueous overflow valve on the middle tank. Look for leaks. |
| _____ | 6. Untag and partially open the feed valve on the north tank. Cut feeds to the DH stills and watch your south DH feed tank organic level and total level closely. Put a DH still on recycle if necessary. Shut down your aqueous pump if necessary to control your total level in the middle tank. |
| _____ | 7. Untag and partially open the equalizing valve between the north and the middle DH feed tanks. Control the organic level in the north tank with the equalizing valve per S.O.P. |
| _____ | 8. When the total level in the middle tank is up to the third sight glass nozzle, untag and open the equalizing line between the south and middle tanks. |

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Still Line Lead
Operator Operator
Operator Untag

- _____
9. Open the north tank feed valve wide open. Open the equalizing valve between the north and middle tanks wide open.
- _____
10. Close the feed valve to the south tank.
- _____ _____
11. Untag and open the DH secondary P/S and DH reflux drum valves to the middle tank.

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South DH Feed Tank Startup Checklist

Suction Valve Under the South Tank was Rolled

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>
--------------------------------------	--

- | | | |
|-------|-------|---|
| _____ | _____ | 1. When Maintenance has put the suction valve back in place and is ready to pull the suction blind, use the east DH feed pump to feed the DH stills. Then tag the following:
A. Discharge valve on the west DH feed pump.
B. Tag open the west DH feed pump suction bleed valve.
C. Crossover valve at the DH feed pump suction. |
| _____ | _____ | 2. Have Maintenance pull the blind. |
| _____ | _____ | 3. Check for other blinds in lines and that Maintenance has completed their job and untagged. |
| _____ | _____ | 4. Untag and close the 3" valve on the bottom of the south tank. Make sure the suction valve on the south tank is closed to the DH feed pumps. |
| _____ | _____ | 5. Untagg and open the vent valve. Look for leaks. |
| _____ | _____ | 6. Untag the following:
A. Sight glass drain valve.
B. 2" valve to the suction of the aqueous pump.
C. Discharge valve on the west DH feed pump.
D. Untag and close the west DH feed pump suction bleed valve.
E. Untag and open the crossover valve at the DH feed pump suction.
F. Feed valve to the south tank. |
| _____ | _____ | 7. Untag and open the aqueous overflow valve on the south tank. Look for leaks. |

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Still Line Operator	Lead Operator Untag
_____	_____
_____	_____
_____	_____
_____	_____

8. Untag and partially open the equalizing valve between the middle and south tanks. Cut feeds to the DH stills and watch your organic level in the middle DH feed tank closely. Control your north tank level per S.O.P. Shut down your aqueous pump if necessary to control your total level in the middle tank.
9. When the total level in the south tank is up to the third sight glass nozzle, finish opening the equalizing line between the middle and south tanks.
10. Open the suction valve on the south tank to the DH feed pumps.
11. Close the suction valve under the middle tank while someone is watching the feed flow to the DH stills.
12. Untag and open the DH secondary P/S and DH reflux drum valves to the south tank.

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South DH Feed Tank Shutdown Checklist

A. Suction Valve Under the South Tank does not have to be Rolled

B. Clearing the South Tank with a Vacuum Truck

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>	
_____		1. Make sure the DH feed pump suction crossover valve is wide open.
_____		2. Open the suction valve under the middle DH feed tank.
_____		3. Close the suction valve slowly on the south tank while someone is watching the feed flow to the DH stills.
_____	_____	4. Close the valve on the equalizing line between the south and the middle tank.
_____	_____	5. Make sure the valves from the DH secondary P/S and DH reflux drums are open on the middle tank, then close both valves to the south tank.
_____	_____	6. Block the aqueous overflow valve on the south tank.
_____	_____	7. Tag the valve to the east suction header of the DH feed pumps.
_____	_____	8. Tag the feed valve to the south tank.
_____	_____	9. Use a vacuum truck to empty this tank to the east acid pit.
_____		10. When the tank is empty, tag the following:
_____	_____	A. The vent valve.
_____	_____	B. The suction valve under the south tank.
_____	_____	C. Tag open the 3" valve on the bottom of the south tank.
_____	_____	D. Sight glass drain valve.
_____	_____	E. 2" valve to the aqueous pump.

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IV. STANDARD OPERATING PROCEDURES

DH Stills

- A. Normal Operation: The DH stills remove dissolved water and HCl from the crude organics. The amount of dissolved water is very small (400-600 ppm). In a 100 gpm of crude organics being fed to the DH stills, there is approximately .08 gpm of dissolved water. Water and each organic compound form an azeotrope and boil at a lower temperature than water or the organic compound.

<u>Pure Compound at 0 psig boiling point °F</u>	<u>Organic - Water Azeotrope Boiling Point °F at 0 psig</u>	<u>Binary System Organic % - Water %</u>	<u>Solubility of Water in Organics at 120°F</u>
Water - 212°F	-	-	-
Trans - 119°F	113.5°F	98.1 - 1.9	1000 ppm
Cis - 140°F	131.5°F	96.65 - 3.35	1000 ppm
CCl ₄ - 170°F	151°F	95.9 - 4.1	240 ppm
Tri - 180°F	165°F	93.0 - 7.0	600 ppm
Per - 250°F	191°F	82.8 - 17.2	200 ppm

The amount of dissolved water in the DH bottoms is controlled by the steam flow to the DH reboilers. An increase in steam will increase the amount of boilup and this should lower the amount of water in the bottoms. Light crude organic ratios will be harder to dry because the dissolved water in light organics is higher and the amount of dissolved water boiled up with the organics is lower. To compound this problem the light organics are harder to condense and cause higher pressures in the DH stills. The DH still bottoms should contain 10-40 ppm water. Once the water gets over 50 ppm, the DH bottoms should be put on recycle back to the DH feed tanks.

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South DH Feed Tank Startup Checklist

Suction Valve Under the South Tank was not Rolled

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>
--------------------------------------	--

- | | | |
|-------|-------|--|
| _____ | _____ | 1. Check for blinds in lines and that Maintenance has completed their job and untagged. |
| _____ | _____ | 2. Untag and close the 3" valve on the bottom of the south tank. Make sure the suction valve on the south tank is closed to the DH feed pumps. |
| _____ | _____ | 3. Untag and open the vent valve. Look for leaks. |
| | | 4. Untag the following:
A. Sight glass drain valve.
B. 2" valve to the suction of the aqueous pump.
C. Feed valve to the south tank. |
| _____ | _____ | 5. Untag and open the aqueous overflow valve on the south tank. Look for leaks. |
| _____ | _____ | 6. Untag and partially open the equalizing valve between the middle and south tanks. Cut feeds to the DH stills and watch your organic level in the middle DH feed tank closely. Control your north tank level per S.O.P. Shut down your aqueous pump if necessary to control your total level in the middle tank. |
| _____ | | 7. When the total level in the south tank is up to the third sight glass nozzle, finish opening the equalizing line between the middle and south tanks. |
| _____ | | 8. Open the suction valve on the south tank to the DH feed pumps. |
| _____ | _____ | 9. Close the suction valve under the middle tank while someone is watching the feed flow to the DH stills. |
| _____ | _____ | 10. Untag and open the DH secondary P/S and DH reflux drum valves to the south tank. |

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The DH reflux drum organics flow back to the top of the DH still. The water phase in the reflux drum returns to the DH feed tanks. The aqueous overflow line from the DH reflux drum should be checked on rounds for organics flowing back to the DH feed tanks. If this is happening the steam flow to the DH reboiler should be reduced.

Too much steam can cause high pressures and high moistures.

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#1 DH STILL

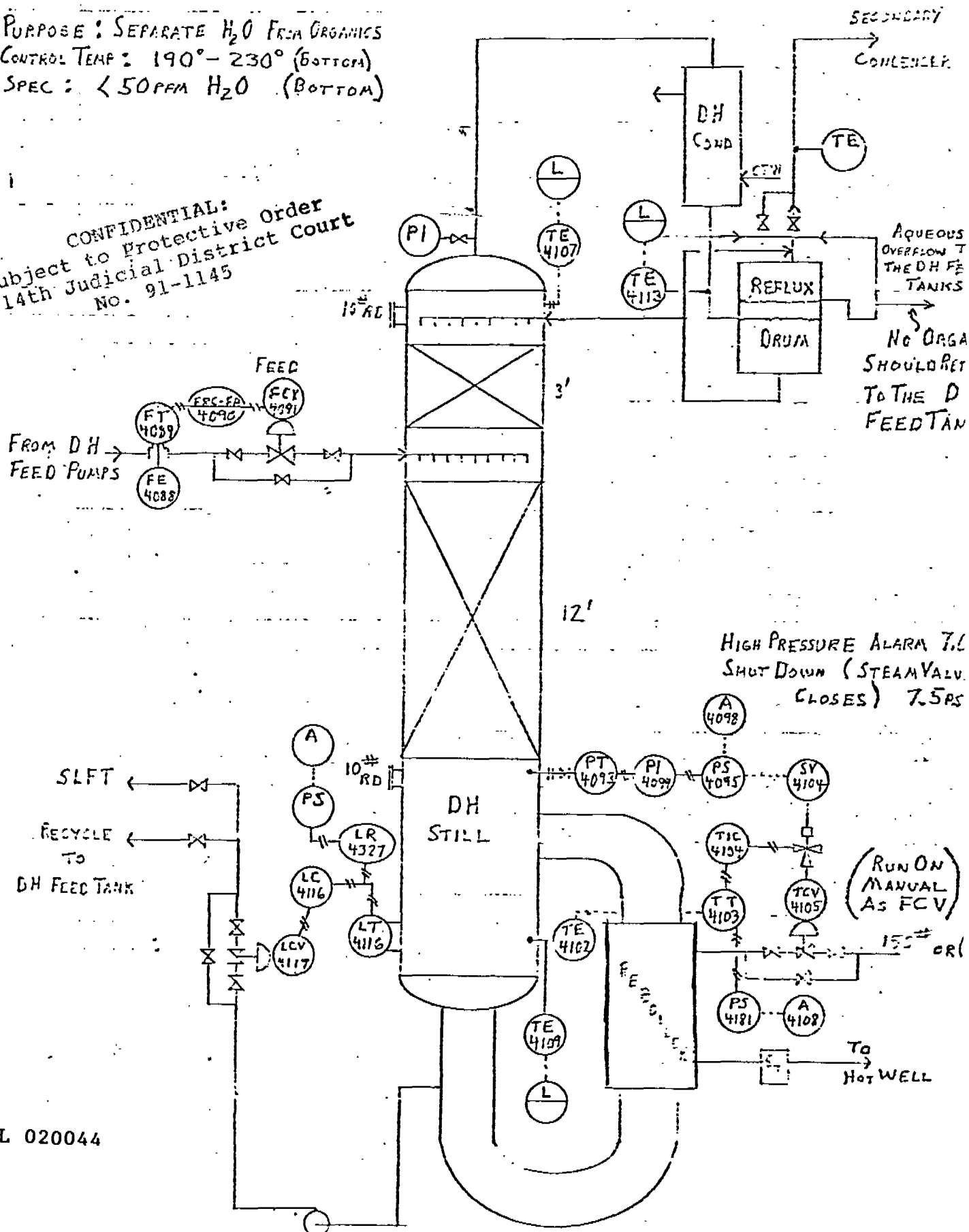
1 1/2" CERAMIC SADDLES

PURPOSE: SEPARATE H₂O FROM ORGANICS

CONTROL TEMP: 190° - 230° (BOTTOM)

SPEC: < 50PPM H₂O (BOTTOM)

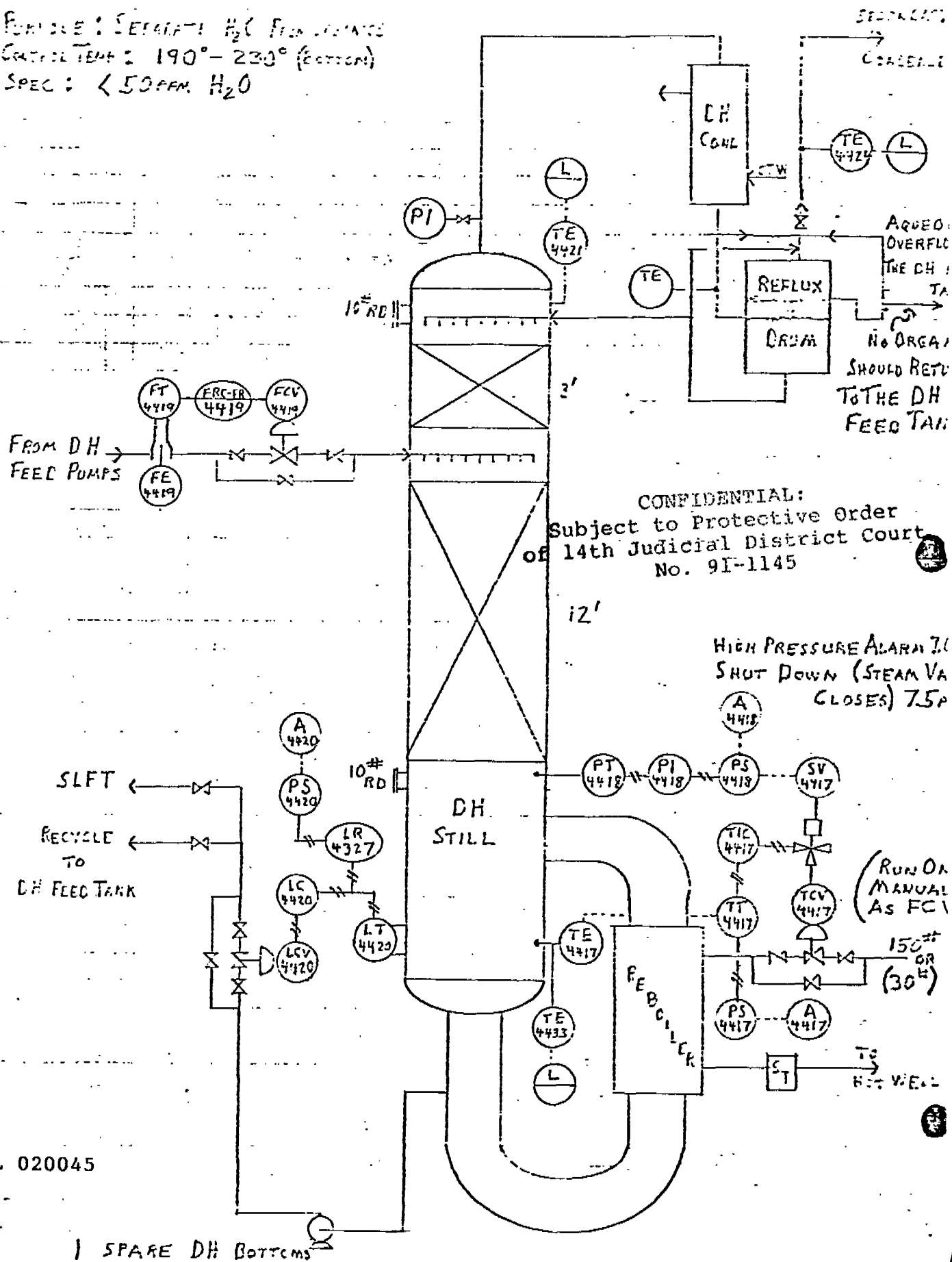
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2" CERAMIC SADDLES

→
C: 1111-1



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1 SPARE DH BOTTOMS

B. Trouble Shooting:

Problem

Possible Solution

- | | |
|---|--|
| <p>1. High moisture in the DH bottoms. No pressure problems.</p> <p>2. High moisture in the DH bottoms and pressure problems.</p> | <p>A. <u>Increase steam</u> and check aqueous overflow for continuous flow of organics. <u>Notify supervisor if there is a continuous flow of organics.</u> This will eventually cause pressure problems in the DH feed tanks and DH stills.</p> <p>A. Flush float chamber and sight glass. Make sure they agree. <u>A high reboiler level will cause high pressures and moistures.</u> If you have a high level, switch bottoms pumps if necessary. Cut feed and bypass your bottom LCV. Your steam shuts off at 7.5 psig. <u>Put the bottoms on recycle if your steam shuts off.</u></p> <p>B. Check reactor ratios and for other possible sources of lights. Check the aqueous overflow for a continuous flow of organics. Try to minimize the amount of lights being fed to the DH still. <u>Cut your feed to the DH still.</u> You will have to decide whether to cut your steam flow back or leave it where it was before you cut your DH feed. Your pressure will be the key.</p> <p>C. High backpressure from the incinerator vent header. <u>Put your DH vents to the DH scrubber.</u> Once dry DH moistures are achieved, put your vents back to the incinerator. <u>Notify supervision if your DH stills will not run dry because of high backpressure from the incinerator vent header.</u></p> <p>D. The DH secondary condenser will freeze if it is run too cold. <u>Block your brine off and partially bypass your secondary condenser.</u> Put your secondary condenser back in service as soon as possible.</p> |
|---|--|

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3. Pressure problems

A. Flush float chamber and sight glass. Make sure they agree. A high reboiler level will cause high pressures and moistures. If you have a high level, switch bottoms pumps if necessary. Cut feed and bypass your bottom LCV. Your steam shuts off at 7.5 psig. Put the bottoms on recycle if your steam shuts off.

- B. There is a N₂ purge on the pressure transmitter impulse line. If the N₂ flow is too high or the impulse line gets restricted, a high or false pressure will be indicated.

4. DH Bottoms pump problems.

A. If the DH bottoms pumps are not putting out or shutting down on overload, it is possible that the pump impeller or suction line is built up with catalyst. Pull the pump and check the impeller. Water will dissolve any catalyst built up on the impeller or in the suction line.

If the DH stills have been fed a lot of catalyst, water wash the column packing.

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C. Shutdown

DH Still Shutdown Checklist

Still Line Operator	Lead Operator Tag
------------------------	-------------------------

1. Put the DH bottoms on recycle back to the DH feed.
2. Cut feed and steam off on the control board.
3. Block and tag the feed
 - (a. At the discharge of the pump
 - or (
 - (b. At the feed FCV
4. Block and tag the steam
 - (a. At the steam TCV of
 - or (
 - (b. At the steam header
5. Bypass the bottoms LCV and shutdown the bottoms pump when it cavitates.
6. Block and tag
 - a. The suction valve to the middle DH bottoms pump.
 - b. The discharge of the bottoms pump.
 - c. The seal flush.
 - d. Tag open the pump suction bleed.
7. Block and tag the vent valve(s).
8. Block and tag the aqueous overflow to the DH feed tanks and tag open the aqueous overflow bleed.
9. Empty the remainder in the reboiler and downcomer to a dumpster box or have a vacuum truck pick up the organics as it drains from the column. Tag open the reboiler ell bleed.

If Necessary:

10. Drain the reflux drum.

Note: There is a N₂ purge on the pressure transmitter impulse line. Never block all bleeds or vents from the column unless you block this N₂ purge.

D. Startup

DH Still Startup Checklist

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>
--------------------------------------	--

- | | | |
|-------|-------|--|
| _____ | _____ | 1. Check for blinds in lines and that maintenance has completed their job and untagged. |
| _____ | _____ | 2. Untag and close the reboiler downcomer drain valve. |
| _____ | _____ | 3. Open the steam trap strainer bleed valve. |
| _____ | _____ | 4. Make sure the DH bottoms is lined up on recycle back to the DH feed tanks and the bottoms LCV bypass is closed. |
| _____ | _____ | 5. Untag the following valves: |
| _____ | _____ | a. The suction valve to the middle DH bottoms pump. |
| _____ | _____ | b. The discharge of the bottoms pump. |
| _____ | _____ | c. Untag and close the suction bleed valve. |
| _____ | _____ | d. Untag and open the seal flush. |
| _____ | _____ | 6. Make sure the reflux drum drain valve is closed and that you have cooling tower water on your condenser. |
| _____ | _____ | 7. Untag and open the vent valve(s). |
| _____ | _____ | 8. Untag and close the aqueous overflow bleed valve. |
| _____ | _____ | 9. Untag and open the aqueous overflow valve to the DH feed tanks. |
| _____ | _____ | 10. Untag and open the feed |
| _____ | _____ | (a. At the discharge of the pump |
| _____ | _____ | or (|
| _____ | _____ | (b. At the feed FCV |
| _____ | _____ | 11. Fill the DH still to a starting level. Check your sight glass and float chamber and see if they agree. |

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till Line
Operator

Lead
Operator
Untag

12. Untag and open the steam
 - (a. At the steam TCV
 - or (
 - (b. At the steam header
13. Start up on total reflux or with a minimum amount of feed.
14. Start up your DH bottoms pump when needed.
15. Add a small amount of steam to heat your piping and reboiler. Then add steam as needed. Your pressure is the key to how much steam you can add.
16. Close your strainer bleed back and heat up your steam trap. Close your strainer bleed when your trap is operating properly.
17. When your DH still bottoms reaches the control temperature, increase feed, wait a while, then sample your bottoms for moisture.
18. When the DH bottoms is less than 50 ppm, put your DH bottoms to the SLFT.

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DH VENT SYSTEM

A. Normal Operation: The vents from the DH stills and the DH feed tanks are combined and fed to the DH secondary condenser. The condensate from this condenser should run between 35°F - 45°F and the pressure drop through the condenser should be less than 1 PSIG. The condensate, water and light organics, drains to the DH secondary phase separator. The water phases out and overflows back to the DH feed tanks and the organics are pumped to the Tetra tanks (6301, 6302, or 6303).

The vents from the DH secondary condenser and the DH secondary phase separator go to the incinerator. If the incinerator is down or if the incinerator header has a high pressure causing problems in the DH stills, the DH scrubber may be used. The DH scrubber is vented to the atmosphere and supervision should be notified when the DH vents are taken out and put back in the incinerator. When the HCl recovery absorber is running, the vents should be in the south incinerator header. Switch to the north incinerator header when the absorber is down and the reactor vents are going to the incinerator.

Switch the vents to the DH scrubber when the Per/Tri vents are tripped out of the incinerator. If the vents are in the south incinerator header, the vents will be going directly to the atmosphere without being scrubbed or if the vents are in the north incinerator header, there will probably be a high back pressure on your DH stills.

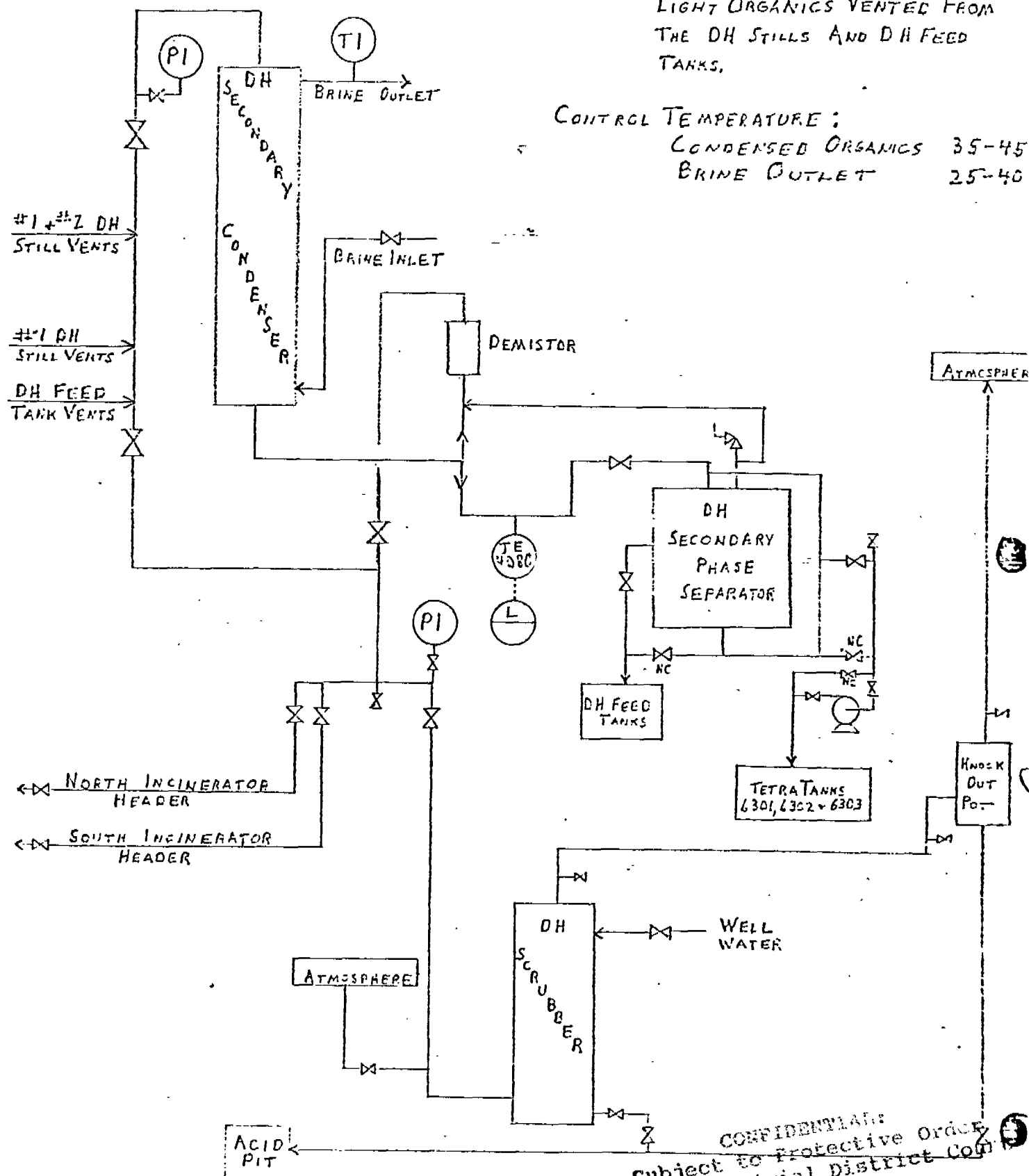
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DH SECONDARY CONDENSER

PURPOSE: TO CONDENSE AND RECOVER LIGHT ORGANICS VENTED FROM THE DH STILL'S AND DH FEED TANKS,

CONTROL TEMPERATURE:
CONDENSED ORGANICS 35-45
BRINE OUTLET 25-40



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B. Trouble Shooting

Problem

Possible Solution

High pressure drop across the secondary condenser (> 1 PSIG).

The DH secondary condenser will freeze if it is run too cold. Block your brine off and partially bypass your secondary condenser. Put your secondary condenser back in service as soon as possible.

High incinerator header pressure.

The incinerator flame arrestor may be plugging.

The vents may be in the wrong incinerator header. With the HCl recovery absorber running, the vents should be in the south incinerator header. When the HCl recovery absorber is down, the vents should be in the north header.

If the Per/Tri vents are not going to the incinerator and they are going to the scrubber, it is possible to have a high incinerator header pressure. Switch to the DH scrubber.

High pressure drop through the DH scrubber.

The scrubber drain is plugged.

Too much water on the scrubber.

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PER-TRI STILL SYSTEM

A. Normal Operation: Dry crude organics from the bottom of the DH stills are fed to the suction of the Per-Tri still feed pumps. This suction line is equalized with the north and south still line feed tanks (SLFT) so that if the DH bottoms flow is greater than the feed to the Per-Tri still the excess crude will go into the SLFT or if the DH bottoms flow is less than the feed to the Per-Tri still the additional feed will come from the SLFT. This allows the hot DH bottoms to be fed directly to the Per-Tri still instead of cooling off and causing excessive vents in the still line feed tanks. The SLFT should be controlled between 10-14 feet unless special levels are needed for start up or shutdown.

The Per-Tri still feed pumps pump the crude organics through filters to remove the solids (catalyst, carbon, etc.) before this material is fed to the Per-Tri still. There are two primary filters (north and south) and a secondary filter. The primary filter should never be bypassed unless supervision is notified and the secondary filter should always be in service unless maintenance is working on the filter. When a filter is put in service, an initial pressure drop reading should be taken. Then when the filter has a pressure drop equal to or greater than 20 PSIG above the initial pressure drop, the filter should be taken out of service and blocked, drained and tagged for maintenance. Supervision should be notified when the filter is ready for maintenance.

After the crude organics are filtered, they go through an economizer and then are fed to the Per-Tri still. In the Per-Tri still, the Tri and lighter organic compounds are boiled overhead while the TCE, Per and heavier organic compounds are taken out of the bottom. In the Per-Tri

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still overhead some TCE is present. The amount of TCE in the overhead is controlled by the reflux and should be controlled less than .02%. The reflux should be increased as the amount of TCE increases in the overhead and decreased slowly if the TCE is less than .01%. A change in the amount of TCE in the feed to the Per-Tri still (reactor start ups, ratio changes, acid pit material, etc.) and feed rate changes to the column will effect the amount of reflux needed to keep the Per-Tri still overhead in spec.

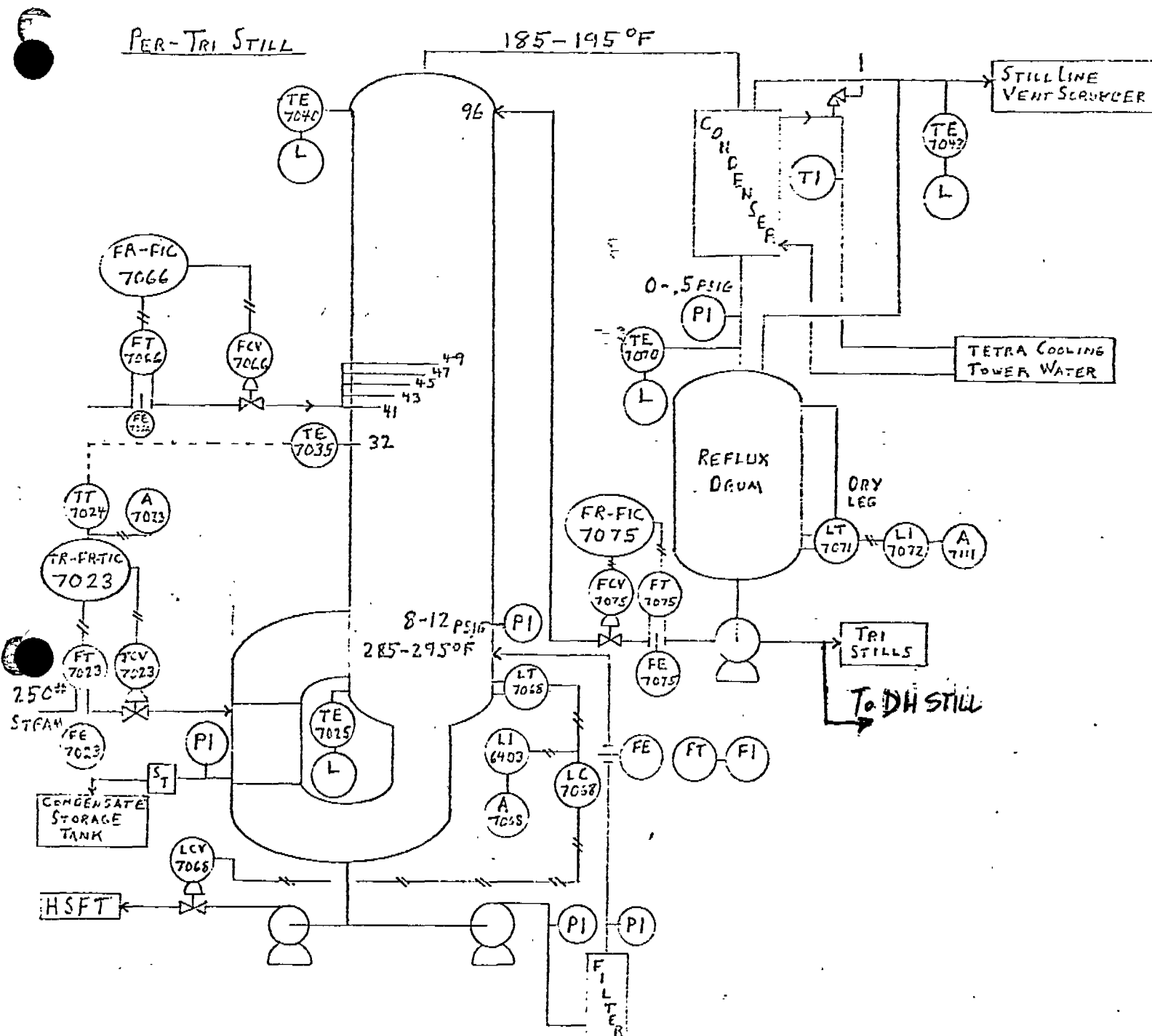
No Tri should be allowed to go out the bottom with the TCE, Per and heavies. The control temperature should be increased if Tri is present in the bottoms. The control temperature should be run between 245°F-255°F.

Part of the Per-Tri bottoms organics are recirculated through filters and back to the column. The east and west Per-Tri bottoms filters should be swapped and cleared for maintenance per S.O.P. on the Per-Tri feed filters.

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PER-TRI STILL



PURPOSE:- SEPARATE TRI FROM TCE

CONTROL TEMPERATURE; 245°F - 255°F

SPEC: OVERHEAD: < .02% TCE

BOTTOM: NO TRI

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B. Trouble Shooting

Problem

Possible Solution

SLFT Venting

Hot DH bottoms materials filling the SLFT.

Tri bottoms on recycle to the SLFT.

Per-Tri bottoms on recycle to the SLFT.

Per-Tri still feed pumps cavitating

High DH bottoms moisture.

Restricted suction of pump.

Control temperature changes rapidly

Put a DH still on recycle or forward, increasing or decreasing the amount of hot feed to the column.

A sudden increase or decrease in pressure.

Changing ratios of Per to Tri in the feed. An increase in Tri will demand more steam, while an increase in Per will reduce steam.

Loss of reflux back to the column.

Fouled reboiler.

Steam trap failure.

Loss of temperature indication.

Sudden increase in TCE in the overhead

Increase in TCE in the feed.

Downstream impulse leg plugged on orifice tap showing higher than actual reflux flow.

Tri in the Per-Tri bottoms

Increase in the column pressure above Tray 32 either by internal plugging or by an increased overhead pressure.

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Tri in the Per-Tri bottoms

Temperature transducer giving the wrong signal to the controller.

Sudden increase in the overhead pressure

Loss of a tetra cooling tower fan.

High noncondensable load (N_2 , HCl, etc.).

Reflux drum full of organics.
Liquid in the vent header.

Starting up a Tri still in the same vent header, or one shutdown with too much N_2 purge on the column.

Steam flow falls off and steam chest pressure maximum

Reboiler boiled dry if when you check the steam trap strainer bleed and it shows very little condensate and mostly live steam.

Reboiler shell side full of condensate.

Sudden reflux drum low level.

High level in the reflux drum which filled the level transmitter dry leg.

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C. Shutdown

Per-Tri Still Shutdown Checklist

Still Line Operator	Lead Operator Tag
------------------------	-------------------------

- | | |
|-------|--|
| _____ | 1. Put the Per-Tri bottoms on recycle to the SLFT. |
| _____ | 2. Put both Per stills on recycle to the HSFT. |
| _____ | 3. Shutdown the Per neutralizer. |
| _____ | 4. At the Tri still feed FCV's open the valve going back to the SLFT and block the valve going to the Tri stills. |
| _____ | 5. Block the Tri recycle TCV's block valve. |
| _____ | 6. Shutdown your Tri bottoms pumps. |
| _____ | 7. On No. 2 Tri still block the bottoms purge to the Topping still. |
| _____ | 8. Shutdown the Topping still. |
| _____ | 9. Shutdown the Tri neutralizer. |
| _____ | 10. Shutdown the Per-Tri still feed pump. |
| _____ | 11. Cut your Per-Tri still steam back in increments. Watch your 250 PSIG steam station, lower the pressure if you need to. Put a N ₂ purge on the column. |
| _____ | 12. Shutdown your Per-Tri reflux pump when the reflux drum is less than 20%. |
| _____ | 13. Block and tag the Per-Tri still steam |
| _____ | (Steam header |
| _____ | or (|
| _____ | (Temperature Control Valve |
| _____ | 14. Open the bypass on the Per-Tri bottoms LCV. |
| _____ | 15. Block and tag the Per-Tri still condensate |
| _____ | (Condensate header |
| _____ | or (|
| _____ | (Steam traps |

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SL 020059

Still Line	Lead
Operator	Operator
	Tag

16. Block and tag the Per-Tri still feed.

(Feed flow control valve
or (Feed pumps

17. Block and tag the Per-Tri still.

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- a. Reflux FCV
- b. No. 1 Tri still feed FCV
- c. No. 2 Tri still feed FCV

18. Pump the rest of the material in the Per-Tri reflux drum to the DH feed tanks through the reflux drum and neutralizer pump out header.

19. Block and tag the reflux drum and neutralizer pump out header at the discharge of the Per-Tri reflux pump. Tag open the reflux pump suction bleeds and make sure the reflux drum is drained. Tag the rework valve on the reflux pump suction.

20. Block off the Per-Tri bottoms recirculation back to the column and open it up to the suction of the bottoms pump. (Do this earlier if the Per-Tri bottoms pumps are cavitating.)

21. When the column is empty, open the bottom bleeds to the ground and shut down the Per-Tri bottoms pump and Per-Tri bottoms recirculation pump. Have a vacuum truck ready to pick up any organics that go to the pad. Block and tag the seal flush to:

- a. Per-Tri bottoms pump
- b. Per-Tri bottoms recirculation pump
- c. Tag open the bottom reboiler bleed valves.

22. Block and tag the Per-Tri still vent valve.

23. Block and tag the Per-Tri bottoms LCV.

24. Block, drain, and tag the Per-Tri bottoms filter that was in service.

25. Block and tag the pad out header to the bottoms filters and the P/T bottoms recirculation pumps.

26. Shut off the N₂ purge on the column before maintenance starts working.

Still Line
Operator

Lead
Operator
Untag

11. Untag and open the following:

- a. Reflux FCV
- b. No. 1 Tri still feed FCV
- c. No. 2 Tri still feed FCV

Make sure the Tri feed is lined up back to the SLFT and blocked off to the still.

12. When the reboiler level appears in the sight glass or starts indicating a reboiler level on the control board, start up the bottoms pump. Cut the feed back to 40 gpm. Check to see if your reboiler sight glass and control board reboiler level indication agree.

13. Untag and open the steam:

- (Steam header
- or (
- (Temperature control valve

Open the TCV just enough to heat the reboiler and piping.

14. Untag the condensate:

- (Condensate Header valve
- or (
- (Steam traps

Open the condensate header valve but you may want to close the valve downstream of the steam trap. Open the strainer bleed.

15. Start increasing steam slowly. Increase your feed to 60 gpm. Put your steam traps in service when possible. Close the strainer bleed valve. Use the low pressure condensate header.

16. When your boilup reaches tray 32, start your reflux to the column at 20 gpm. Increase the steam. Increase the reflux flow if possible. Shoot for the reflux drum to be less than 10 percent when your organics starts overhead.

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Still Line
Operator

Lead
Operator
Untag

17. When your boilup is going overhead, check for water. If the moisture is over 100 ppm, cut your reflux back to 30 gpm and control your reflux drum between 10-20% by pumping the remainder of the organics to the DH feed tanks.

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Still Line
Operator

Lead
Operator
Untag

18. If the moisture is less than 100 ppm, control your reflux drum between 10-20% by increasing your reflux up to 70 GPM. Then put the remainder back to the SLFT through the Tri still feed valves. Increase steam when needed.
19. Shoot a bottoms GC when tray 16 reaches 265°F. Put the bottoms forward to the HSFT when the Tri in the bottoms is less than .5%.
20. When the Per-Tri overhead is less than .02% heavies, swap the reflux drum material that is going back to the SLFT to the Tri still. Line up the Tri bottoms back to the SLFT. (NOTE: Make sure No. 2 Tri bottoms is coming off the bottom and not tray No. 3.) Kick on your Tri still bottoms pumps. Unblock your Tri recycle.
22. When the Tri bottoms are in spec, start up the topping still, Tri neutralizer and drier. Swap No. 2 Tri bottoms back to tray No. 3 and the bottoms purge to the topping still.

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TRI STILLS

- A. Normal Operation: Feed to the Tri stills comes from the Per-Tri still reflux pumps. The purpose of the Tri stills is to remove compounds lighter than Tri (CCl_4 , EDC, CHCl_3 , trans, Cis, and VDC). Carbon tetrachloride (CCl_4) is the hardest compound to remove from Tri. The Tri still bottoms should be controlled so that the total impurities are less than or equal to .05 percent. The Tri still overheads, when possible, should be controlled between 1-5 percent Tri. The Tri bottoms specification must be achieved while the overhead specification is an optimization step. TCE cannot be removed in the Tri stills and is added to the amount of light impurities to get the total impurities.

<u>Tri Bottoms Impurities</u>	<u>Tri in the Overhead</u>	<u>Possible Solution</u>
Lights .03% TCE .01%	1%	or atta-boy or atta-girl
Lights .03% TCE .01%	Less than 1%	Increase your control temperature
Lights .01% TCE .01%	5%	Lower your control temperature to get the Tri in the overhead closer to 1%
Lights .01% TCE .01%	1%	Cut your steam flow to the reboiler
Lights .01% TCE .01%	Less than 1%	Increase your control temperature and cut your steam flow
Lights .05% TCE .01%	1%	Increase your control temperature
Lights .05% TCE .01%	5%	Increase your steam flow
Lights .07% TCE .01%	1%	Increase your steam flow and increase your control temperature

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<u>Tri Bottoms Impurities</u>	<u>Tri in the Overhead</u>	<u>Possible Solution</u>
Lights .07%	5%	Increase your steam flow and decrease your control temperature
TCE .01%		

The Tri still bottoms should be put on recycle back to the SLFT when the total impurities are greater than .08 percent or if the total impurities have been greater than .05 percent for more than six hours.

A CCl₄-EDC azeotrope at a ratio of 4:1 lowers the boiling point of CCl₄ and makes the separation easier. EDC does not "naturally" enter the system and must be introduced. To get EDC into the system, a tie-in has been into the "lights still" transfer line from OHC to T/E II. This line is metered into the DH bottoms suction line by a rotometer. The amount of EDC in the Tri stills overhead should be maintained at 0.6 to 1.0%. Any more or less EDC would be detrimental to the operation of your column. The higher the concentration of EDC in the Tri still overheads, the higher your control temperature should be. Your control temperature is the boiling point of that mixture of compounds at the tray pressure. If the tray boiling point is 150 °F and if the amount of a compound that boils higher than 150°F increases, then the control temperature will have to be increased in order to keep the same amount of Tri in the overhead. Pressure will also indicate the need to change your control temperature. An increase in pressure should be followed by an increase in the control temperature and vice-versa.

The Tri reflux driers should not be bypassed unless absolutely necessary. Notify supervision when the driers are totally or partially bypassed. The

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west and middle (1 and 2) Tri reflux driers have 100 psig rupture discs and east has a 150 psig rupture disc. The top pressure of the driers should be checked on rounds. If the west or middle pressure is 85 psig or if the east is 125 psig, supervision should be notified.

The Tri reflux driers should be cleared to the still line vent recovery tank (SLVRT). A nitrogen N₂ pad is used to force the liquid organics to the SLVRT. After all the liquid has been cleared, a hot N₂ purge is used to strip most of the remaining organics from the calcium chloride. This hot N₂ purge is vented to the SLVRT and scrubbed in the still line vent scrubber.

When No. 2 Tri still is put on recycle because of too much TCE or other heavy impurities, the valve at the suction of the bottoms pump from the bottom of the reboiler should be opened and the valve from tray 3 should be closed. The bottoms purge to the topping still should also be closed.

Total Reflux

1. At the Tri still feed FCV, open the valve going back to the SLFT and block the valve going to the Tri still.
2. Block the Tri recycle TCV's block valve.
3. Shut down your Tri bottoms pump.
4. If it is No. 2 Tri still block the bottoms purge to the topping still.

SL 020067

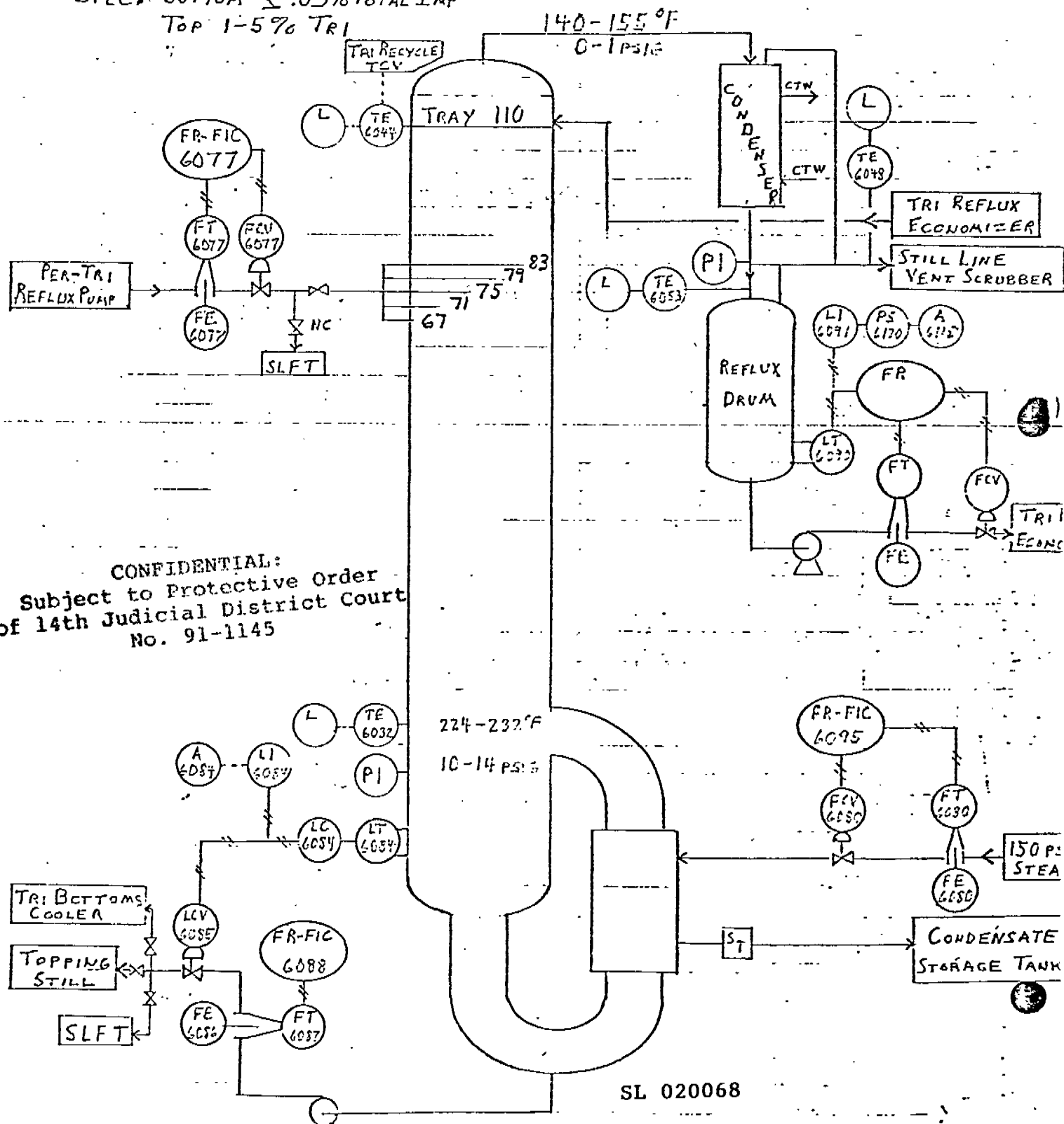
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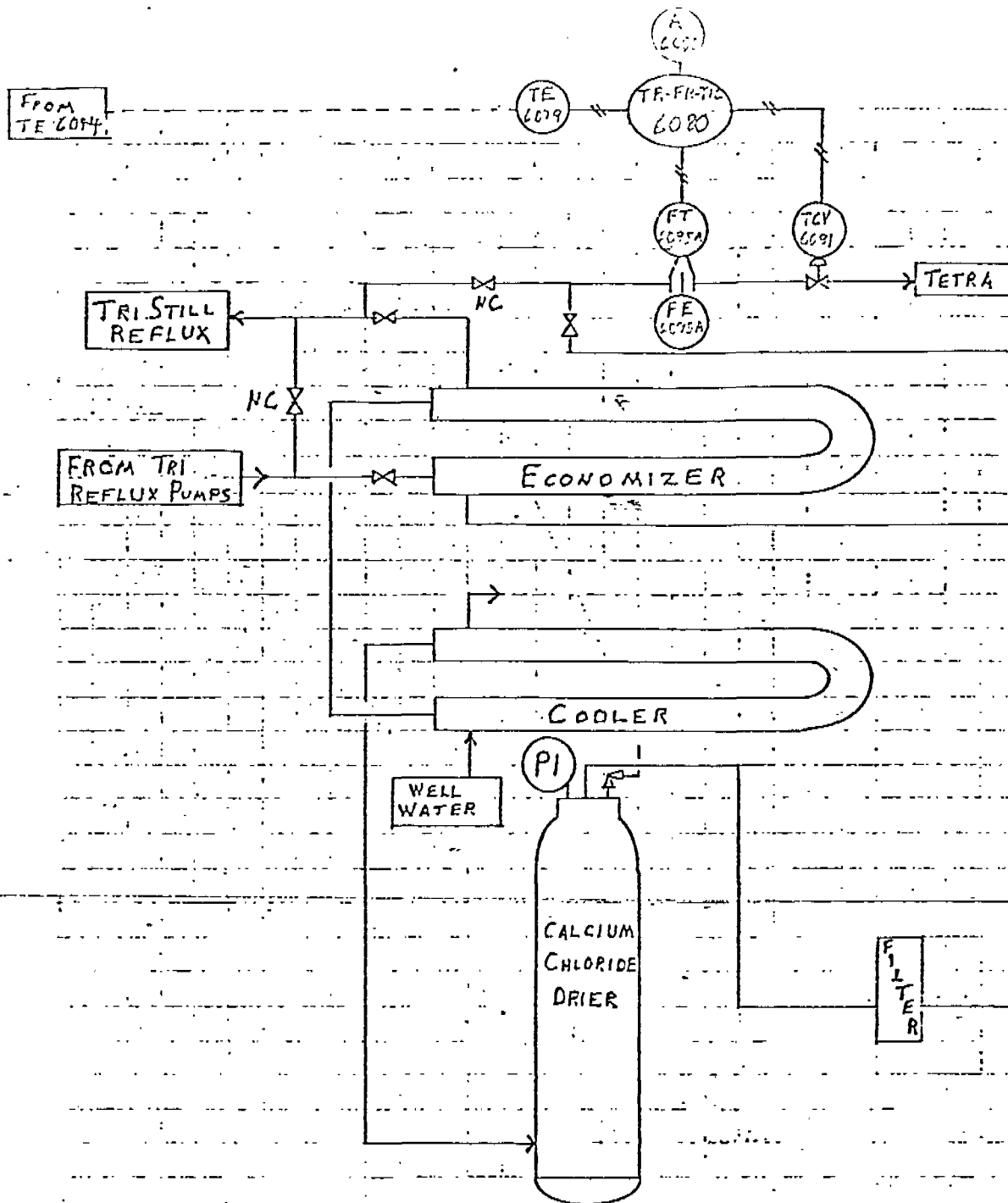
#1 TRI STILL

PURPOSE: SEPARATE TRI FROM
CCl₄ + LIGHTS (CHCl₃ + EDC)

CONTROL: 140°F - 155°F

SPEC: BOTTOM $\leq .05\%$ TOTAL IMP
TOP 1-5% TRI





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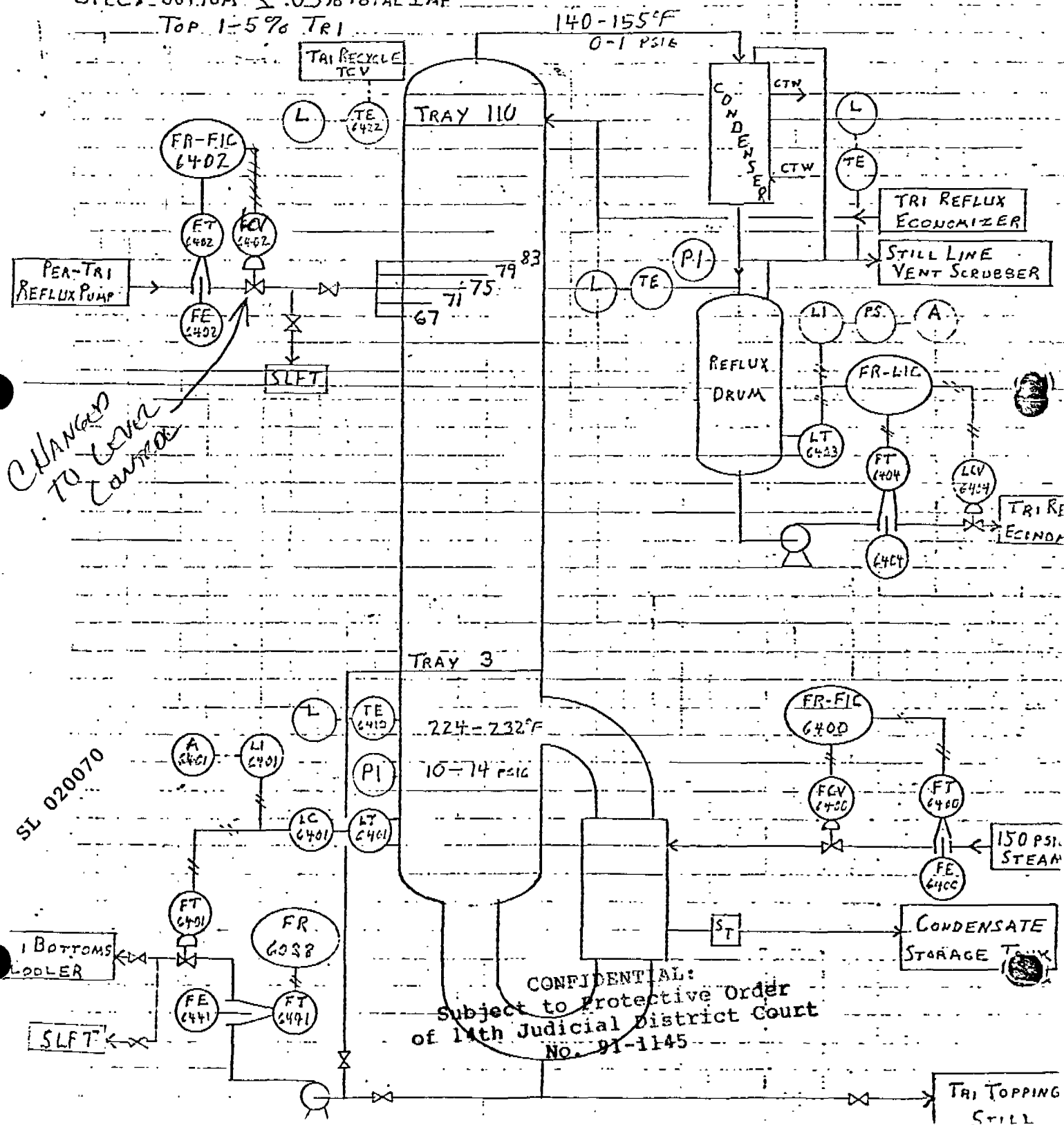
SL 020069

#2 TRI STILL

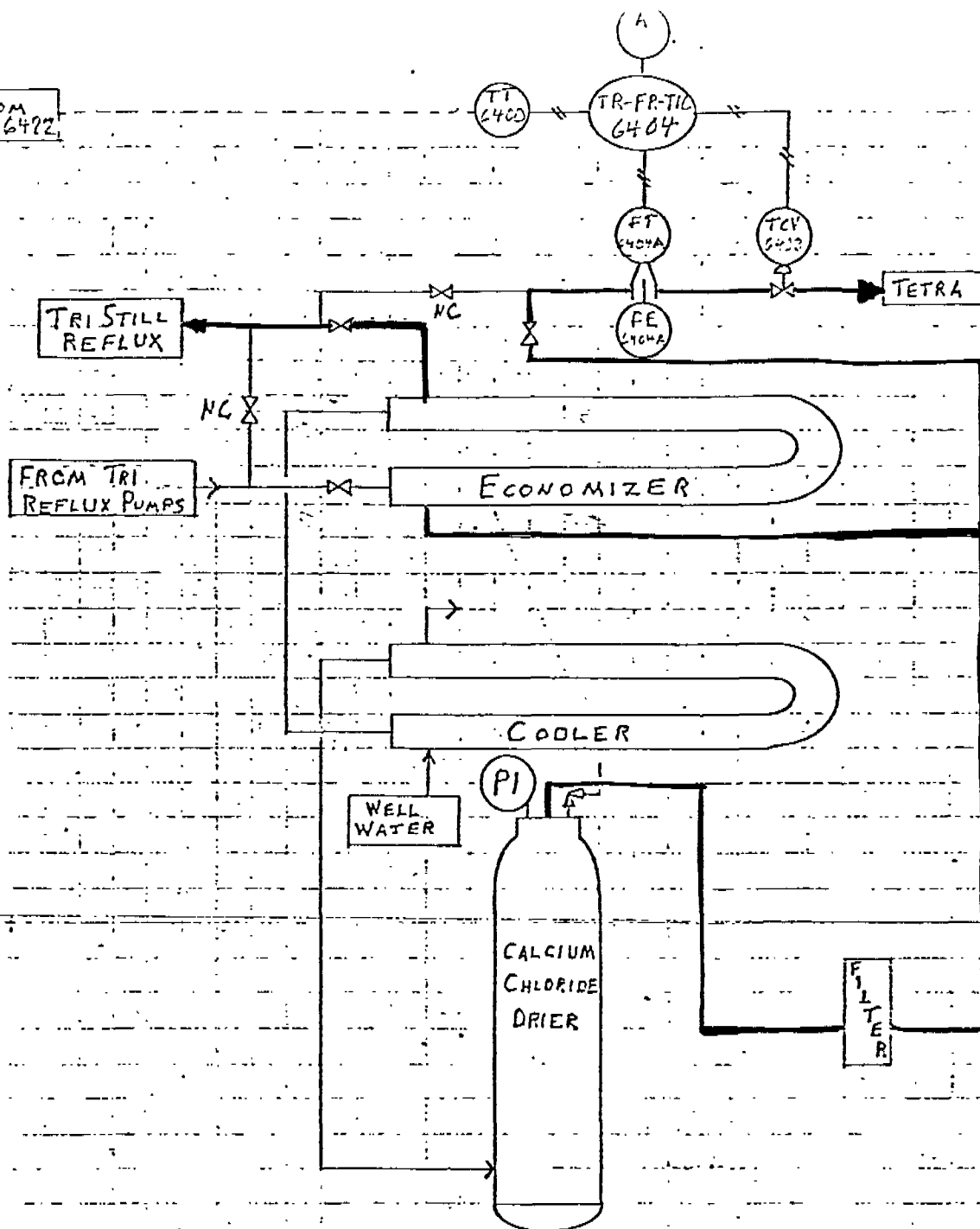
PURPOSE: SEPARATE TRI FROM
CCl₄ + LIGHTS (CHCl₃ + EDC)

CONTROL: 140°F - 155°F

SPEC: BOTTOMS < .05% TOTAL IMP
TOP: 1-5% TRI



FROM
TE 6422



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B. Trouble Shooting

Problem

Possible Solution

Control temperature changes rapidly

A sudden increase or decrease in pressure.

OFTEN

Filling a reflux drier.

Loss of reflux back to the column.

Loss of temperature indication.

Sudden increase in the overhead pressure

OFTEN

Loss of a Tetra cooling tower fan or pumps.

OFTEN

High noncondensable load (N₂, HCl, etc.).

Reflux drum full of organics. Liquid in the vent header.

Starting up the Per-Tri or a Tri still in the same vent header, or one shutdown with too much N₂ purge on the column.

Steam flow falls off and steam chest pressure maximum

Reboiler boiled dry if when you check the steam trap strainer bleed and it shows very little condensate and mostly live steam.

Reboiler shell side full of condensate.

Sudden reflux drum low level

High level in the reflux drum which filled the level transmitter dry leg.

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Tri Still Shutdown Checklist

Still Line	Lead
Operator	Operator
	Tag

- If both Tri stills are being shut down, shut down the topping still and Tri neutralizer.

2. At the Tri still feed FCV's, open the valve going back to the SLFT and block the valve going to the Tri stills.

3. Put the Tri recycle TCV on manual and open it all the way. Cut your Tri still steam back in increments.

4. Switch the Tri still you are shutting down into the vent header by itself. Put a N₂ purge on the column.

5. Shut down the Tri reflux pump when the reflux drum is less than 10 percent.

6. Block and tag the Tri still steam

```
(steam header
or(
  (steam FCV
```

7. Open the bypass on the Tri bottoms LCV.

8. Block and tag the Tri still condensate

```
(condensate header
or(
  (steam traps
```

9. Block and tag the Tri still feed.

10. Block and tag the Tri still recycle TCV after step 5 has been completed.

11. Block and tag the Tri still reflux LCV.

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6
Still Line
Operator

Lead
Operator
Tag

12. Pump the rest of the material in the Tri reflux drum to the DH feed tanks through the reflux drum and neutralizer pump out header. Pump this material very slowly. It may cause pressure problems in your DH stills.
13. Block and tag the reflux drum and neutralizer pump out header at the discharge of the Tri reflux pumps. Tag open the reflux pump suction bleeds and make sure the reflux drum is drained.
14. When the column is empty, shut down the Tri bottoms pump and tag open the bottom bleeds to the pad. Have a vacuum truck ready to pick up any organics that go to the pad.
15. Block and tag the Tri bottoms LCV. If No. 2 Tri still is shut down, tag the bottoms purge valve to the topping still.
16. Block and tag the Tri still vent valve.
17. Shut off the N₂ purge on the column before Maintenance starts working.

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D. Startup

Tri Still Startup Checklist

<u>Still Line Operator</u>	<u>Lead Operator Untag</u>
--------------------------------	------------------------------------

- | | | |
|-------|-------|---|
| _____ | _____ | 1. Check for blinds in lines and that Maintenance has completed their job and untagged. |
| _____ | _____ | 2. Untag and close the bottoms suction line bleed valves, the reflux pump suction bleed valves, and any other open valves on the column. Tape all flanges opened by Maintenance. Pressurize the column to 20 psig and leak check. |
| _____ | _____ | 3. When the leak check is completed, depressurize the column. |
| _____ | _____ | 4. Untag and open the vent valve to vent header. Make sure the Tri still being started up is in the vent header by itself. Also, make sure there is cooling tower water on the Tri stills condenser. |
| _____ | _____ | 5. Untag and open the Tri still feed. |
| _____ | _____ | 6. Start filling the Tri still. |
| _____ | _____ | 7. Untag the reflux drum and neutralizer pump out header valve at the discharge of the Tri reflux pump. |
| _____ | _____ | 8. Untag and open the Tri bottoms LCV. Make sure the Tri bottoms is lined up back to the SLFT. |
| _____ | _____ | 9. Untag and open the reflux FCV. |
| _____ | _____ | 10. Untag the condensate
(Condensate header valve
or (
(Steam traps |

Open the condensate header valve but you may want to close the valve downstream of the steam trap. Open the strainer bleed.

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Still Line
Operator

Lead
Operator
Untag

11. When a reboiler level of 70 percent appears in the sight glass or is indicated on the control board, untag and open the steam

(Steam Header
or (Temperature control valve

Open the FCV just enough to heat the reboiler and piping. Check to see if your reboiler sight glass and control board reboiler level indication agree.

12. Start increasing steam slowly. Increase your feed as needed to control your reboiler level. Put your steam traps in service when possible. Close the strainer bleed valve.

13. When your boilup is going overhead, you will have to check the reflux drum sight glass for a level indication (the dry leg on the level transmitter should be drained. Start up the reflux pump. Put 20 gpm reflux on the column.

If the column is wet, the reflux drum and neutralizer pump-out header can be used to control the reflux drum level until the moistures come down.

14. You can start the Tri still up on total reflux or turn on the bottoms pump when needed. Increase feed and steam when possible. Put the reflux level control valve on automatic when possible.

15. Untag the Tri recycle TCV. Set the control temperature at 155°F. Hold this temperature until the bottoms is in spec.

16. When the column reaches its normal steam flow, put the bottoms pump on and make sure your feed flow is 10 gpm or less. With a small amount of feed on the column, the bottoms will get in spec faster.

When the Tri still bottoms is less than or equal to .05 percent total impurities, put the bottoms forward. If it is No. 2 Tri still untag and open the bottoms purge to the topping still. At the suction of the bottoms pump, open the valve from tray 3 and close the valve from the bottom of the column.

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If both Tri stills were down, start up the topping still, Tri neutralizer, and drier.

Tri Topping Still

A. Normal Operation: The purpose of the topping still is to remove small quantities of heavy compounds, pentachlorobutadiene and hexachlorobutadiene, that are formed in the Tri still reboilers. These heavy compounds are removed out the bottom of the topping still in a small purge stream that is recycled back to the SLFT. This purge should be controlled so the pentachlorobutadiene is between 10 and 15%.

The topping still has a horizontal steel condenser. The vent off the condenser is controlled by a PCV. The reflux drum moisture should be less than -10°C by the cloud poing method. A condenser failure would cause corrosion in the topping still, Tri bottoms cooler, and the Tri neutralizer top section. The reflux back to the topping still is controlled at 5 gpm.

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C. Shutdown

Tri Topping Still Shutdown Checklist

<u>Still Line Operator</u>	<u>Lead Operator Tag</u>	
		1. Block the purge from No. 2 Tri bottoms.
		2. Switch No. 1 Tri bottoms to the Tri bottoms cooler or the SLFT.
_____	_____	3. Block and tag the feed block valve to the topping still.
_____	_____	4. Block and tag the steam. (Steam header or (Level control valve.
		Put a N ₂ purge on the column.
_____		5. Close the reflux flow control valve on the control board and put the reflux drum LCV on manual and open it.
_____		6. Open the topping still bottoms purge and pump the topping still material back to the SLFT.
_____	_____	7. Shut down the reflux pump when it cavitates. Block and tag the pump discharge valves. Tag open the reflux pump suction bleed valves.
_____	_____	8. After the bottoms pump cavitates, shut down the pump and block and tag the discharge valve to the SLFT. Tag open the bottom bleed and have a vacuum truck pick up the organics.
_____	_____	9. Block and tag the topping still vent valve.
_____		10. Shut off the N ₂ purge on the column before Maintenance starts working.

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D. Startup

Tri Topping Still Startup Checklist

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>
--------------------------------------	--

_____	_____
-------	-------

1. Check for blinds in lines and that Maintenance has completed their job and untagged.

_____	_____
-------	-------

2. Untag and close the bottoms suction line bleed valve, the reflux pump suction bleed valve, and any other open valves on the column. Tape all flanges opened by Maintenance. Pressurize the column to 20 psig and leak check.

_____	_____
-------	-------

3. When the leak check is completed, depressurize the column.

_____	_____
-------	-------

4. Untag and open the vent valve. Make sure there is cooling tower water on the topping still condenser. The vent PCV bypass will probably have to be open because of the noncondensable load during startup.

_____	_____
-------	-------

5. Untag and open the topping still feed valve.

_____	_____
-------	-------

6. Start filling the topping still. Switch No. 1 Tri bottoms flow to the topping still and open the bottoms purge from No. 2 Tri bottoms (if the Tri bottoms are in spec).

_____	_____
-------	-------

7. Untag the condensate

(Condensate header valve
or (
(Steam traps

Open the condensate header valve but you may want to close the valve downstream of the steam traps. Open the strainer bleed.

_____	_____
-------	-------

8. When a reboiler level of 10 percent appears in the sight glass or is indicated on the control board, untag and open the steam.

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(Steam header
or (
(Level control valve

Open the LCV just enough to heat the reboiler. Check to see if your reboiler sight glass and control board reboiler level indication agrees.

Still Line
Operator

Lead
Operator
Untag

9. Put the steam LCV in service. Put the steam traps in service when possible. Close the strainer bleed valve.
10. Untag the reflux pump discharge valves. When your boilup is going overhead, close your reflux drum level control valve and put 5 gpm reflux to the topping still. Check to see if your reflux drum sight glass and board indication agree.
- If the column is wet, the reflux drum and neutralizer pump-out header can be used to control the reflux drum level until the moistures come down.
11. When the reflux drum level reaches 50 percent, put the reflux drum level control valve in service.
12. Start up the bottoms pump to get the bottoms recirculation started.

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Tri Neutralization and Drying

A. Normal Operation: The Tri bottoms cooler outlet temperature should run less than 130°F. If the product temperature to the neutralizer runs too high, it will be harder for the NH_3 to dissolve in the Tri, cause higher vent losses, and it will be harder to dry the Tri product.

The ammoniator PCV is usually controlled about 3 psig and can be run higher if the ammoniator LCV starts to plug.

The Tri neutralizer runs on an NH_3 excess and the pH should be controlled between 6.5-7.5. If the pH is too low (less than 6.5), increase the NH_3 flow. If the pH is too high (greater than 7.5), increase the water flow because there is too much dissolved NH_3 in the product. Also, there may be problems in the wash section because the water and Tri are not mixing properly. Acid washing the neutralizer may be necessary.

The unchlorinated well water comes from VC's Elliott air compressors. This water is used to cool the air compressor oil. If our unchlorinated well water is blocked off without VC being notified, their air compressors could shut down on high oil temperature.

The top and bottom sections of the Tri neutralizer hold 5,000 gallons of Tri product at normal control levels. If the Tri bottoms are way out of spec and this amount of material cannot be blended with the material in the Tri stabilizer tanks, dump the material in the top section to the bottom and pump the organics back to the DH feed tanks through the reflux drum and neutralizer pumpout header.

The Tri driers should be switched every other day on graveyards, unless the moisture determined by cloud point is greater than -15°C (-25°C to -15°C is okay, -14°C to -10°C or greater, the drier should be switched immediately).

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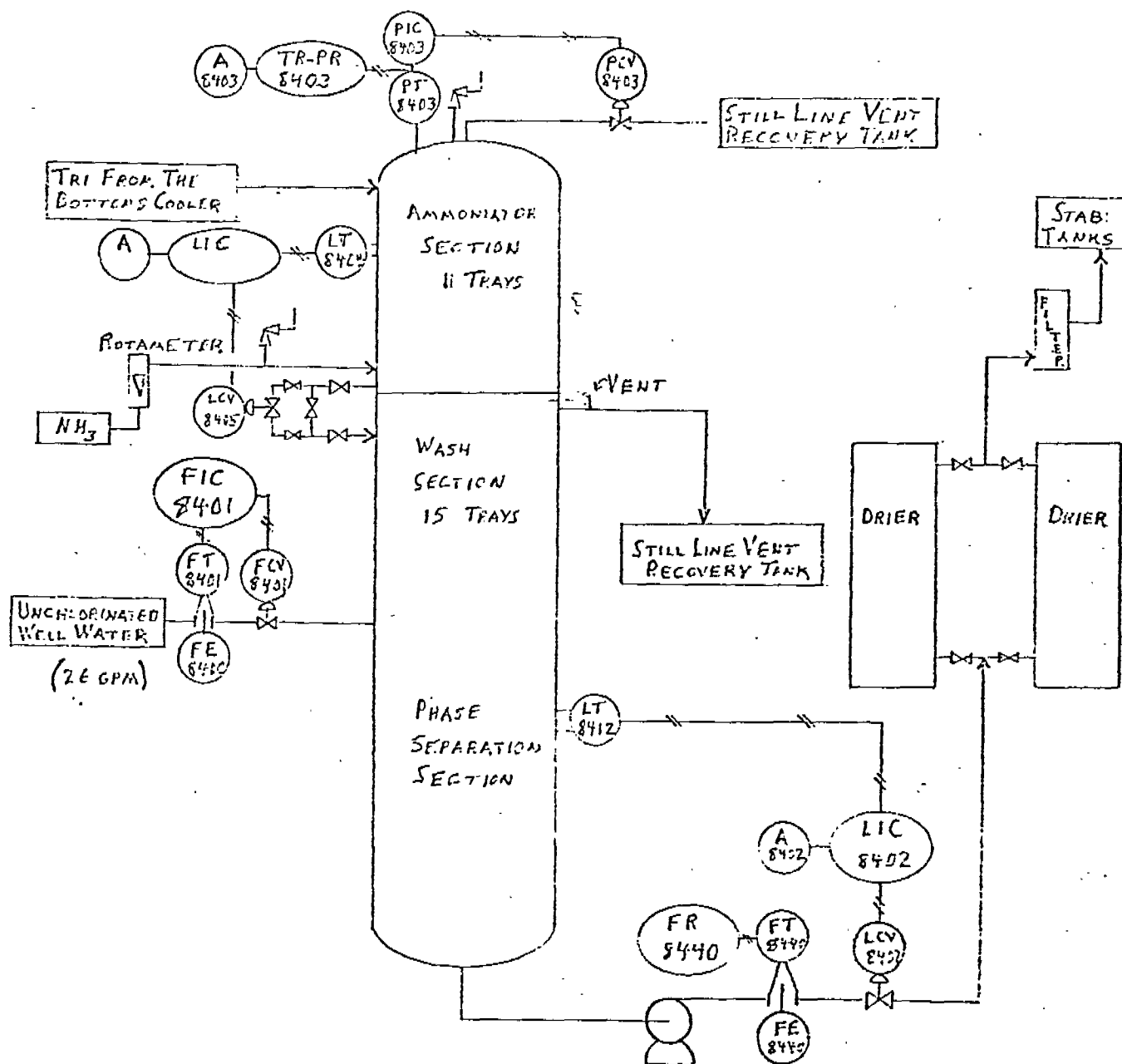
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If the driers have been exposed to a pH of less than 6.0, the driers should be switched (check the pH of the Tri being fed to the driers, if it is not 6.5 pump the material back to the DH feed tanks until the pH is good).

There will be no flush material available for stabilizing when the Tri neutralizer bottoms pumps are down.

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PURPOSE: TO NEUTRALIZE ORGANIC ACIDS, HCl, AND OXIDES

WATER FLOW: 26 GPM

CONTROL: pH 6.5 TO 7.5

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B. Trouble Shooting

Problem

Spiking and erratic ammoniator pressure

Liquid in the NH₃ rotameter

Ammoniator LCV plugging

Freezing conditions outside

Plugged wash section water overflow line. Water overflowing out of the drain vent.

Possible Solution

Flooded top section of the neutralizer. Open the bypass on the LCV.

In cold weather steam tracing must be on the NH₃ piping after the NH₃ PCV.

The level control valve can be water washed. Do not get any water in the neutralizer top section. If the restriction is in the outlet nozzle of the top section, use N₂ to break up the plug.

Run the unchlorinated well water FCV on manual. If the impulse lines freeze, flow indication will be lost or in error. Put the FCV on manual anytime freezing conditions exist outside.

Acid wash the wash section overflow line with acid from the DH feed tanks.

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C. Shutdown

Tri Neutralizer Shutdown Checklist

- | <u>Still Line
Operator</u> | <u>Lead
Operator
Untag</u> | |
|--------------------------------|------------------------------------|---|
| _____ | | 1. Put both Tri bottoms on recycle to the SLFT. Block No. 2 Tri bottoms purge to the topping still. |
| _____ | | 2. Shut down the topping still. |
| | | 3. Tag the following valves to the Tri bottoms cooler. |
| | _____ | A. No. 1 Tri bottoms valve. |
| | _____ | B. No. 2 Tri bottoms valve. |
| | _____ | C. Topping still reflux drum LCV. |
| _____ | | 4. Put the ammoniator LCV on manual and open the valve. |
| _____ | | 5. Block and tag the NH ₃ when the ammoniator section is drained. |
| _____ | | 6. Put the ammoniator PCV on manual and open the valve. |
| _____ | | 7. When the Tri product flow falls off or there is a low level alarm on the Tri neutralizer bottoms, check the level in the wash section sight glass. If you can see the Tri-water interphase, continue pumping the interphase level down to the bottom sight glass, then pump the remaining organics through the reflux drum and neutralizer pump-out header to the DH feed tanks. If the interphase level cannot be seen in the sight glass, use the reflux drum and neutralizer pump-out header to pump the remaining organics to the DH feed tanks. |
| | | Note: Never let phase water go to the product driers. |
| _____ | _____ | 8. Call VC (2687) and tell them the unchlorinated well water coming to Per-Tri is going to be blocked off. When vinyl says its okay, block and tag the unchlorinated well water FCV. |

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<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>
_____	_____
_____	_____

9. When there are no organics left in the neutralizer bottom, shut down the bottoms pump and tag open the suction bleeds. The remaining water will go to No. 6 lift station. Tag the pump discharge valves.

10. Block and tag the ammoniator PCV.

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D. Startup

Tri Neutralizer Startup Checklist

<u>Still Line Operator</u>	<u>Lead Operator Untag</u>	
_____	_____	1. Check for blinds in lines and that Maintenance has completed their job and untagged.
_____	_____	2. Untag and close the bottoms suction line bleed valves and any other valves on the neutralizer.
_____	_____	3. Untag the open the PCV block valves. Put the valve on automatic and set it for 3 psig.
_____	_____	4. Call VC (2687) and tell them you need to start taking 26 gpm of unchlorinated well water. When vinyl says its okay, untag and open the FCV.
_____	_____	5. Close the ammoniator LCV block valve and untag and open the NH ₃ . Set the rotameter flow at 40 percent.
_____	_____	6. Untag the following valves to the Tri bottoms cooler. A. No. 1 Tri bottoms valve. B. No. 2 Tri bottoms valve. C. Topping reflux drum LCV.
_____	_____	7. Put No. 2 Tri bottoms forward if it is in spec.
_____	_____	8. Start up the topping still when possible.
_____	_____	9. When the Tri ammoniator level reaches 50 percent, put the LCV in service.
_____	_____	10. Untag the neutralizer bottoms pumps. When the Tri neutralizer bottom section level reaches 50 percent, put the bottoms pumps on and the bottoms LCV in service.

SL 020088

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Tri Rework System

Normal Operations: Tri production is sent to the stab tanks after neutralizing and drying. In these stab tanks (Tri S-1, S-2, and S-3, high purity HP-1, HP-2, and HP-3), the product is checked for water, color, pH, and purity (purity check) in the Per-Tri lab. If the specifications for product purity are met then the tanks are stabilized. The main lab then analyzes the stab tank sample (stab clearance). If the Tri product fails the purity check or the stab tank clearance, and the material cannot be blended or sold, the Tri product is reworked.

<u>Problem</u> <u>(Out of spec)</u>	<u>Rework to</u>
Water	DH feed tanks
Heavy organics (TCE, Per, etc.)	DH feed tanks
Light organics (CCl ₄ , EDC, etc.)	P/T reflux drum
pH (greater than 8.5)	P/T reflux drum
Color	Topping still
NVR	Topping still
pH (less than 8.5)	Tri neutralizer

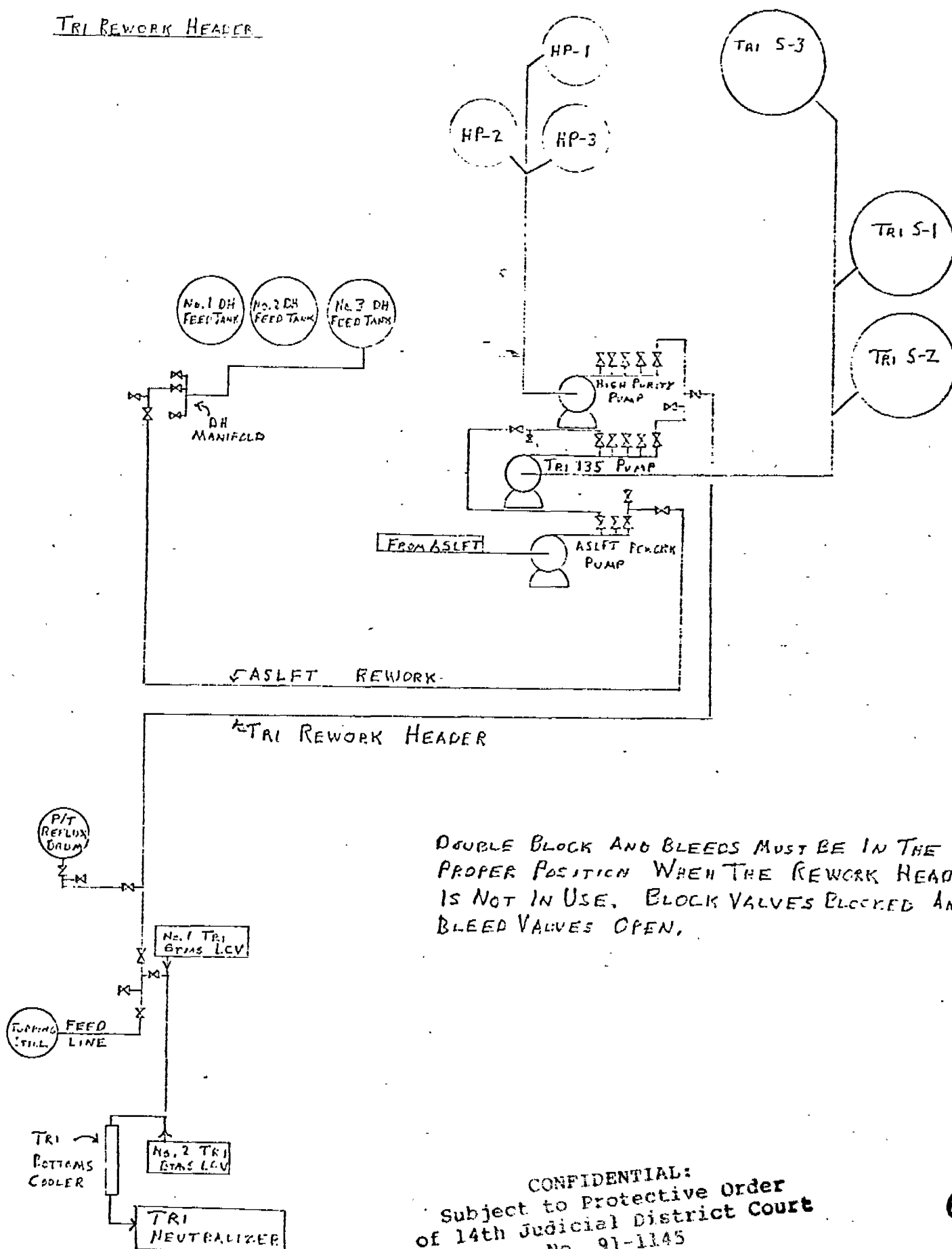
If the tank is out of spec on more than one item, rework to the first part of the process. Such as a tank out of spec on NVR and heavy organics, the tank must be reworked to the DH feed tanks.

All double block and bleeds must be in the proper position when the header is not in use. That is block valves blocked and bleed valves open to insure no cross-contamination. If a block valve is leaking through, notify supervision.

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TRI REWORK HEADER



DOUBLE BLOCK AND BLEEDS MUST BE IN THE PROPER POSITION WHEN THE REWORK HEADER IS NOT IN USE. BLOCK VALVES CLOSED AND BLEED VALVES OPEN.

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HEAVY STILL SYSTEM

A. Normal Operation: Per-Tri bottoms are fed to the suction of the heavy still feed pumps. This suction line is equalized with the heavy still feed tank (HSFT) so that if the Per-Tri bottoms flow is greater than the feed to the heavy still, the excess crude will go into the HSFT or if the Per-Tri bottoms flow is less than the feed to the heavy still, the additional feed will come from the HSFT. This allows the hot Per-Tri bottoms to be fed directly to the heavy still instead of cooling off and causing excessive vents in the heavy still feed tanks. The HSFT should be controlled between 10-14 feet unless special levels are needed for startup or shutdown.

The heavy still feed pumps pump the crude organics through filters to remove the solids (catalyst, carbon, etc.) before this material is fed to the heavy still. There are two primary filters (north and south) and a secondary filter. The primary filter should never be bypassed unless supervision is notified and the secondary filter should always be in service unless Maintenance is working on the filter. When a filter is put in service, an initial pressure drop reading should be taken. Then when the filter has a pressure drop equal to or greater than 20 psig above the initial pressure drop, the filter should be taken out of service and blocked, drained, and tagged for Maintenance. Supervision should be notified when the filter is ready for maintenance.

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After the crude organics are filtered, they are fed to the heavy still. In the heavy still the light organic compounds, Per and very little Unsym are boiled overhead while some Per, unsym, and heavy organic compounds are taken out of the bottom. The amount of Unsym in the overhead is controlled by the reflux and should be controlled .05-.07%. The reflux should be increased as the amount of Unsym increases in the overhead and decreased as the amount of Unsym decreases in the overhead. A change in the amount of Unsym in the feed to the heavy still (reactor startups, ratio changes, etc.) and feed rate changes to the column will effect the amount of reflux needed to keep the heavy still overhead in spec.

The heavy still bottoms is controlled with 25% Per in the bottoms. If the Per concentration in the bottoms gets too low there may be problems with plugging lines and cracking in the reboilers both of which have an affect on fouling the reboilers. The control temperature should be increased if the Per in the bottoms is greater than 25% and decreased if the Per is less than 25%. The control temperature depending on bottoms pressure will range between 330-355°F.

There are three bottoms filters. Two primary filters and a secondary filter. The secondary filter can be used as a primary filter or all the filters can be bypassed. The filters should not be bypassed unless supervision is notified. The heavy still bottoms filters should be swapped and cleared for maintenance per S.O.P. on the heavy still feed filters.

The bottoms pump suction lines have temperature indications at each reboiler ell. If the temperature on one side is lower than the other, the suction line may be plugging. Blast the suction line with N₂ to remove the plug. If the situation continues notify supervision.

SL 020092

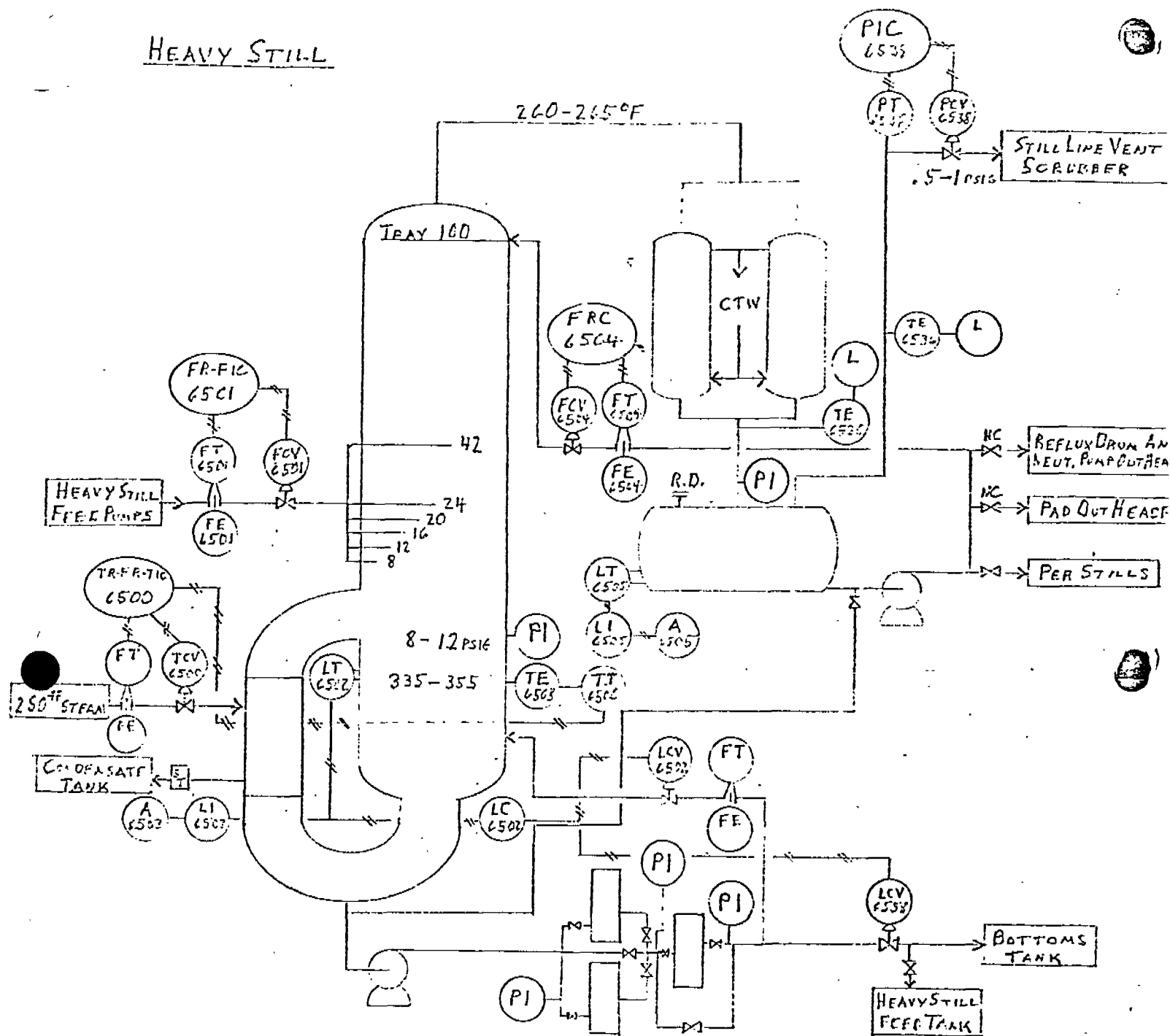
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The heavy still vent PCV should be controlled between .5-1 psig. If the valve stays open too much, cut back on the N₂ purges to the condensers.

The Betz antifoulants AF 109, AF 114, and AF 103 are used to control fouling in the heavy still reboilers. AF 109 is an antioxidant which controls polymerization that will form tars (heavy boilers). AF 114 is a dispersant which keeps solids in solution so they can be filtered out. AF 103 is a metal coordinator which ties up iron, copper, and other metals that cause cracking. The amounts added vary with every heavy still reboiler run. The recommended addition ratio is 3.5:1.0:0.5 (AF 109: AF114: AF 103). Betz addition rates should be checked once per day. If the metering pumps are not working supervision should be notified and the Betz addition pot should be used to add the antifoulant.

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PURPOSE : To SEPARATE PER FROM UNSYM AND OTHER HEAVY COMPOUNDS.

CONTROL TEMPERATURE : 330 - 355°F

SPEC : .05-.07 UNSYM (OVERHEAD)

25% PER (BOTTOMS)

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B. Trouble Shooting

<u>Problem</u>	<u>Possible Solution</u>
HSFT venting	Per bottoms on recycle to the HSFT. Per-Tri bottoms filling the HSFT.
Heavy still feed pump cavitating	Pump suction restricted. Tri in the Per-Tri bottoms. Too low a level in the HSFT.
Control temperature changes rapidly	A sudden increase or decrease in pressure. Steam trap failure. Erroneous temperature indication.
Sudden increase in the overhead pressure	Loss of a Tetra cooling tower fan. High noncondensable load (N ₂ , HCl, etc.) Reflux drum full of organics.
Steam flow falls off and steam chest pressure maximum	Reboiler boiled dry when the steam trap strainer bleed shows very little condensate and mostly live steam. Reboiler shell side full of condensate.
Sudden reflux drum low level	High level in the reflux drum which filled the level transmitter dry leg.

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C. Shutdown

Heavy Still Shutdown Checklist

- | <u>Still Line</u>
<u>Operator</u> | <u>Lead</u>
<u>Operator</u>
<u>Tag</u> | |
|--------------------------------------|--|---|
| _____ | | 1. Put the Per-Tri bottoms on recycle to the SLFT. |
| _____ | | 2. Shut down the heavy still feed pumps and Betz addition pumps. |
| _____ | | 3. Call Powerhouse C (4791) and tell them the 400 psig steam flow will be reduced approximately 30,000 pounds per hour. |
| _____ | | 4. Reduce the 250 psig station to 225 psig. |
| _____ | | 5. Cut the heavy still steam back in increments. Watch the 250 psig steam station, lower the pressure if you need to. Put two or three N ₂ hoses on the column. If the heavy still starts going on a vacuum, close the vent valve to the still line vent scrubber. |
| _____ | | 6. Block and tag the steam to the heavy still.

(A. Temperature control valve
or (
(B. West of the Tri neutralizer |
| _____ | | 7. Block and tag the reflux to the heavy still but continue to pump the material in the reflux drum to the Per stills. |
| _____ | | 8. Block and tag the heavy still feed FCV. |
| _____ | | 9. At the heavy still bottoms LCV switch the bottoms from the bottoms tank to the HSFT. Open the bypass around the level control station. Make sure the line gets hot. Block the bottoms recirculation LCV back to the heavy still. |
| _____ | | 10. Block, drain and tag the condensate from the heavy still.

(A. Condensate header
or
(B. Steam traps |

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Still Line
Operator

Lead
Operator
Tag

21. Clear the heavy still bottoms filters that were in service and the bottoms piping to the bottoms tank. Block drain and tag in order that the bottoms line can be hydroblasted to the bottoms tank (switch vaporizer blowdown).

22. Tag the following:

- A. Heavy still reflux pump seal flush.
- B. Heavy still reflux pump discharge valves to the pad out and pump out headers.
- C. Heavy still bottoms pump seal flush.
- D. Heavy still bottoms pump discharge valves to the pad out header.
- E. Betz addition pumps starter switches.
- F. N₂ to the heavy still condensers.
- G. Per rework line at the heavy still reflux drum.

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D. Startup

Still Startup Checklist

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<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>
--------------------------------------	--

_____	_____	Untag the Per rework valve at the heavy still reflux drum. Fill the heavy still reflux drum with Per from the stabilizer tanks before Maintenance has completed the reboilers if it is possible.
-------	-------	--

_____	_____	1. Check for blinds in lines and that Maintenance has completed their job and untagged.
-------	-------	---

_____	_____	2. Close the bottoms suction line bleed valves, the reflux pump suction bleed valves, and any other open valves on the column. Tape all flanges opened by Maintenance. Pressurize the column to 20 psig and leak check.
-------	-------	---

_____	_____	3. When the leak check is completed, depressurize the column.
-------	-------	---

_____	_____	4. Untag and open the vent valve to the still line vent scrubber. Also, make sure there is cooling tower water on the heavy still condenser. Untag and open the N ₂ to the heavy still condenser.
-------	-------	--

_____	_____	5. Untag and open the heavy still feed FCV.
-------	-------	---

_____	_____	6. Untag and open the heavy still reflux FCV and seal flush to the reflux pump. Check with supervision to determine if they want to flush the heavy still with some of the material in the reflux drum. After flushing is finished, pump the remaining material into the heavy still. Shut down the reflux pump before it cavitates.
-------	-------	--

_____	_____	7. Start filling the heavy still with Per from the stabilizer tanks. With the heavy still feed pumps, no filters are necessary if Per from the stabilizer tanks is used.
-------	-------	--

_____	_____	8. Untag the seal flush and pad out header on the heavy still bottoms pump. Got bottoms recirculation started.
-------	-------	--

_____	_____	9. Untag the Betz addition pumps starter switches. Start the Betz addition pumps and set the flows per supervision's instructions. Fill the Betz addition pot per supervision's instructions.
-------	-------	---

SL 020099

Still Line
Operator

Lead
Operator
Untag

10. Untag the condensate

(Condensate header valve
or (
(Steam traps

Open the condensate header valve but you may want to close the valve downstream of the steam trap. Open the strainer bleed. Start up in the low pressure condensate header.

- _____
11. When the reboiler level appears in the sight glass or starts indicating a reboiler level on the control board, untag and open the steam.

(Steam header
or (
(Temperature control valve

Open the TCV just enough to heat the reboiler and piping. Check to see if the sight glass and float chamber agree.

- _____
12. The heavy still feed pump may have to be shut down or the feed flow cut way back once the reboiler level reaches 60%. Increase the steam flow when the chart indication is one line above the bottom line.

- _____
13. Call Powerhouse C (4791) and tell them in the next 8 hours that Per-Tri's 400 psig steam flow will increase 30,000 pounds per hour.

- _____
14. Hold the steam flow one line above the bottom unless heatup is going too slow. Have a vacuum truck hooked up to the bottom nozzle on the south end of the reflux drum before boilup goes overhead.

- _____
15. Have the vacuum truck suck out the first organics that comes overhead. Check the overhead moisture. When supervision says the moisture is low enough, shut down the vacuum truck. Let the reflux drum fill up to 20% and put reflux on the column. Start up the heavy still feed pump (Per from the stabilizer tanks) to control the reboiler level.

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Still Line
Operator

Lead
Operator
Untag

16. Increase steam, feed, and reflux as needed. Fill the heavy still feed tank to 14-16 feet with Per-Tri bottoms.
17. When the reflux flow is at least 230 gpm put the overhead forward to the Per stills.
18. Put the Per stills on recycle to the HSFT.
19. Switch the heavy still feed from the Per stabilizer tanks to the Per-Tri bottoms and HSFT.
20. When the Per bottoms are in spec, start up the Per neutralizer.
21. Start rework from the ASLFT when tank levels permit.

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Per Stills

Normal Operation: Feed to the Per stills comes from the heavy still reflux pumps. The purpose of the Per stills is to remove compounds lighter than Per (Tri, TCE, 1,1 Dibromochloroethylene, 1,2 Dibromochloroethylene, etc.). In the Per still feed, TCE is the largest impurity while 1,2 Dibromochloroethylene is the hardest compound to remove from the Per product. The Per bottoms should be controlled so that the total impurities are less than or equal to .1 percent (.05 to .07 Unsym and .01 to .03 lights). If the light compounds are greater than .03 percent, increase steam to the Per still. If the light compounds are less than .01 percent, decrease steam to the Per still.

The Per still recycle will be used in the seal flush system. The light impurities taken overhead in the Per stills will be removed from the still line by the seal flush to the reactor force circulation pumps, reactor recycle pumps, and bottoms tank pumps. No. 2 Per still reflux pump discharges into the suction of the seal flush pump. No. 1 Per still recycle FCV will be controlled so that the overhead compositions of both stills are about the same. If additional recycle is necessary, there are lines from No. 1 and No. 2 recycle FCV's that go to the Tetra tanks (6301, 6302, 6303).

Unsym cannot be removed in the Per stills. The Per bottoms should be put on recycle back to the HSFT when the total impurities are greater than .13 percent or if the total impurities have been greater than .1 for more than six hours.

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Total Reflux

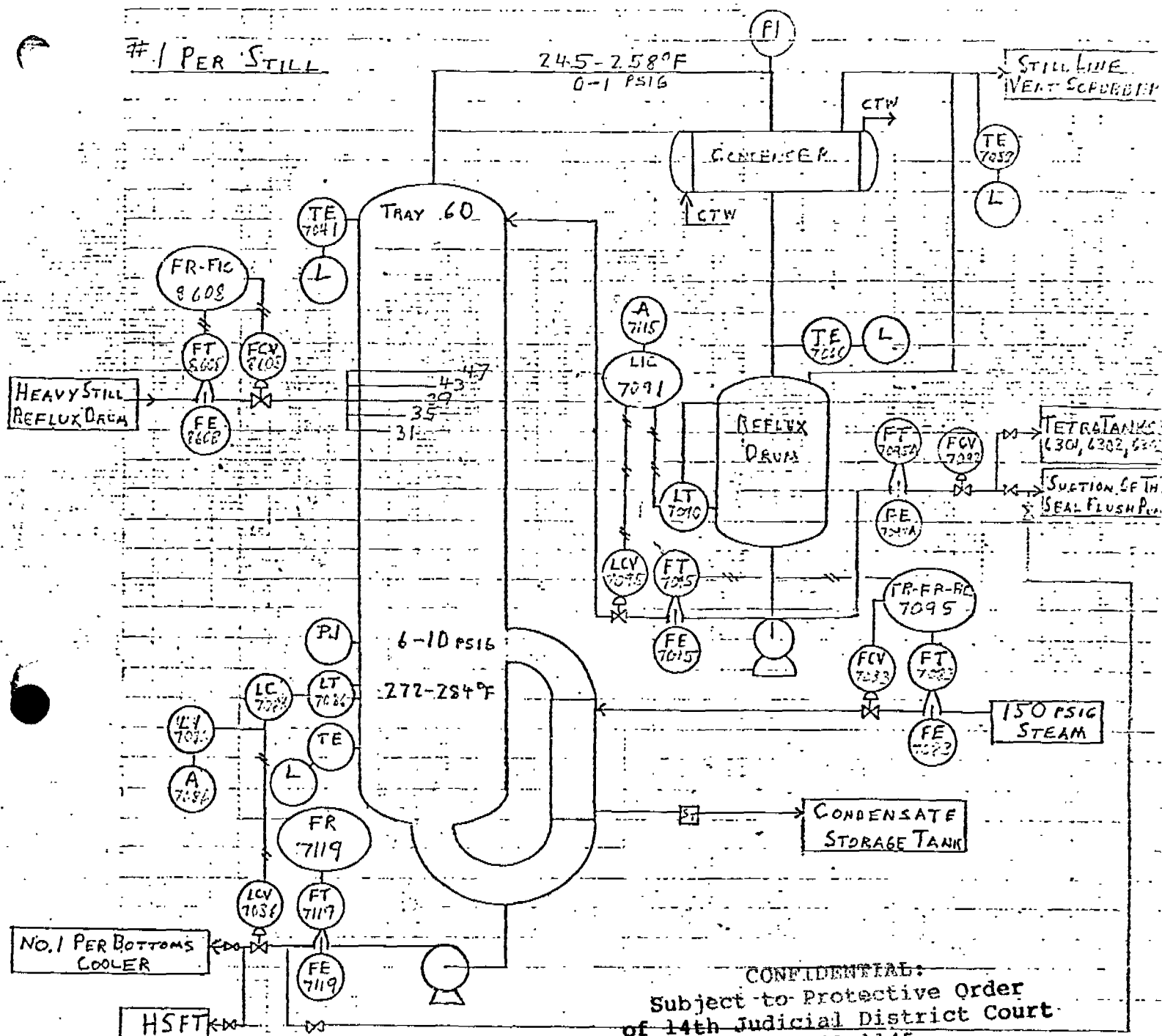
1. Block the Per still feed.
2. Block the Per recycle.
3. Shut down the Per bottoms pump.

Note: Only one Per still can be put on total reflux; the other Per still must supply seal flush. If the heavy still is down, seal flush material can come from the Per stabilizer tanks.

If No. 2 Per still is shut down, No. 1 Per recycle FCV must be wide open to supply all the seal flush.

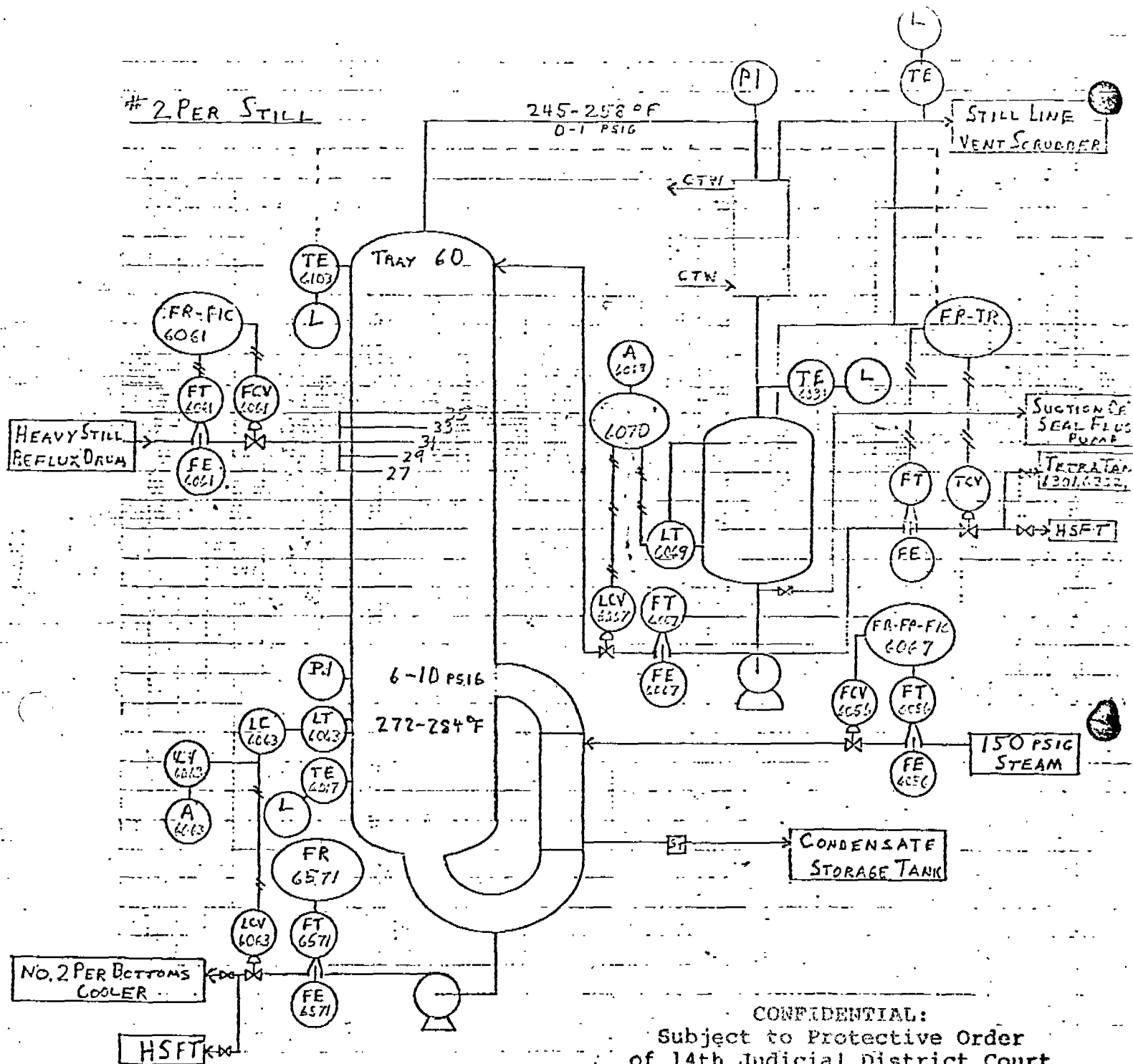
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SL 020103



PURPOSE: SEPARATE TCE AND LIGHTS FROM PER

SPEC: TOP SUPPLIES SEAL FLUSH
 BOTTOM $\leq$.03% LIGHTS
 $\leq$.1% TOTAL IMPURITIES



PURPOSE: SEPARATE TCE AND LIGHTS FROM PER

SPEC: TOP SUPPLIES SEAL FLUSH
BOTTOM $\leq .03\%$ LIGHTS
 $\leq .1\%$ TOTAL IMPURITIES

SL 020105

B. Trouble Shooting

Problem

Possible Solution

Sudden increase in the overhead pressure

Loss of a Tetra cooling tower fan or pumps.

High noncondensable load (N₂, HCl, etc.).

Reflux drum full of organics. Liquid in the vent header.

Steam flow falls off and steam chest pressure maximum

Reboiler boiled dry if when you check the steam trap strainer bleed and it shows very little condensate and mostly live steam.

Reboiler shell side full of condensate.

Sudden reflux drum low level

High level in the reflux drum which filled the level transmitter dry leg.

Cannot control No. 2 per reflux drum level

Bottoms pump suction valve to the seal flush pump is open and the reflux pump suction valve to the seal flush pump is open, causing No. 2 Per bottoms to equalize with the No. 2 Per reflux drum.

No. 1 Per bottoms valve is open to the seal flush pump suction.

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SL 020106

C. Shutdown

Per Still Shutdown Checklist

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Tag</u>
--------------------------------------	--

- | | |
|-------|---|
| _____ | 1. Put the Per bottoms on recycle back to the HSFT. |
|-------|---|

If both Per stills are being shut down, shut down the Per neutralizer and phase separator. Also, if the heavy still continues to run, there is a line back to the HSFT at No. 1 Per feed FCV.

- | | |
|-------|--|
| _____ | 2. If only No. 1 Per still is being shut down, nothing needs to be done on the Per seal flush system. Block and tag No. 1 Per recycle FCV. |
|-------|--|

_____	If only No. 2 Per still is being shut down, open the No. 1 Per recycle FCV all the way. Block and tag No. 2 Per still recycle to the seal flush pump.
-------	---

_____	If both Per stills are being shut down, open No. 1 Per recycle FCV all the way. Block and tag No. 2 Per still recycle to the seal flush pump. Open from either No. 1 or No. 2 Per bottoms to the suction of the seal flush pump. (Remember No. 1 will have to have a bottoms pump running in order to supply seal flush.) Block and tag No. 1 Per recycle FCV. Additional material for seal flush can come from the heavy still reflux drum or the Per stabilizer tanks.
-------	--

- | | |
|-------|--|
| _____ | 3. Block and tag the Per still feed FCV. |
|-------|--|

- | | |
|-------|---|
| _____ | 4. Cut your Per still steam back in increments. Put a N ₂ purge on the column. |
|-------|---|

- | | |
|-------|---|
| _____ | 5. Put your reflux LCV on manual and open it. |
|-------|---|

- | | |
|-------|----------------------------|
| _____ | 6. Block and tag the steam |
|-------|----------------------------|

_____	(Flow control valve
_____	or (
_____	(Steam header

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Still Line Operator	Lead Operator Tag
------------------------	-------------------------

- | | | |
|-------|-------|---|
| _____ | _____ | 7. Open the bypass on the Per bottoms LCV if the still is not going to be used to supply seal flush. If this column is going to be used for seal flush on No. 1 Per still, block the bottoms LCV or on No. 2 Per still, shut down the bottoms pump. |
| _____ | _____ | 8. Shut down the reflux pump when it cavitates. Tag open the suction bleeds. |
| _____ | _____ | 9. Tag the reflux drum neutralizer pump out header valve. |
| _____ | _____ | 10. Block and tag the condensate
(Condensate header
or (|
| _____ | _____ | (Steam traps

Open the steam trap strainer bleed. |
| _____ | _____ | 11. Block and tag the reflux LCV. |
| _____ | _____ | 12. Shut down the bottoms pump when it cavitates. Tag open the bottom bleeds and have a vacuum truck ready to pick up any organics that go to the pad. |
| _____ | _____ | 13. Block and tag the bottoms LCV. |
| _____ | _____ | 14. Tag the seal flush valve from the Per still bottoms. |
| _____ | _____ | 15. Block and tag the Per still vent valve. |
| _____ | _____ | 16. Shut off the N ₂ purge on the column before Maintenance starts working. |

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D. Startup

Per Still Startup Checklist

<u>Still Line</u> <u>Operator</u>	<u>Lead</u> <u>Operator</u> <u>Untag</u>	
_____	_____	1. Check for blinds in lines and that Maintenance has completed their job and untagged.
_____	_____	2. Untag and close the bottoms suction line bleed valves, the reflux pump suction bleed valves, and any other open valves on the column. Tape all flanges opened by Maintenance. Pressurize the column to 20 psig and leak check.
_____	_____	3. When the leak check is completed, depressurize the column.
_____	_____	4. Untag and open the vent valve to vent header. Make sure there is cooling tower water on the Per still condenser.
_____	_____	5. Untag and open the Per still feed.
_____	_____	6. Start filling the Per still.
_____	_____	7. Untag the reflux drum and neutralizer pump out header valve at the discharge of the Tri reflux pump.
_____	_____	8. Untag and open the Per bottoms LCV. Make sure the Per bottoms is lined up back to the HSFT.
_____	_____	9. Untag and open the reflux LCV.
_____	_____	10. Untag the condensate
	_____	(Condensate header valve
	_____	or (
	_____	(Steam traps

Open the condensate header valve but you may want to close the valve downstream of the steam trap. Open the strainer bleed.

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Still Line
Operator

Lead
Operator
Untag

11. When a reboiler level of 70 percent appears in the sight glass or is indicated on the control board, untag and open the steam

(Steam header
or (-
(Temperature control valve

Open the FCV just enough to heat the reboiler and piping. Check to see if your reboiler sight glass and control board reboiler level indication agree.

12. Start increasing steam slowly. Increase your feed as needed to control your reboiler level. Put your steam traps in service when possible. Close the strainer bleed valve.

13. When your boilup is going overhead, you will have to check the reflux drum sight glass with the control board indication to see if they agree. Start up the reflux pump. Put 10 gpm reflux on the column.

If the column is wet, the reflux drum and neutralizer pump-out header can be used to control the reflux drum level until the moistures come down.

14. You can start the Per still up on total reflux or turn on the bottoms pump when needed. Increase feed and steam when possible. Put the reflux level control valve on automatic when possible.

15. Untag and open the Per recycle to the seal flush pump. Make sure all the seal flush material is coming from the overhead (recycle) and not the Per bottoms.

16. When the column reaches its normal steam flow, put the bottoms pump on and make sure your feed flow is 10 gpm or less. With a small amount of feed on the column, the bottoms will get in spec faster.

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Still Line
Operator

Lead
Operator
Untag

17. When the Per still bottoms is less than or equal to .1 percent total impurities, put the bottoms forward.

If both stills were down, start up the Per neutralizer, phase separator, drier, and decolorizer.

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Per Neutralization, Drying, and Decolorizer

A. Normal Operation: The Per bottoms cooler outlet temperature should run less than 130°F. If the product temperature to the neutralizer runs too high, it will be harder for the NH_3 to dissolve in the Per, cause higher vent losses, and it will be harder to dry the Per product.

The ammoniator PCV is usually controlled about 5 psig and can be run higher if the ammoniator top section starts to flood.

The Per neutralizer runs on an NH_3 excess and the pH should be controlled between 6.5-7.5. If the pH is too low (less than 6.5), increase the NH_3 flow. If the pH is too high (greater than 7.5), increase the water flow because there is too much dissolved NH_3 in the product. Also, there may be problems in the wash section because the water and Per are not mixing properly. Acid washing the neutralizer may be necessary.

The neutralizer and phase separator hold 1,500 gallons of Per product at normal control levels. If the Per bottoms are way out of spec and this amount of material cannot be blended with the material in the Per stabilizer tanks, dump the material in the top section to the bottom and pump the organics back to the DH feed tanks through the reflux drum and neutralizer pumpout header.

The Per driers should be switched every other day on graveyards, unless the moisture determined by cloud point is greater than -10°C (-20°C to -10°C is okay, -9°C to -10°C or greater, the drier should be switched immediately). If the driers have been exposed to a pH of less than 6.0, the driers should be switched (check the pH of the Per being fed to the driers, if it is not 6.5 pump the material back to the DH feed tanks until the pH is good).

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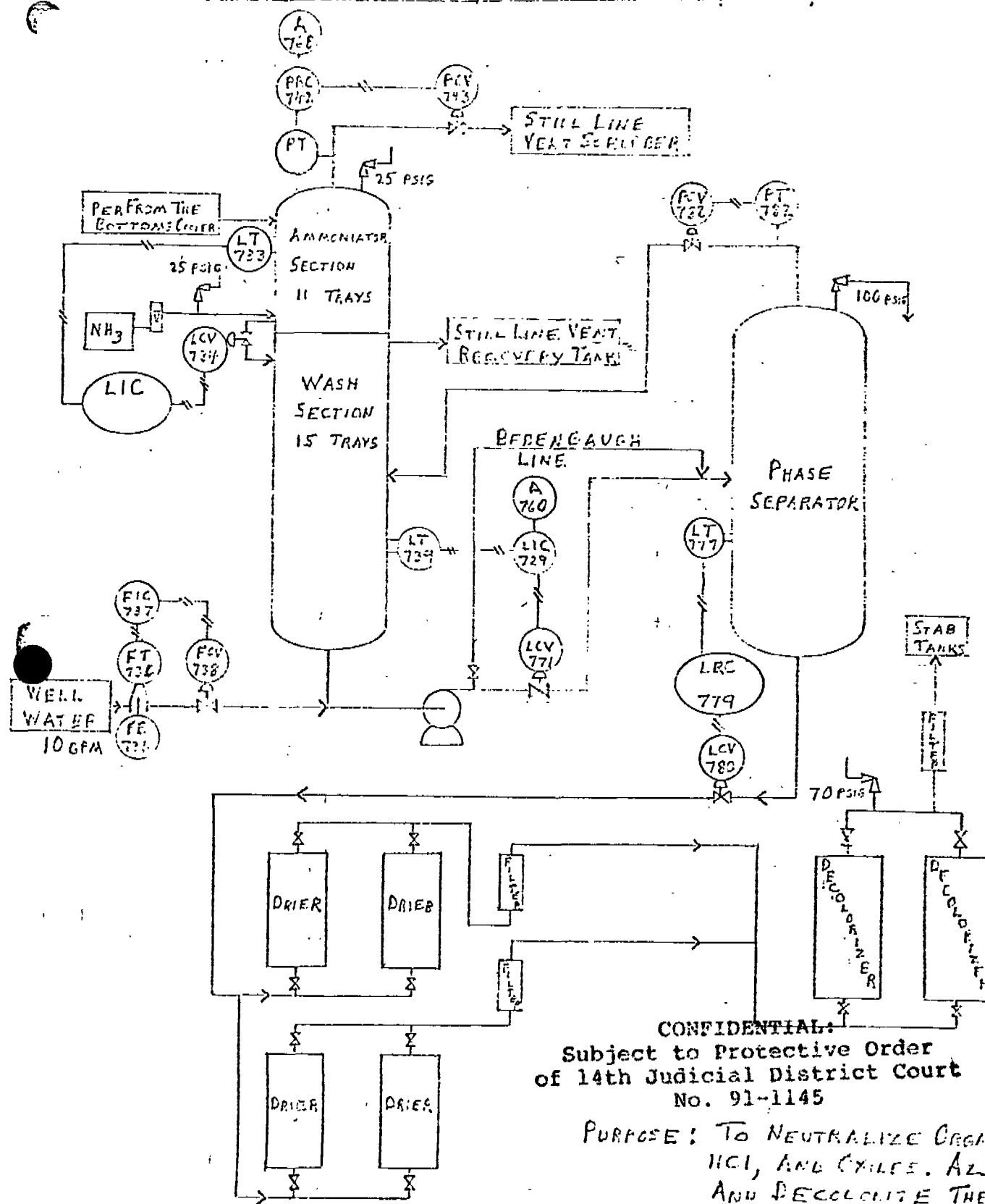
There will be no flush material available for stabilizing when the Per neutralizer bottoms pumps are down.

The Per decolorizer should be switched and recharged if the color of the outlet is greater than the inlet or the product color after the decolorizer is greater than 15. After the decolorizer is recharged, it must be purged with hot N₂ to dry the activated carbon.

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P.P. NEUTRALIZER, PHASE SEPARATOR, DRIER, AND DECOLORIZER



WATER FLOW: 10 GPM

CONTROL: pH 6.5 TO 7.5
COLOR < 15
WATER < -10°C

SL 020114

B. Trouble Shooting

Problem

Possible Solution

Spiking and erratic ammoniator pressure

Flooded top section of the neutralizer. Open the bypass on the LCV.

Liquid in the NH_3 rotameter

In cold weather steam tracing must be on the NH_3 piping after the NH_3 PCV.

Ammoniator LCV plugging

The level control valve can be water washed. Do not get any water in the neutralizer top section. If the restriction is in the outlet nozzle of the top section, use N_2 to break up the plug.

Freezing conditions outside

Run the unchlorinated well water FCV on manual. If the impulse lines freeze, flow indication will be lost or in error. Put the FCV on manual anytime freezing conditions exist outside.

Plugged wash section water overflow line. Water overflowing out of the drain vent.

Acid wash the wash section overflow line with acid from the DH feed tanks.

High organic level in the neutralizer bottom section

Neutralizer bottoms pump restricted suction or a build up on the pump impeller.

Too high a pressure on the phase separator. LCV plugged or not opening all the way.

High organic level in the phase separator

Increase the pressure on the phase separator.

Plugged drier or decolorizer filter.

SRV relieving to the sewer.

LCV not opening all the way.

Decolorizer SRV relieving

Plugged filter.

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SL 020115

C. Shutdown

Per Neutralizer and Phase Separator Shutdown Checklist

<u>Still Line Operator</u>	<u>Lead Operator Tag</u>
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<u>1</u>	<u> </u>
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1. Put both Per stills on recycle to the HSFT. Tag the valves at the Per bottoms LCV's to the neutralizer.

<u> </u>	<u> </u>
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2. Put the ammoniator LCV on manual and open the valve.

<u> </u>	<u> </u>
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3. Block and tag the NH₃ when the ammoniator section is drained. Adjust the NH₃ PCV to 26 psig.

<u> </u>	<u> </u>
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4. Put the ammoniator PCV on manual and open the valve.

<u> </u>	<u> </u>
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5. Open the bypass around the neutralizer interphase LCV or open the Bedenbaugh line.

<u> </u>	<u> </u>
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6. When the product flow falls off or there is a low level in the phase separator, check the level in the phase separator sight glass. If you can see the Per-water interphase, continue pumping the interphase level down to the bottom of the sight glass, then pump the remaining organics through the reflux drum and neutralizer pumpout header to the DH feed tanks. If the interphase level cannot be seen in the sight glass, use the reflux drum and neutralizer pumpout header to pump the remaining organics to the DH feed tanks.

Note: Never let phase water go to the product driers.

<u> </u>	<u> </u>
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7. Block and tag the well water to the Per neutralizer.

<u> </u>	<u> </u>
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8. When there are no organics left in the neutralizer or phase separator, shut down the bottoms pump and open the pump suction bleeds and the bleed at the phase separator LCV. The remaining water will go to No. 6 lift station.

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Still Line
Operator

Lead
Operator
Tag

9. Block and tag:

- A. Phase separator LCV.
- B. Neutralizer and reflux drum pumpout header.
- C. Ammoniator PCV.
- D. Per rework to the ammoniator section.

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D. Startup

Per Neutralizer and Phase Separator Startup Checklist

<u>Still Line Operator</u>	<u>Lead Operator Untag</u>
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- | | | |
|-------|-------|--|
| _____ | _____ | 1. Check for blinds in lines and that Maintenance has completed their job and untagged. |
| _____ | _____ | 2. Close the bottoms suction line bleed valves and any other valves on the neutralizer and phase separator. |
| _____ | _____ | 3. Untag and open the PCV block valves. Put the valve on automatic and set it for 3 psig. |
| _____ | _____ | 4. Untag and open the water to the per neutralizer. |
| _____ | _____ | 5. Close the ammoniator LCV block valve and untag and open the NH ₃ . Set the rotameter flow at 40 percent. |
| _____ | _____ | 6. Untag and open the Per to the neutralizer if the Per bottoms are in spec. |
| _____ | _____ | 7. When the Per ammoniator level reaches 50 percent, put the LCV in service. |
| _____ | _____ | 8. When the Per neutralizer bottom section level reaches 50 percent, put the bottoms pumps on and the bottoms LCV in service. |
| _____ | _____ | 9. When the Per phase separator interphase level is 50 percent in the float chamber, untag and put the phase separator LCV in service. |
| _____ | _____ | 10. Untag the neutralizer and reflux drum pumpout header and the Per rework header. |

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Per Rework System

Normal Operation: Per production is sent to the stab tanks after neutralizing, drying, and decolorizing. In these stab tanks (Per S-2 and S-2, degreaser high purity DG-1, DG-2, DG-3, and DG-4), the product is checked for water, color, pH, and purity (purity check) in the Per-Tri lab. If the specifications for product purity are met then the tanks are stabilized. The main lab then analyzes the stab tank sample (stab clearance). If the Per product fails the purity check or the stab clearance, and the material cannot be blended or sold, the Per product is reworked.

Problem
(Out of spec)

Rework to

Water

DH feed tanks

Heavy organics (unsym, etc.)

HSFT

Color

HSFT

NVR

HSFT

Light organics (TCE, brominated compounds, etc.)

Heavy reflux drum

pH

Per neutralizer

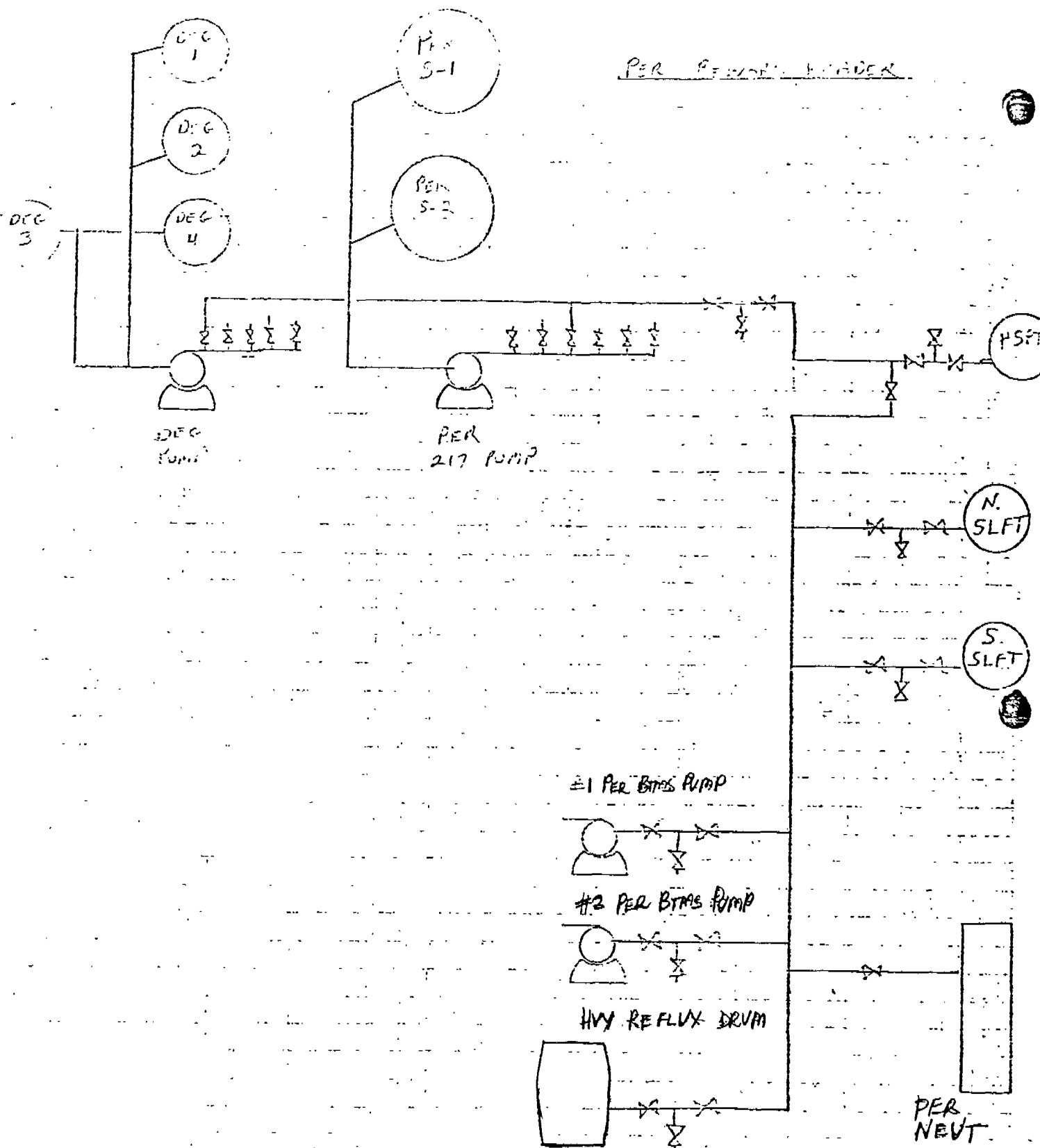
If the tank is out of spec on more than one item, rework to the first part of the process. Such as a tank out of spec on pH and heavy organics, the tank must be reworked to the HSFT.

All double block and bleeds must be in the proper position when the header is not in use. That is block valves blocked and bleed valves open to insure no cross-contamination. If a block valve is leaking through, notify supervision.

If there is no time to rework Per S-1 or S-2 back to the still line, a DG tank can be used for production or Per S-1 or S-2 can be moved to the ASLFT's.

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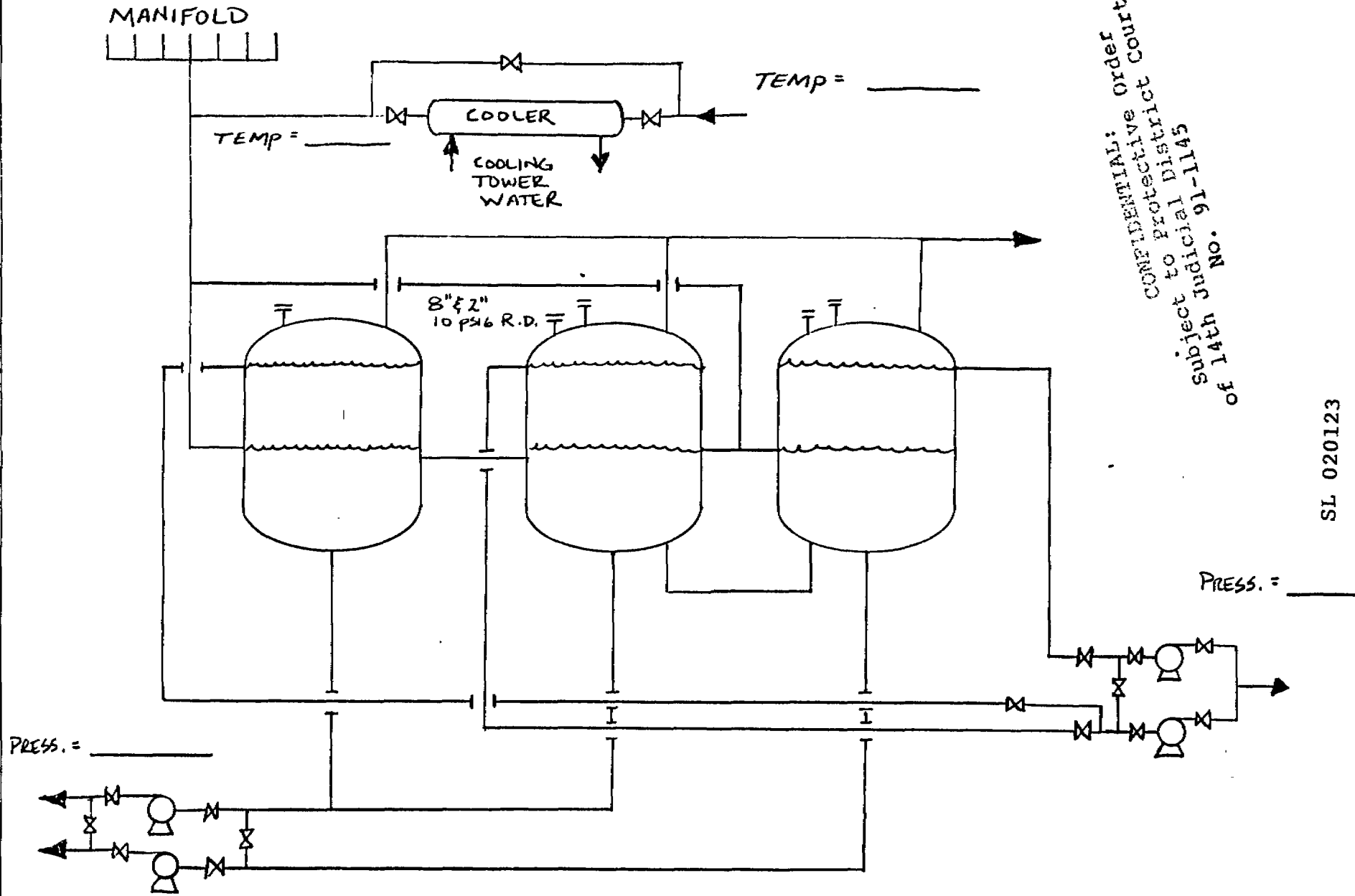
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Per-Tri Still Line
Component Boiling Points

	Temp
1 VDC	88.9 °F
2 Trans	119.1
3 DCE	135.1
4 Cis	140.4
5 CHCl ₃	142.2
6 CCl ₄	170.2
7 EPC	183.0
8 Tri	188.6
9 TCE	236.8
10 Per	249.8
11 UNSYM	266.9
12 SYM	295.2
13 Penta	320.9
14 Hexa	364.6
15 HCBD	419.0

DH STILL FEED TANKS

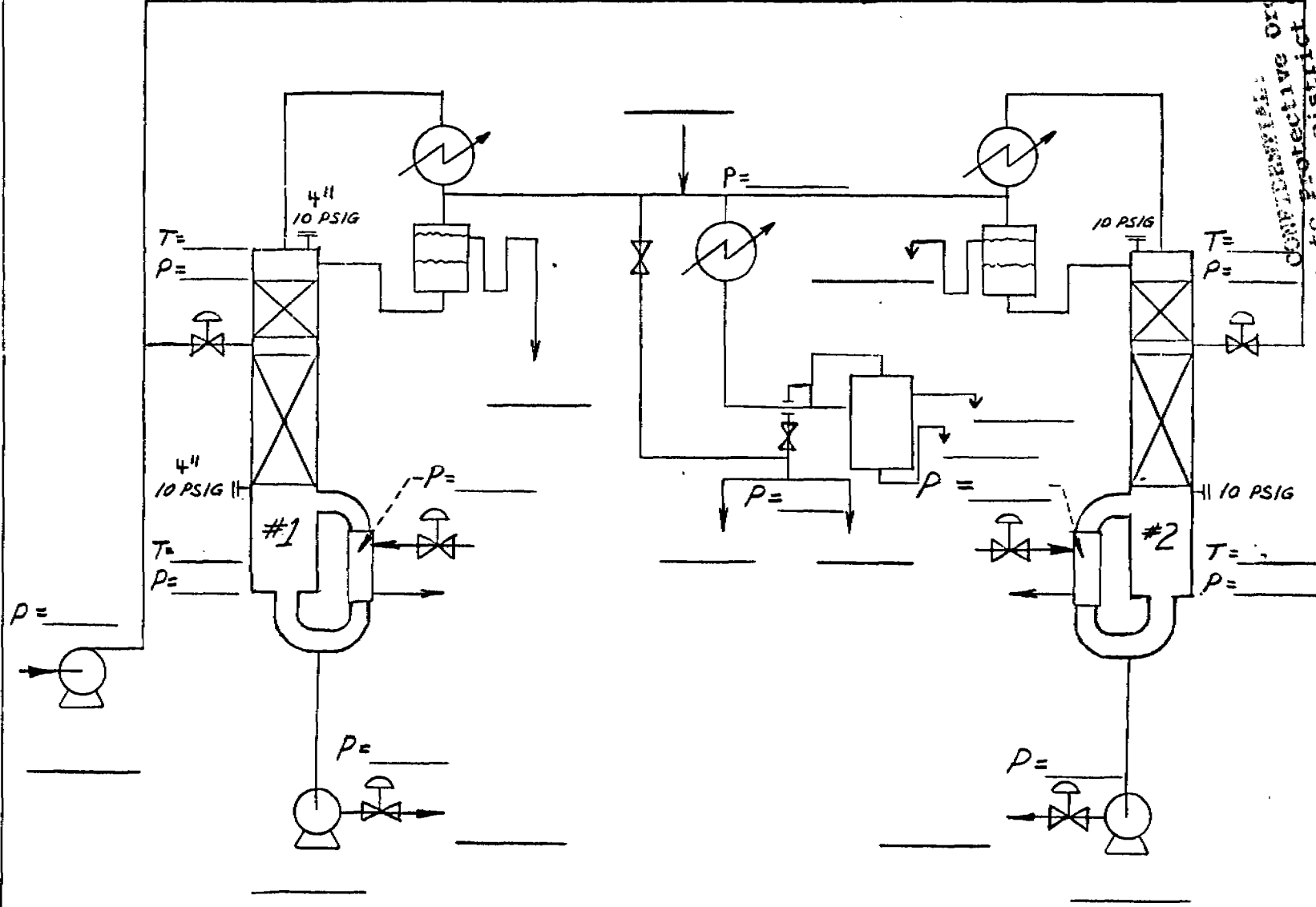


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FEED MANIFOLD TO DH FEED TANKS

SUBJECT #1 & #2 DH STILLs

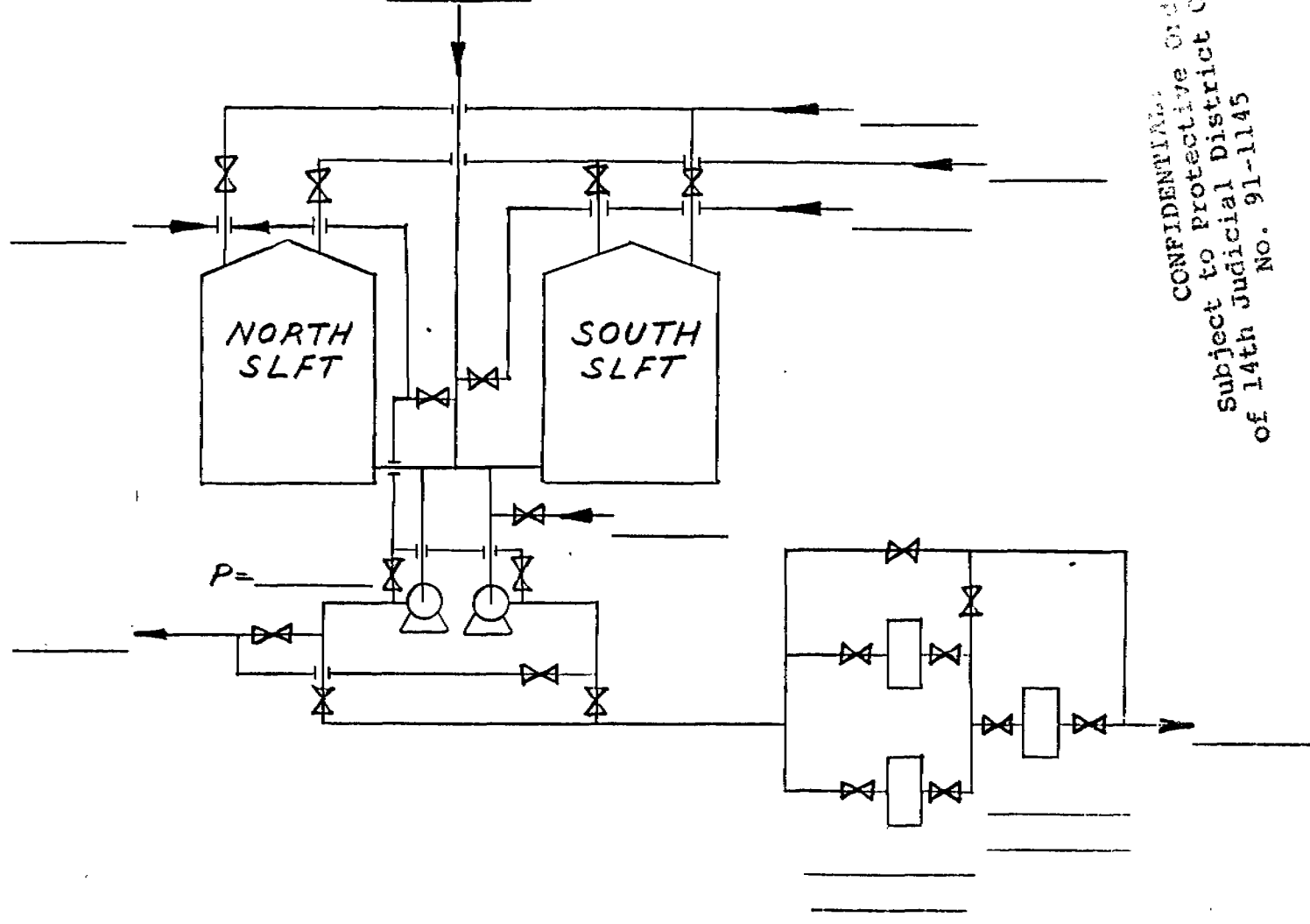


20-30420 spec items

Flow on manual

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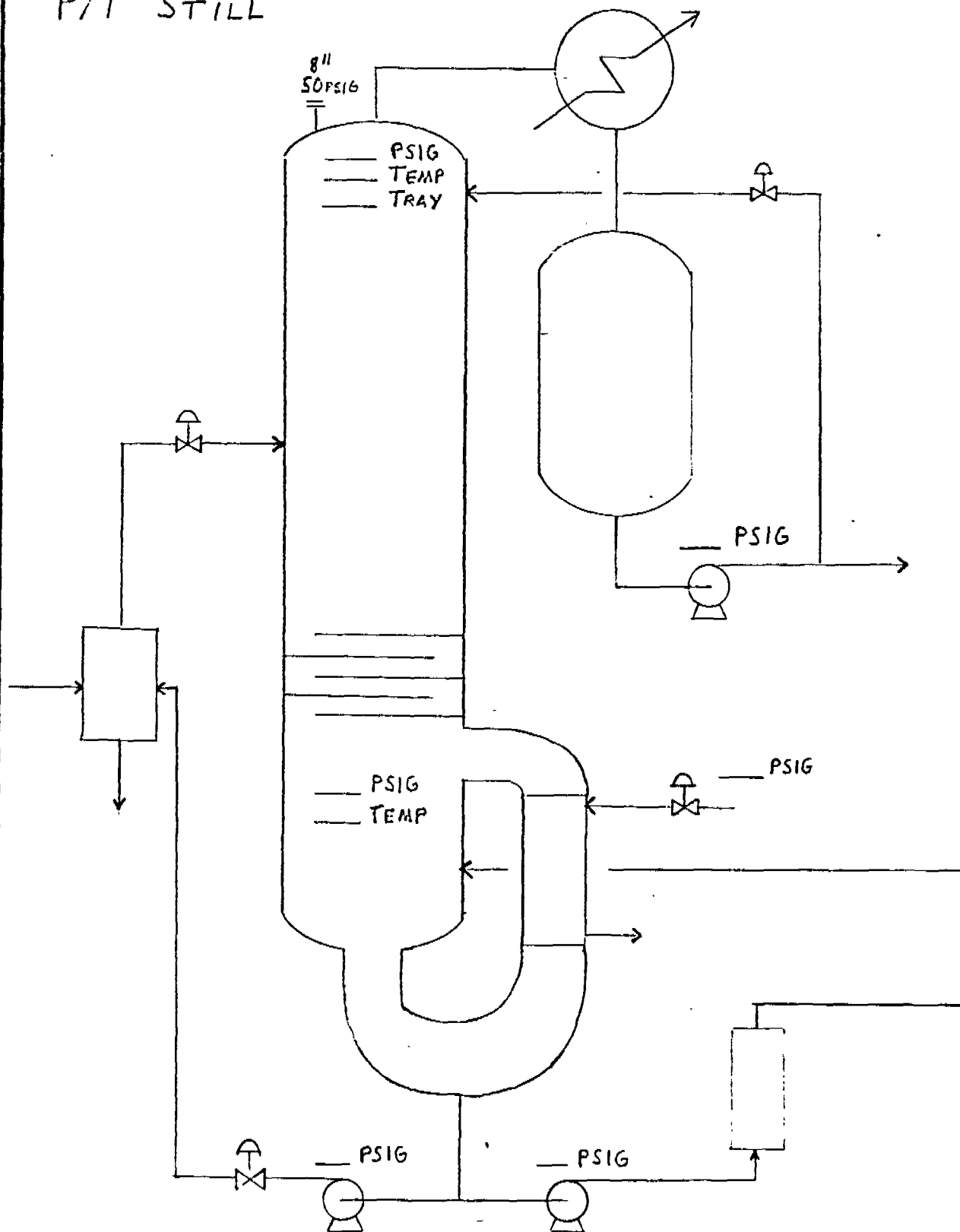
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SUBJECT STILL LINE FEED TANKS

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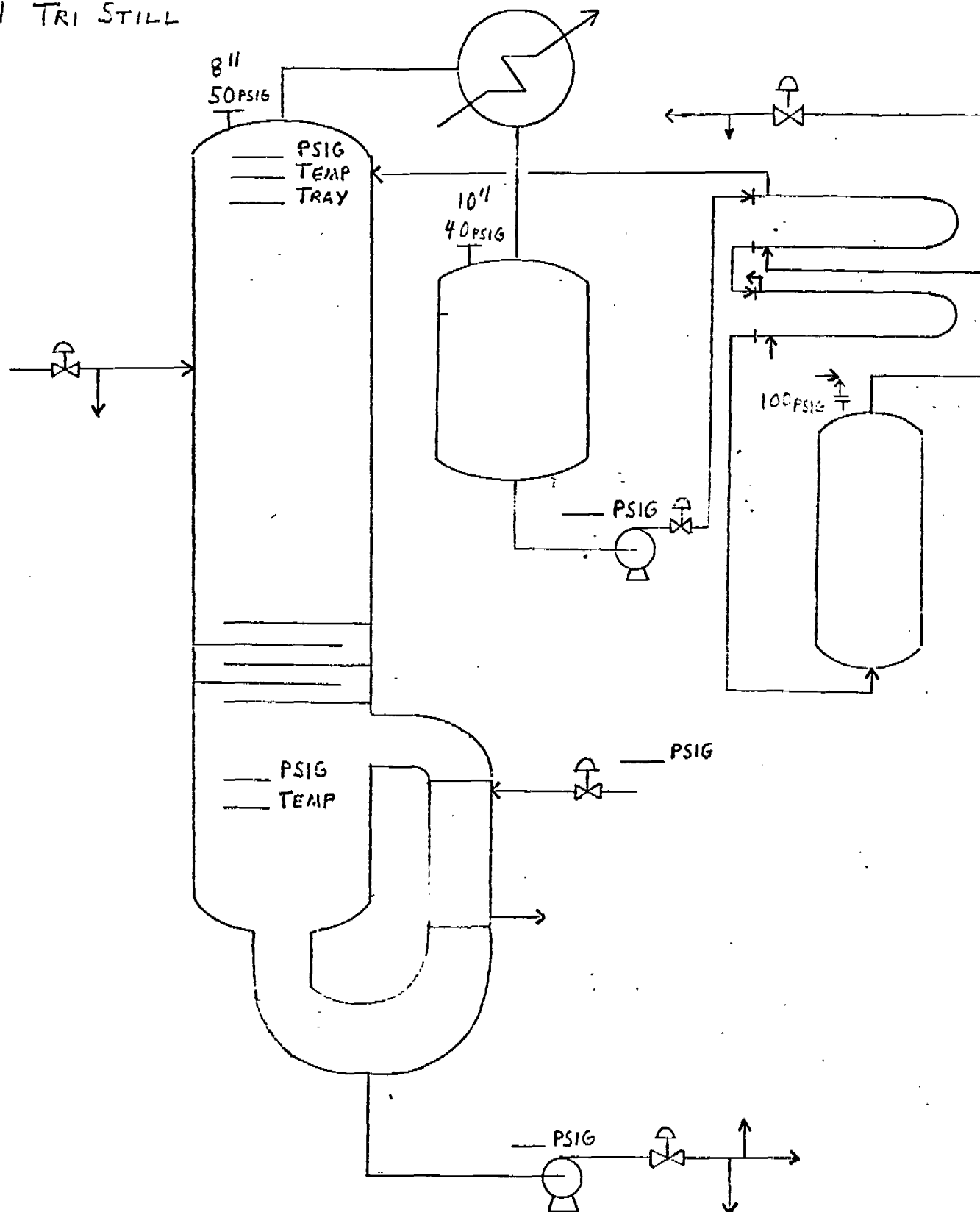
P/T STILL



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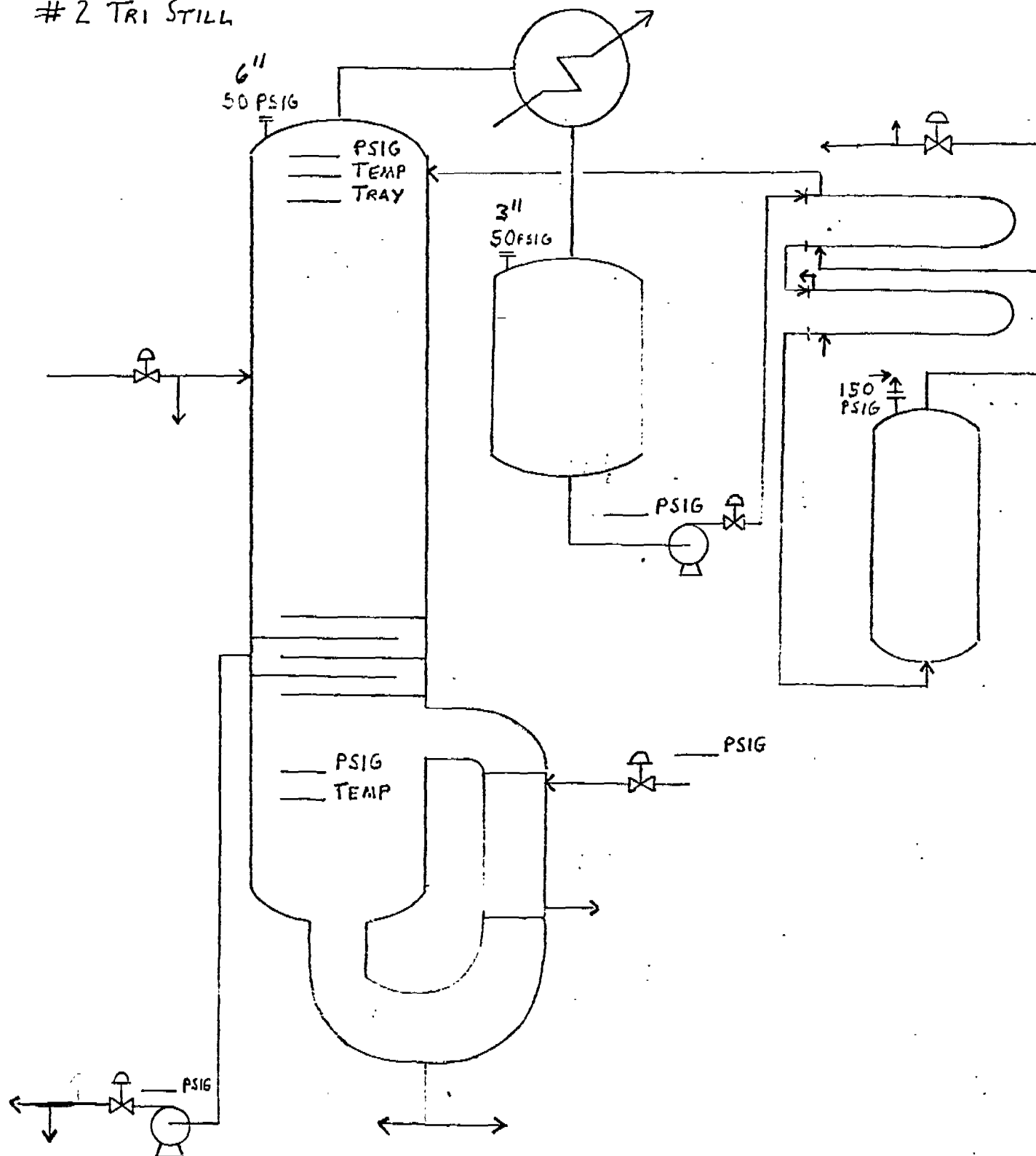
#1 TRI STILL



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2 TRI STILL

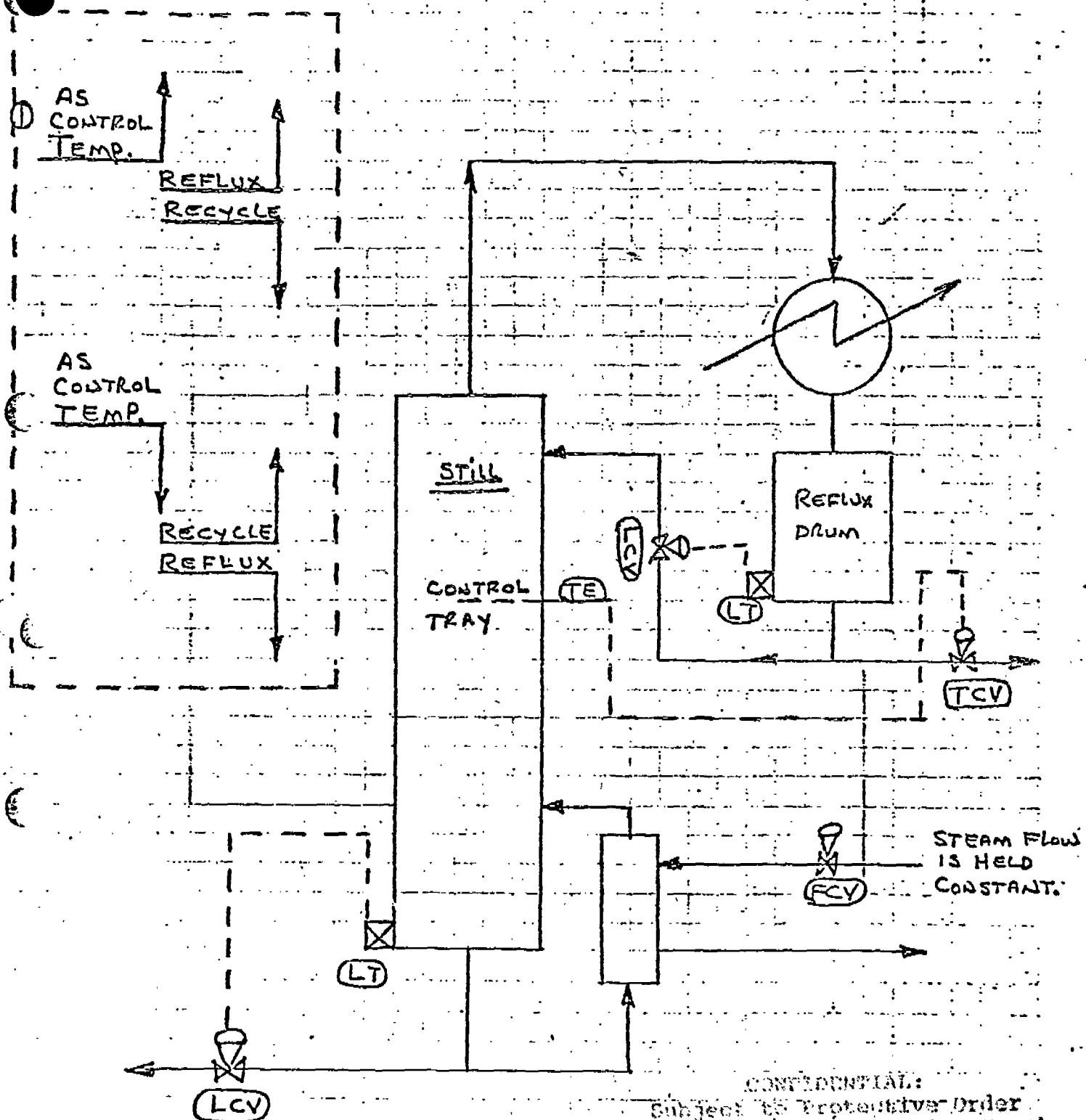


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5-17-77
CLARY

MATERIAL BALANCE CONTROL

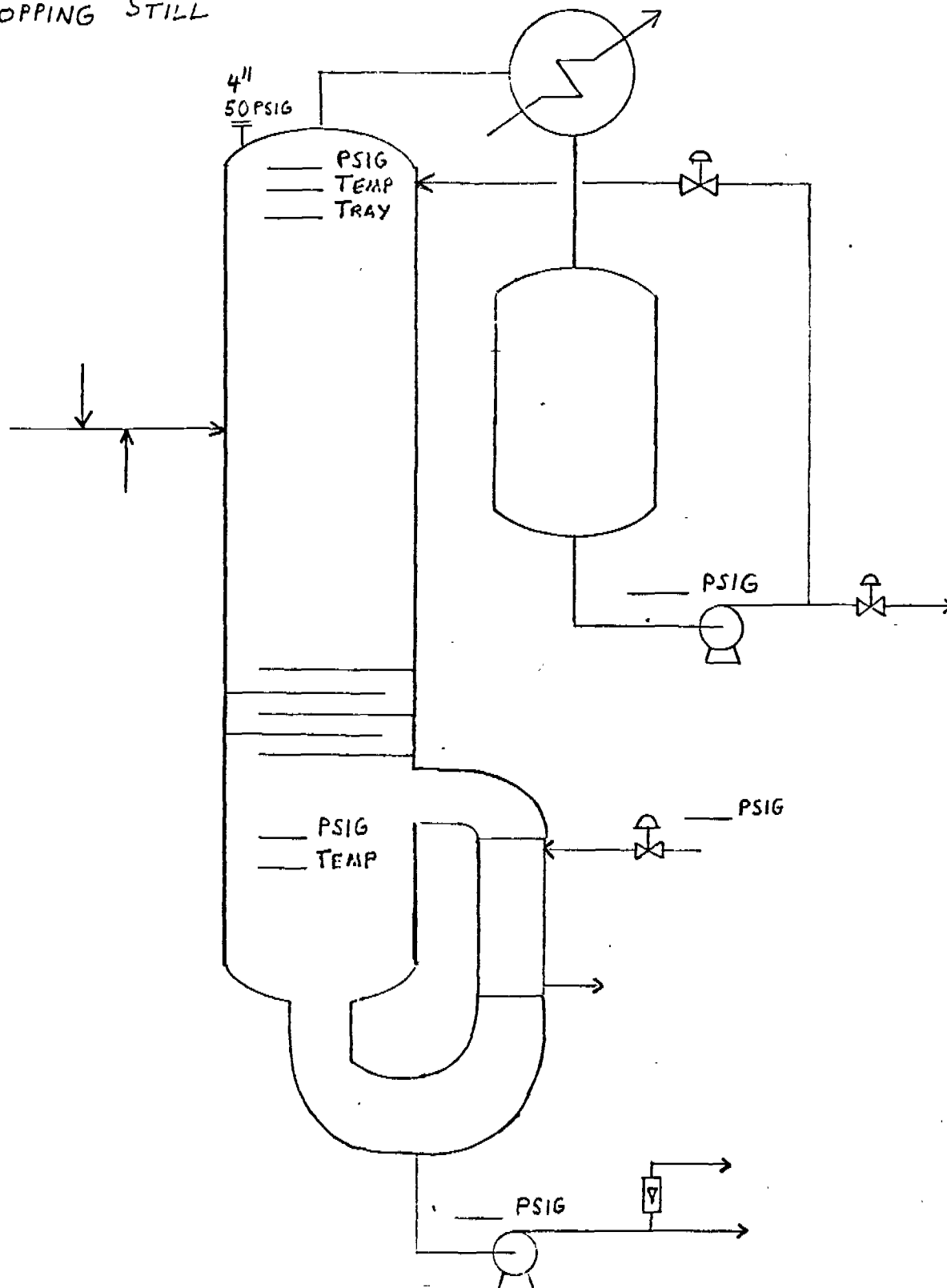


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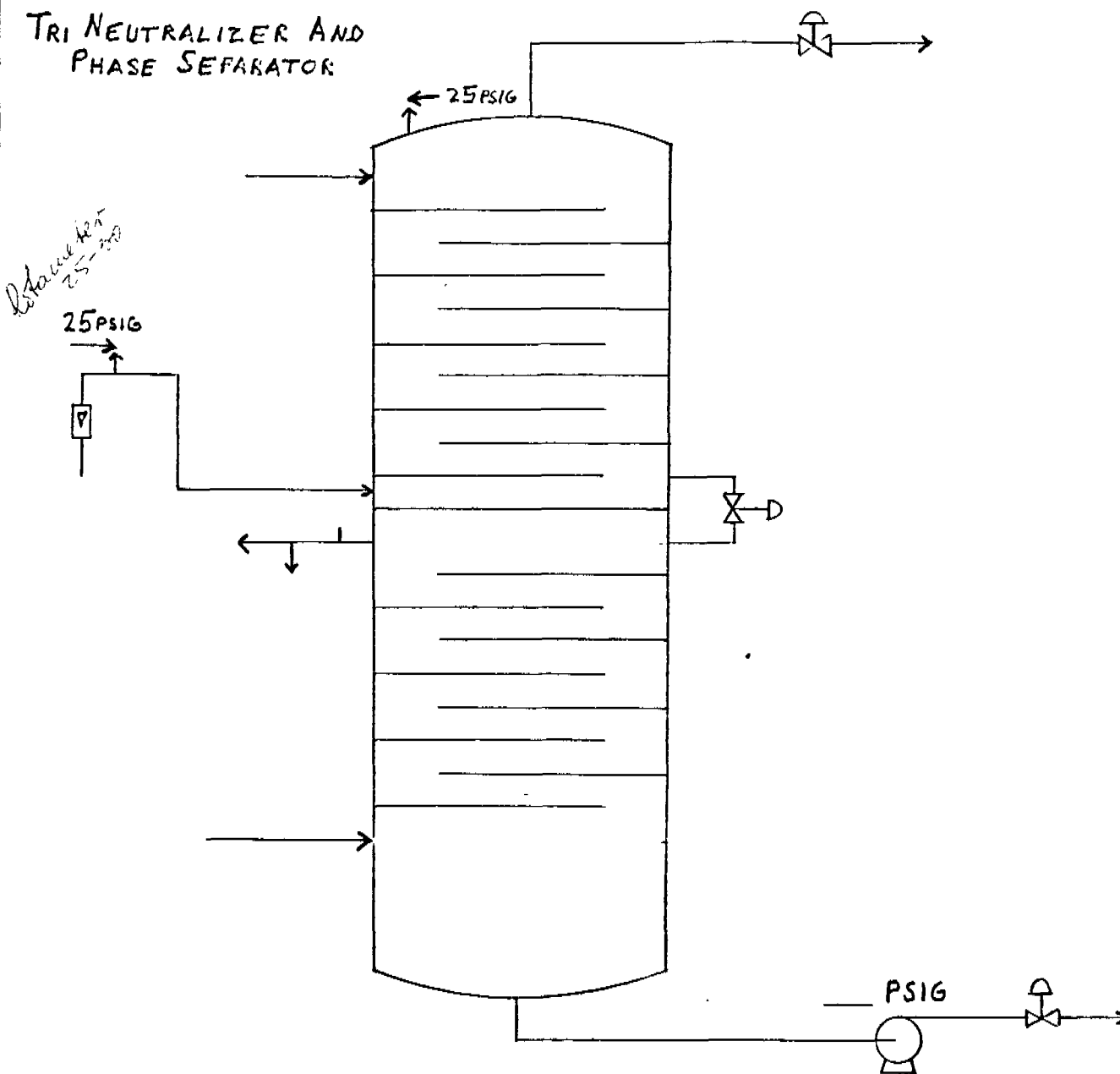
TOPPING STILL



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TRI NEUTRALIZER AND
PHASE SEPARATOR

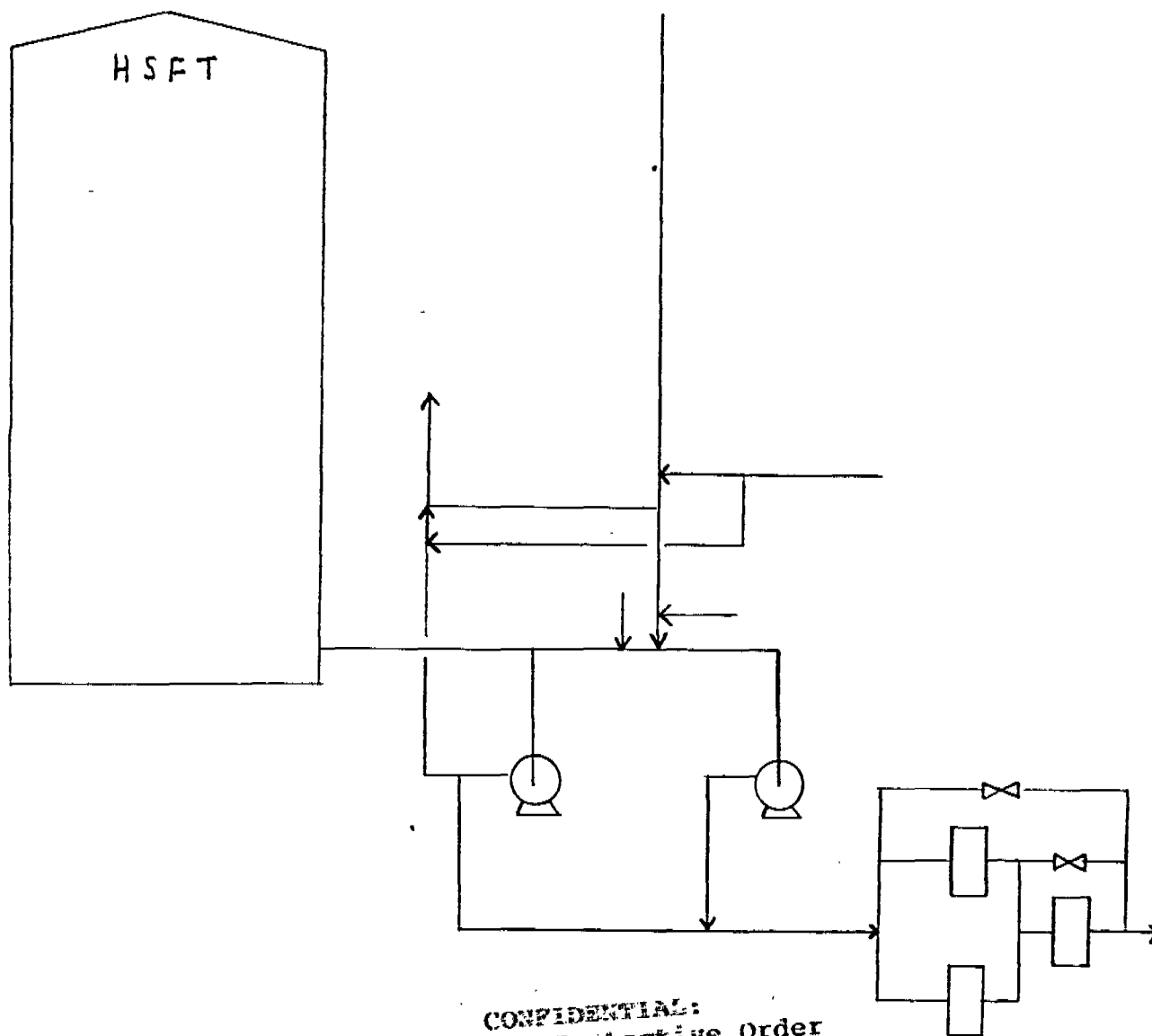


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SL 020132



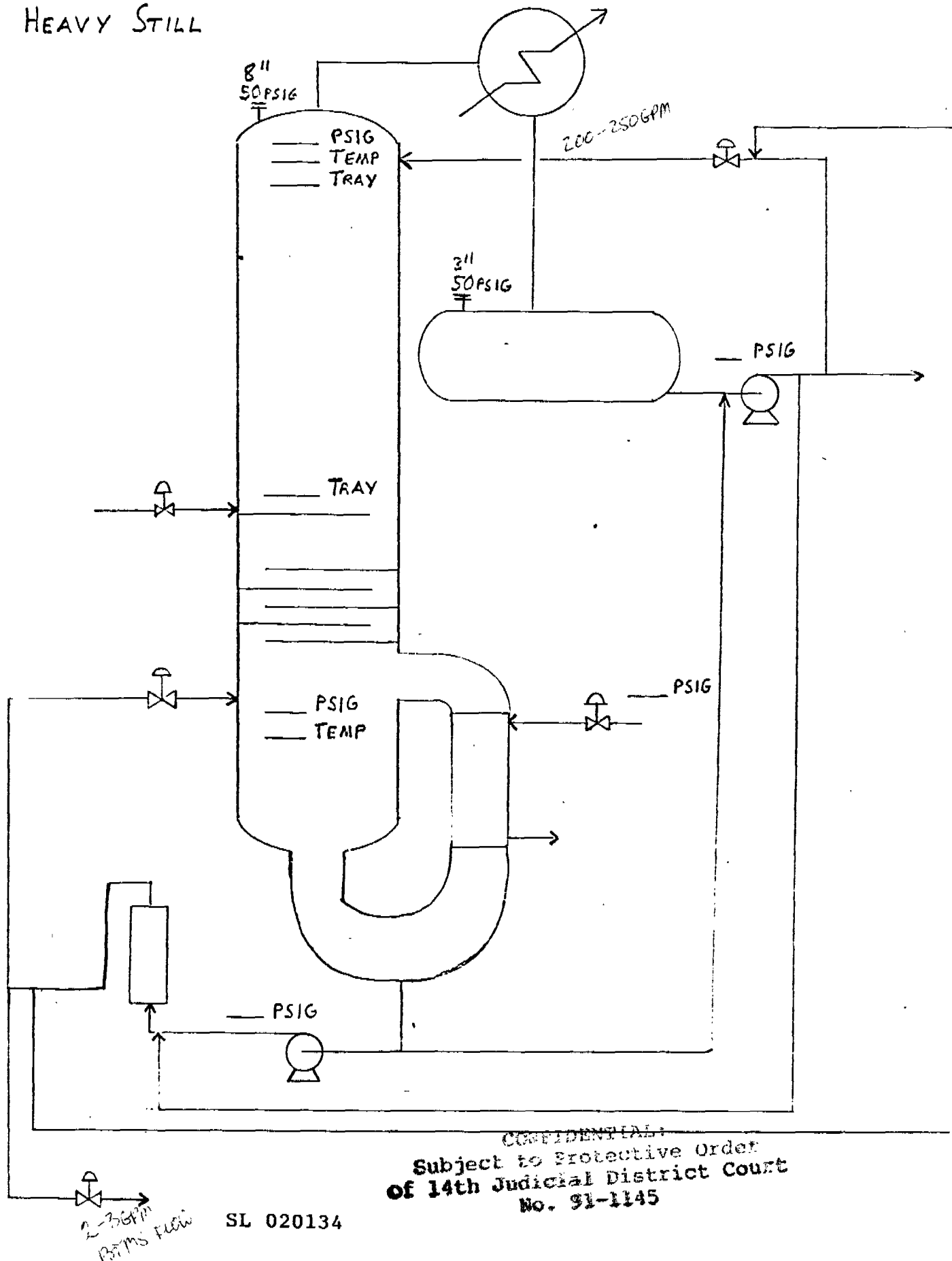
HEAVY STILL FEED TANK



SL 020133

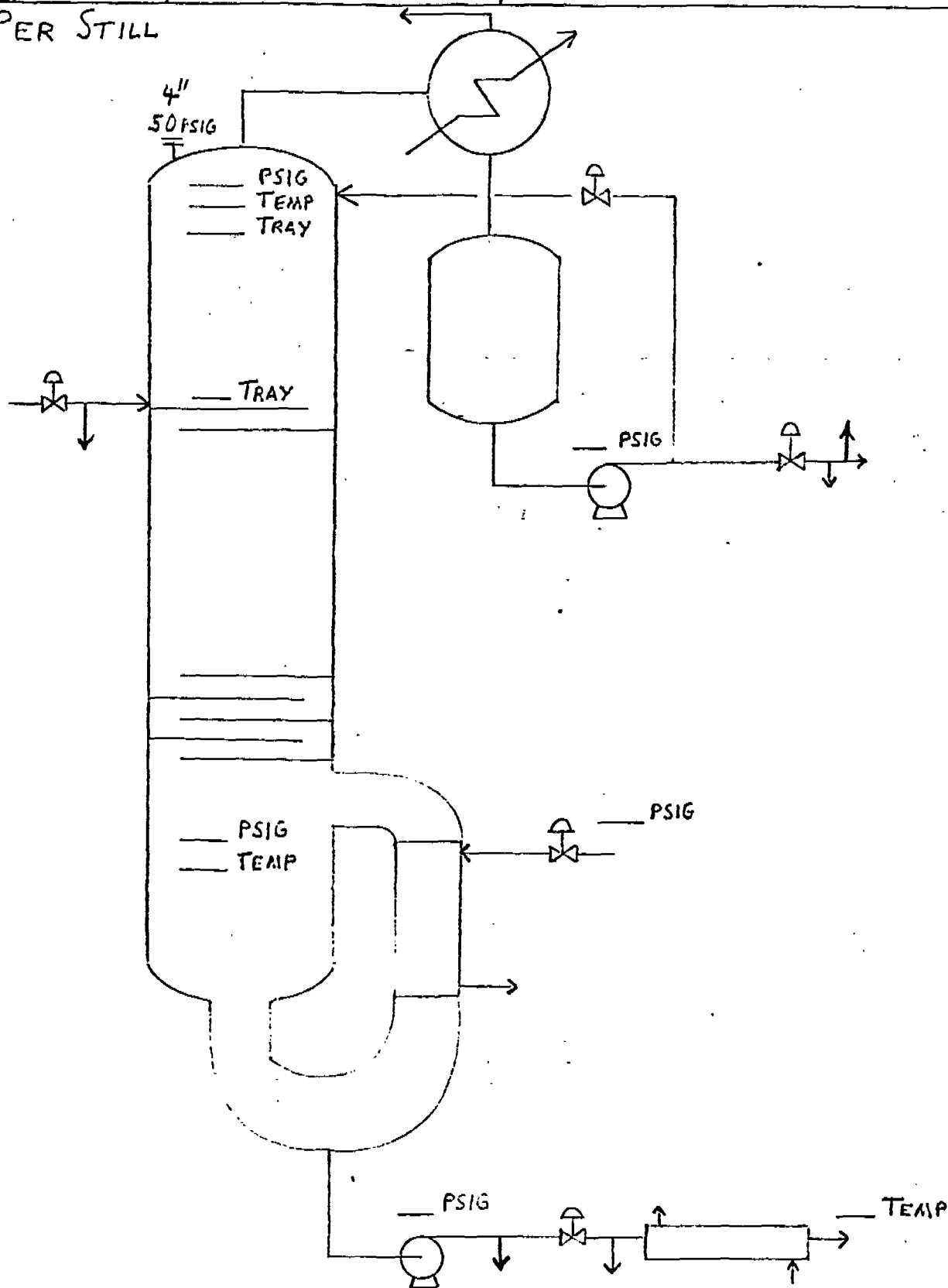
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HEAVY STILL



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1 PER STILL

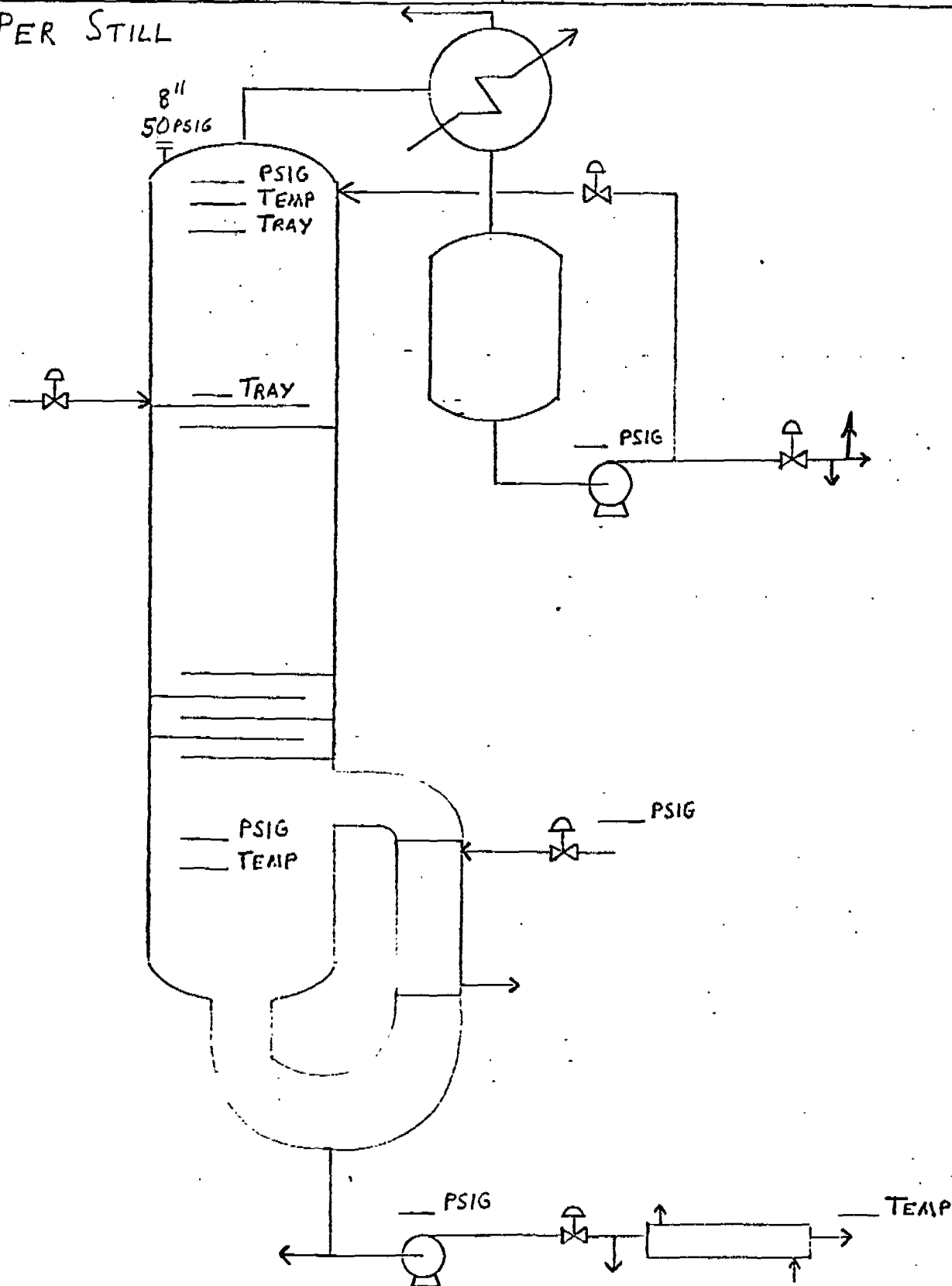


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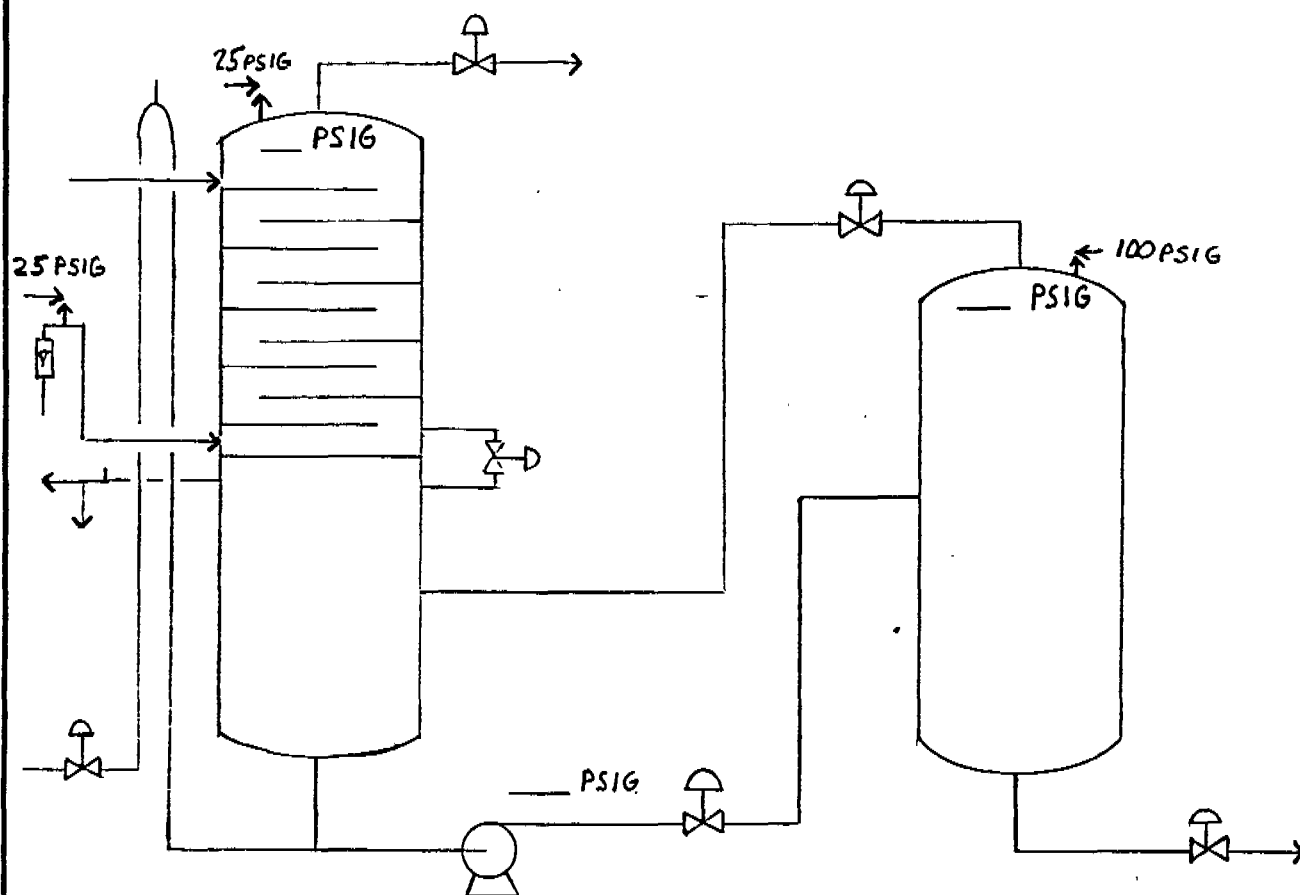
2 PER STILL



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PER NEUTRALIZER AND PHASE SEPARATOR



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STILL LINE RESPONSE TO A POWER FAILURE

Short Duration - Less than one minute

1. Start all pumps which were running before the failure.

These next two will require some operator judgment. You will have to make these decisions based on the severity of the power failure.

2. Put still line on recycle.
3. If incinerators tripped, put DH vents to scrubber.

Long Duration - More than one minute

1. Block off steam to all columns on the board.
2. Put DH vents to the scrubber/put still line on recycle.
3. Open condensate bleeds to the pad.
4. Shut off Betz pumps at starters in the field. These are 110 volt and will come back on automatically when power is restored.
5. Check control board for any control valves which might be leaking by. Isolate these in the field.
6. The heavies still and P/T still will probably pull a vacuum as they cool down. Put N₂ hoses on the columns and maintain positive pressure.
7. Switch to the low pressure condensate header on the P/T and heavies still. Call Tetra and have them do the same for the lights still. Block the outlet block valve on top of the 30 psig flash tank to prevent it from filling up with condensate. It will back fill from the 30 psig steam header.
8. Make sure the EDC addition to the DH bottoms pumps is blocked.
9. Steam will be put on the heavies still first followed by the P/T still. Line up unit to facilitate these startups.
10. Pad out all product driers to SLVRT if it looks like it will be several hours before product will be put forward. Line these up for regeneration.

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