

PROCESS DESIGN

EMISSION RECOVERY SYSTEM REVISION NO. 2

INSTALLATION OF T-701 DRAIN PUMP

MARCH 8, 1979

BY:

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EMISSION RECOVERY SYSTEM REVISION NO. 2INSTALLATION OF T-701 DRAIN PUMPI. PURPOSE OF DESIGN

The purpose of this design is to provide for the adequate draining of the Inlet Knockout Drum in the Emission Recovery System, T-701. Inadequate draining of T-701 will not allow efficient operation of the Emission Recovery System and will result in the automatic shutdown of the system. This design will install a pump to aid in draining the tank when the drain valve opens.

The Emission Recovery System Vacuum Pump, P-704, maintains a 15 in. Hg vacuum on T-701. CV-601 is normally open to allow vapor to enter the system from the Old Reactor Module Blowdown Tank. Normally the Blowdown Tank is maintained at about 10 in. Hg vacuum and 175°F. Water entrained in the vapor entering the Emission Recovery System is condensed in EA-701, the Condenser, and drains into T-701. When the level reaches the middle level switch, CV-701 opens to allow water to drain back into the Old Blowdown Tank. The elevation of T-701 normally gives a sufficient pressure head to cause the water to drain.

Approximately twice per shift the Old Blowdown Tank is stripped to 225°F before being pumped out. During stripping, the pressure on the tank rises to 0-5 psig. When CV-701 opens to drain T-701 during stripping, the pressure head is not large enough to cause the water to drain to the blowdown tank. The level in T-701 then builds up to the High Level Shutdown Switch at the top of the level well, and shuts down the Emission Recovery System. Pressure leaks due to faulty drain valves on the Large Reactor Recovery System or the Recovered VCM Receivers also occasionally pressurize the Old Blowdown Tank, preventing T-701 from draining.

This design will provide a pump that will aid in draining T-701. The pump will supply enough head to drain T-701 to the Old Blowdown Tank even if the Blowdown Tank has up to 30 psig pressure on it.

EMISSION RECOVERY SYSTEM REVISION NO. 2INSTALLATION OF T-701 DRAIN PUMPII. PROCESS DESCRIPTION

Water will collect in the existing Inlet Knockout Drum of the Emission Recovery System, T-701, until the existing middle level switch, LS-701B, is reached. When LS-701B is activated, CV-701, the existing T-701 drain valve, will open to drain liquid to the existing Old Reactor Module Blowdown Tank, and P-701, the new T-701 Drain Pump, will start. When the existing bottom level switch, LS-701A, is reached, CV-701 will close and P-701 will shut off. This cycle will be normally repeated approximately twice per hour. A local switch at P-701 will be installed to allow either automatic or manual operation of the pump.

EMISSION RECOVERY SYSTEM REVISION NO. 2INSTALLATION OF T-701 DRAIN PUMPIII. EQUIPMENT SPECIFICATIONSEQUIPMENT LIST

| <u>Item</u> | <u>Description</u> | <u>Current Conoco No.</u> |
|-------------|--------------------|---------------------------|
| P-701       | T-701 Drain Pump   | 72027                     |

Note: Pump is to be refurbished, and impeller size verified.



## ENGINEERING CENTER

 PONCA CITY, OKLAHOMA  
 SPECIFICATION SHEET

A.F.E. NO.

DATE 2-7-79

W.O. NO.

MADE BY MPB

INO. NO.

APP'D BY

REQ. NO.

B.M. NO.

P.O. NO.

## CENTRIFUGAL PUMPS

 PLANT LOCATION ABERDEEN PVC PROJECT EMISSION RECOVERY SYSTEM REVISION NO. 2  
INSTALLATION OF T-701 DRAIN PUMP

|    |                                                                                                                         |                  |                       |              |                 |                                    |                   |  |  |  |  |
|----|-------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------|--------------|-----------------|------------------------------------|-------------------|--|--|--|--|
| 1  | APPLICABLE TO: ESTIMATE ( ) PURCHASE ( )                                                                                |                  |                       |              |                 | VENDOR                             |                   |  |  |  |  |
| 2  | TAG NO. <u>P-701</u>                                                                                                    |                  |                       |              |                 | MANUFACTURER                       |                   |  |  |  |  |
| 3  | SERVICE <u>T-701 DRAIN PUMP</u>                                                                                         |                  |                       |              |                 | SIZE AND TYPE                      |                   |  |  |  |  |
| 4  |                                                                                                                         |                  |                       |              |                 | STAGES                             |                   |  |  |  |  |
| 5  | MOTOR DRIVE ( <input checked="" type="checkbox"/> ) TURBINE ( )                                                         |                  |                       |              |                 | RPM                                |                   |  |  |  |  |
| 6  |                                                                                                                         |                  |                       |              |                 | ROTATION FACING CPLG.              |                   |  |  |  |  |
| 7  | OPERATING CONDITIONS                                                                                                    |                  |                       |              |                 | EFF.                               |                   |  |  |  |  |
| 8  | LIQUID                                                                                                                  | <u>WATER</u>     | U.S. gpm at PT, NOR.  | <u>30</u>    | RATED <u>30</u> | HYD. H.P.                          |                   |  |  |  |  |
| 9  |                                                                                                                         |                  | DISCH PRESS., psig    | <u>51.66</u> |                 | RATED B.H.P.                       |                   |  |  |  |  |
| 10 | PT F                                                                                                                    | <u>100</u>       | SUCT PRESS., psig MAX | <u>15.46</u> | RATED           | RATED HP DRIVER                    |                   |  |  |  |  |
| 11 | SP GR at PT                                                                                                             | <u>0.973</u>     | DIFF PRESS., psi      | <u>36.20</u> |                 | DIA. IMP.                          |                   |  |  |  |  |
| 12 | VAP PRESS. at PT, psia                                                                                                  | <u>0.95</u>      | DIFF HEAD, ft         | <u>84.21</u> |                 | MAX. DIA. IMPELLER                 |                   |  |  |  |  |
| 13 | VIS at PT, <u>0.652 cp</u>                                                                                              |                  | NPSH AVAIL., ft       | <u>33.75</u> |                 | N.P.S.H. REOD. IN                  |                   |  |  |  |  |
| 14 | CORR/EROS caused by                                                                                                     |                  |                       |              |                 | FT. FLUID PUMPED                   |                   |  |  |  |  |
| 15 | CONSTRUCTION                                                                                                            |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 16 | CASING MOUNTING (CENTERLINE <input checked="" type="checkbox"/> ) (FOOT ) (BRACKET ) (VERTICAL )                        |                  |                       |              |                 | MFRS. BEARING No.                  |                   |  |  |  |  |
| 17 | SPLIT (AXIAL ) (RADIAL )                                                                                                |                  |                       |              |                 | RADIAL                             |                   |  |  |  |  |
| 18 | TYPE (SINGLE VOLUTE ) (DOUBLE VOLUTE ) (DIFFUSER )                                                                      |                  |                       |              |                 | THRUST                             |                   |  |  |  |  |
| 19 | TAPPED OPENINGS (VENT <input checked="" type="checkbox"/> ) (DRAIN <input checked="" type="checkbox"/> ) (GAGE CONNS. ) |                  |                       |              |                 | PACKING OR SEAL                    |                   |  |  |  |  |
| 20 | NOZZLES                                                                                                                 | SIZE             | ASA RATING            | FACING       | POSITION        | FLUSHING, GPM                      |                   |  |  |  |  |
| 21 | SUCTION                                                                                                                 |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 22 | DISCHARGE                                                                                                               |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 23 | MATERIAL CODE-EXTERNAL CASING                                                                                           |                  |                       |              |                 | INTERNAL PARTS <u>DUCTILE IRON</u> |                   |  |  |  |  |
| 24 | I-CAST IRON                                                                                                             | INTERNALS CODE   | I                     | B            | S               | C                                  | SPECIAL MTL. CODE |  |  |  |  |
| 25 | B-BRONZE                                                                                                                | IMPELLER         | I                     | B            | <u>(S)</u>      | C                                  |                   |  |  |  |  |
| 26 | S-STEEL                                                                                                                 | INNER CASE PARTS | I                     | I            | S               | C                                  |                   |  |  |  |  |
| 27 | C-11-13% Cr                                                                                                             | SLEEVE (PACKED)  | Cr                    | Cr           | Al              | Al                                 |                   |  |  |  |  |
| 28 | A-ALLOY                                                                                                                 | SLEEVE (SEAL)    | C                     | C            | C               | C                                  |                   |  |  |  |  |
| 29 | h-HARDENED                                                                                                              | WEAR PARTS       | I                     | B            | Cr              | Cr                                 |                   |  |  |  |  |
| 30 | f-FACED                                                                                                                 | SHAFT            | S                     | S            | S               | S                                  |                   |  |  |  |  |
| 31 | X-                                                                                                                      |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 32 |                                                                                                                         |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 33 | MOTOR DRIVER BY                                                                                                         |                  |                       |              |                 | TURBINE DRIVER BY                  |                   |  |  |  |  |
| 34 | ITEM NO.                                                                                                                | MTD BY           | ITEM NO.              | MTD BY       |                 |                                    |                   |  |  |  |  |
| 35 | <u>BHP 2.7</u>                                                                                                          | <u>RPM 1750</u>  | <u>FRAME</u>          |              |                 |                                    |                   |  |  |  |  |
| 36 | MFR                                                                                                                     |                  | MFR and TYPE          |              |                 |                                    |                   |  |  |  |  |
| 37 | OR COMPANY APPV'D. EQUAL                                                                                                |                  | INLET STEAM, psig     | TEMP F       |                 |                                    |                   |  |  |  |  |
| 38 | TYPE                                                                                                                    | INSUL            | EXHAUST               |              |                 |                                    |                   |  |  |  |  |
| 39 | ENC EXP. P100                                                                                                           | TEMP RISE C      | STEAM RATE, FL        | 10/BHP/HR    |                 |                                    |                   |  |  |  |  |
| 40 | VOLTS/PHASE/CYCLES                                                                                                      |                  | BEARINGS              | LUBE         |                 |                                    |                   |  |  |  |  |
| 41 | BEARINGS                                                                                                                | LUBE             | NOZZLES               | SIZE         | ASA RATING      | FACING                             | POSITION          |  |  |  |  |
| 42 | FULL LOAD AMPS                                                                                                          |                  | INLET                 |              |                 |                                    |                   |  |  |  |  |
| 43 |                                                                                                                         |                  | EXHAUST               |              |                 |                                    |                   |  |  |  |  |
| 44 | REMARKS:                                                                                                                |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 45 | <u>SINGLE MECH SEAL W/ FLUSH.</u>                                                                                       |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 46 | <u>IMPELLER TO BE 9" IMPELLER.</u>                                                                                      |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 47 | <u>USE AN EXISTING MTD. IF ONE IS AVAILABLE.</u>                                                                        |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 48 | PUMP IS TO BE MANUFACTURED IN ACCORDANCE WITH THE FOLLOWING STANDARDS.                                                  |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 49 | <u>APPROX AVS</u>                                                                                                       |                  |                       |              |                 |                                    |                   |  |  |  |  |
| 50 | ( ) INDICATES ITEM CHANGED ON LATEST REVISION.                                                                          |                  |                       |              |                 |                                    |                   |  |  |  |  |

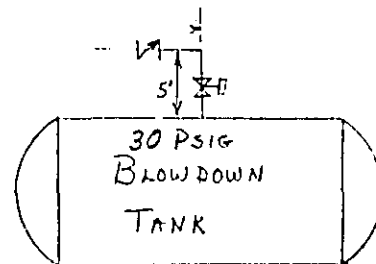
NOTE: THE SOUND LEVELS GENERATED BY THE PUMP AND DRIVER SHALL BE WITHIN THE LIMITS OF THE ATTACHED SPECIFICATION.

 NOTE: EXISTING PUMP CONOCO #72027 COULD BE USED.  
 PUMP WOULD HAVE TO BE REFURBISHED BEFORE  
 INSTALLATION, AND IMPELLER SIZE VERIFIED.

 QUOTATION WILL NOT BE CONSIDERED IF SUPPLIER DOES NOT COMPLETE  
 RIGHT HAND COLUMN.

SHEET \_\_\_\_\_ OF \_\_\_\_\_ REV \_\_\_\_\_

|                |                             |             |    |
|----------------|-----------------------------|-------------|----|
| S. CHECK VALVE | $2 \times 3" \times 11.0 =$ | 66.0        | FT |
| BALL VALVE     | $1 \times 3" \times 0.3 =$  | 0.9         |    |
| PLUG VALVE     | $1 \times 3" \times 1.5 =$  | 4.5         |    |
| TEE (SIDE OUT) | $1 \times 3" \times 5.0 =$  | 15.0        |    |
| 90° ELL        | $6 \times 3" \times 2.5 =$  | 45.0        |    |
| PIPE           |                             | <u>68.0</u> |    |
|                |                             | 199.4       | FT |



PUMP CALCULATION SHEET  
PLANT ABERDEEN PVC  
Job No. Pump No. NP-701  
By: MPB Checked:  
Date 1-18-79 Rev.  
Sketch No.

V.P. Corr. = Orig. Pr - Vapor Pr

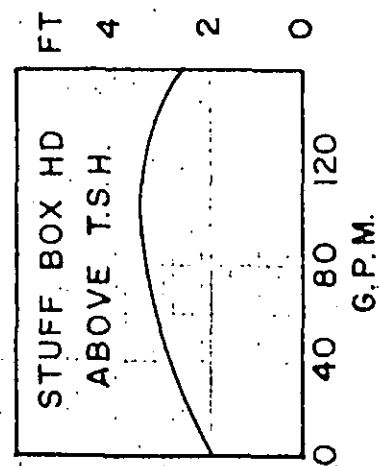
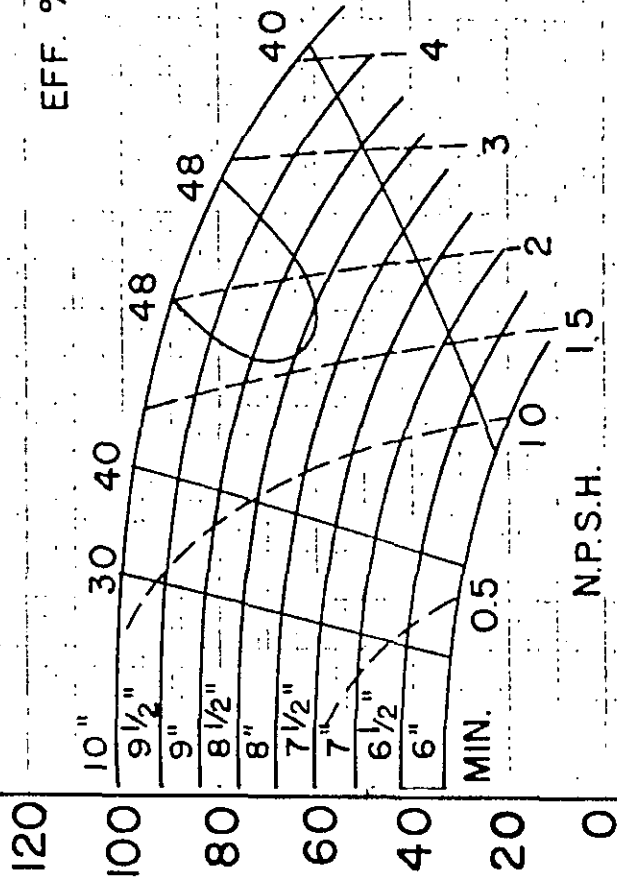
|                                                                                              |                               |                                                                                                                   |  |                                                                                     |  |
|----------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|--|
| <b>THE DURIRON COMPANY, INC.</b><br>DAYTON, OHIO<br>DURCOPUMP PERFORMANCE<br>CHARACTERISTICS |                               | <b>EYE AREA</b> 6.70 SQ. IN.<br><b>MAX. SPHERE</b> 1/2 IN.<br><b>IMP. PATT.</b> CT-22821A<br><b>STD. NO - A50</b> |  | <b>DURCO MARK II</b><br>3 X 1 1/2 - 10<br>SPEED 1750 R.P.M.<br>CURVE NO. MII 7702AV |  |
| <b>B.H.P.</b>                                                                                | <b>T.D.H.<br/>IN<br/>FEET</b> |                                                                                                                   |  |                                                                                     |  |

CURVES SHOW APPROXIMATE CHARACTERISTICS WHEN PUMPING CLEAR WATER

TO CALCULATE EXACT  
EFFICIENCY, USE THE  
FOLLOWING:

$$\% \text{ EFF.} = \frac{\text{TDH} \times \text{GPM}}{\text{HP} \times 3960}$$

EFF. %



0 40 80 120 160 200 12/65

CAPACITY U. S. GALLONS PER MIN.

EMISSION RECOVERY SYSTEM REVISION NO. 2INSTALLATION OF T-701 DRAIN PUMPIV. INSTRUMENT SPECIFICATIONSINSTRUMENT LIST

| <u>Item</u> | <u>Description</u> | <u>Location</u> |
|-------------|--------------------|-----------------|
| PG-710      | Pressure Gauge     | Line 3-HM-811   |



## ENGINEERING CENTER

PONCA CITY, OKLAHOMA

SPECIFICATION SHEET

PRESSURE GAUGES

A F E NO

DATE 2-7-79

W O NO

MADE BY MPB

I I I NO

APP'D BY

R E Q NO

B. M NO

P O NO

PLANT ABERDEEN PVC

PROJECT EMISSION RECOVERY SYSTEM REVISION No. 2

INSTALLATION OF T-701 DRAIN PUMP

| 1  | TAG    |         | INSTRUMENT    | OPERATING   | OPERATING |                   |
|----|--------|---------|---------------|-------------|-----------|-------------------|
| 2  | NO.    | SERVICE | RANGE, PSIG   | PRESS, PSIG | TEMP, OF  | LOCATION          |
| 3  | PG-710 | WATER   | 30" Hg VAC-LO | 0           | 80        | LINE 3-HM-811 (1) |
| 4  |        |         |               |             |           |                   |
| 5  |        |         |               |             |           |                   |
| 6  |        |         |               |             |           |                   |
| 7  |        |         |               |             |           |                   |
| 8  |        |         |               |             |           |                   |
| 9  |        |         |               |             |           |                   |
| 10 |        |         |               |             |           |                   |
| 11 |        |         |               |             |           |                   |
| 12 |        |         |               |             |           |                   |
| 13 |        |         |               |             |           |                   |
| 14 |        |         |               |             |           |                   |
| 15 |        |         |               |             |           |                   |
| 16 |        |         |               |             |           |                   |
| 17 |        |         |               |             |           |                   |
| 18 |        |         |               |             |           |                   |
| 19 |        |         |               |             |           |                   |
| 20 |        |         |               |             |           |                   |
| 21 |        |         |               |             |           |                   |
| 22 |        |         |               |             |           |                   |
| 23 |        |         |               |             |           |                   |
| 24 |        |         |               |             |           |                   |
| 25 |        |         |               |             |           |                   |
| 26 |        |         |               |             |           |                   |
| 27 |        |         |               |             |           |                   |
| 28 |        |         |               |             |           |                   |
| 29 |        |         |               |             |           |                   |
| 30 |        |         |               |             |           |                   |
| 31 |        |         |               |             |           |                   |
| 32 |        |         |               |             |           |                   |
| 33 |        |         |               |             |           |                   |
| 34 |        |         |               |             |           |                   |
| 35 |        |         |               |             |           |                   |
| 36 |        |         |               |             |           |                   |
| 37 |        |         |               |             |           |                   |
| 38 |        |         |               |             |           |                   |
| 39 |        |         |               |             |           |                   |

(1) NOTE: PRESSURE GAUGE TO BE EQUIPPED WITH PRESSURE SNUGGER.

QUOTATION WILL NOT BE CONSIDERED IF SUPPLIER DOES NOT COMPLETE RIGHT HAND COLUMN

SHEET 1 OF 1 REV

Date 2-7-79 Made By MPB  
Project EMISSION ATTENUATION SYSTEM R&Ds  
Plant ABERDEEN PVC  
INSTALLATION OF T-701 DRAIN PUMP

ABD00200499

EMISSION RECOVERY SYSTEM REVISION NO. 2INSTALLATION OF T-701 DRAIN PUMPVI. WORK LIST

1. Install T-701 Drain Pump, P-701. Pump is to be existing Conoco equipment if available. Existing pump Conoco No. 72027 can possibly be used. Pump would have to be refurbished before installation and impeller size verified (see specification sheet included in this design). Motor is to be existing Conoco equipment if available. Motor would possibly need to be refurbished before installation.
2. Tie-in new 3-HM-810-S-A2-3 to existing 3-HM-715-N-A2-3.
3. Tie-in new 3-HM-811-S-A2-3 to existing 3-HM-715-N-A2-3.
4. Install 3" ball valve in existing 3-HM-715-N-A2-3 between new 3-HM-810-S-A2-3 and new 3-HM-811-S-A2-3.
5. Tie-in new 1-WP-812-S-A2-3 to existing 1-WP-754-S-A2-3.
6. Tie-in electrical switch for P-701 to existing LS-701A and existing LS-701B on existing LW-701. Pump is to have a local auto-off-hand switch which will allow pump to be run either automatically or manually. Existing CV-701 is to be tied-in to the local switch so that it will open when the pump is turned on manually. The control valve is to normally be opened by LS-701B in the automatic mode.

EMISSION RECOVERY SYSTEM REVISION NO. 2

INSTALLATION OF T-701 DRAIN PUMP

VII. DRAWING

For P & I Diagram, refer to Drawing No. MS-9226-42-1D,  
Revision No. 8.