conoco

Interoffice Communication

To M. L. Ashby

From P. D. Despres

Date October 18, 1983

Subject VCM-LCCP Low Pressure Steam Transfer
Design No. 192-500-1083-PDD
Review Design
Return Comments by October 20, 1983

The attached review design specifies the installation of a line to transfer excess 250 psig and 150 psig steam from the VCM Plant to the LCCP 25 psig steam header. A 6" line will connect to the VCM Plant's 250 psig and 150 psig vent manifold and to the LCCP 25 psig (LP) steam header at the VCM-LCCP fence line. A flow meter and local chart recorder will be provided to account for the low pressure (LP) steam transferred to LCCP from VCM. The ability to transfer LP steam from VCM to LCCP will increase the overall energy efficiency of the Lake Charles Chemical Complex; the VCM Plant's efficiency will not be affected, but LCCP will benefit from the transfer.

Certain methods of operation at LCCP create a need for LP steam, which is obtained by breaking down 650 psig steam directly from the steam plant. An alternative method of obtaining the LP steam will save LCCP the direct cost of producing that amount of 650 psig steam. The VCM Plant can supply a certain amount of the needed LP steam through the transfer of 250 or 150 psig steam that would normally be vented to the atmosphere. An approximate 36.60MM Lbs./Yr. of steam or 56,287MM BTU/Yr. can be saved by this project, based on a 10,000 Lbs./Hr. transfer for 3,660 Hrs./Yr. An estimate of the construction costs of this project will allow the economics to be completed.

It is proposed that this project be completed on unallocated funds for 1983. By copy of this design to J. R. Holcomb, a preliminary cost estimate is requested for the basis of the economic evaluation. A definitive estimate will be requested upon issue of the final design for the AFE preparation. Please bring or return all comments to me by the review meeting at 12:30, October 20, 1983 (Ext. 5049).

Paul D. Despres
Process Engineer

APPROVED D. L. Davis
D. L. Davis
Sr. Process Engineer

kf
cc: RAC-JWW-JRH(4)-JMT-MLA(4)-MCM
RB-PLF-DLD-SRA-MWC-PE
RJF-JAD-RHG-PDC-GLF-SAR-KC

CCR 000016978

Process Description

This design will connect the VCM Plant's and LCCP's steam systems and allow excess steam from VCM to be consumed usefully by LCCP. A 6" line will tie into the VCM 250 and 150 psig steam vent manifolds and route normally vented steam into the 25 psig (LP) steam header at LCCP. The connection of the two systems will be made at the Plants' boundary line.

There will be no changes in any steam system operations at the VCM Plant; the steam vent valves will be discharging into the LP steam header instead of to the atmosphere. There will be no loss of performance for the PIC-574B (250 psig vent valve), but a decrease in the maximum flow for PIC-575B (150 psig vent valve) from 40,000 Lbs./Hr. to 28,000 Lbs./Hr. will result. The LP steam transfer line will float on LCCP's pressure controller (normal setting is 25 psig) and excess pressure in the system will be vented through LCCP's vent control valve. Emergency overpressure in the VCM Plant's 250 psig and 150 psig steam systems will still be handled by RV's-507 and -508, respectively.

A vortex flow meter (high rangeability, low differential pressure) and circular chart recorder will be installed in the 6" line to measure the quantity of steam transferred to LCCP. A similar flow meter and recorder is installed at LCCP on the LP vent. The VCM Plant will receive a 650 psig credit for the net use of the transferred steam (quantity transferred-quantity vented = amount of credit). LCCP will maintain the meter charts and account for the steam credits. However, the VCM Plant will maintain the equipment.

Design Basis

The success of the Low Pressure Steam Transfer Project depends primarily on the quantity and reliability of the steam transfers from the VCM Plant to LCCP, LCCP's need for LP steam and the VCM Plant's ability to supply it. The occurrence of a substantial VCM steam vent and the reasons for it are briefly explained in the following paragraph. The projects that will create an excess of LP steam in the VCM Plant are also listed. If no excess LP steam is expected to be produced in the VCM Plant during normal operation, these new designs will be evaluated along with this transfer line project in determining the final project jusitifications.

Excess steam has been available at the VCM Plant for the majority of the time since the completion of the Oxy Modernization (average vent = 14,000 Lbs./Hr., July-Sept. 1983). However, much of that availability was due to inefficiencies in the cooling systems throughout the plant. This type of operation was not advantageous to the process and has since been corrected. However, it is expected that summertime cooling loads at maximum production rates will result in steam venting. There are several available designs that can increase the availability of excess steam that can be transferred from the VCM Plant to LCCP. They are:

1. Condensate System Revisions, 2030 Lbs./Hr., 15.56MM Lbs./Yr.
2. Heavy Ends Column Overhead/EDC Recycle Interchanger, 3,500 Lbs./Hr., 26.9MM Lbs./Yr.
3. Steam Generation from Oxy Effluent, 2,800 Lbs./Hr., 21.51MM Lbs./Yr.

These designs will be evaluated for consideration in the final economics for this project.

A need for approximately 10,000 Lbs./Hr. of LP steam is created at LCCP when the Clark air compressor in the Alcohol Plant is shut down at low production rates. The compressor is a turbine driven unit and breaks down 350 psig steam to 25 psig. This need for LP steam is also created by using a steam turbine driven BFW pump at the Steam Plant for a spare and running an electric motor driven pump in its place. One turbine driven BFW pump will always be in operation at the steam plant to provide safe operation in the event of a power failure. Overall steam savings are expected to provide a sufficient project payout in addition to offsetting the incremental electrical energy usage.

The review design has been based on a transfer rate of 10,000 Lbs./Hr. A six inch line will require an 8 psi pressure drop at the design flow rate. A block valve has been provided at the VCM Plant-LCCP boundary limits to isolate the two steam systems. Therefore, the new six inch line in the VCM Plant has been specified for a 300# flange rating in case it is pressured up by the 250 psig steam system. However, the design flowing pressure of the

new line is 33 psig based on an LCCP steam header pressure of 25 psig.

A six inch transfer line is necessary to provide an acceptable pressure drop at a maximum expected flow rate of approximately 20,000 Lbs./Hr. A four inch line would restrict the vent rate and possibly cause the steam system at the VCM Plant to overpressure.

The design steam temperature has been caluclated to be 360°F based on equal flows of 150 psig and 250 psig steam vented into the transfer line. Approximately 80°F of superheat will be provided in the LP steam.

Environmental Impact Statement

This project will have no effect on the environment.

Energy Impact Statement

This project will reduce the Lake Charles Chemical Complex energy consumption by an approximate 56,287MM BTU/Yr. by transfer of excess low pressure steam from the VCM Plant to LCCP and reducing the steam boiler natural gas consumption by 65,442 MSCF/Yr. and increasing electricity consumption by 1,177 MKWH/Yr. The project will reduce the VCM Plant energy consumption by 60,573MM BTU/Yr. based on the 36,600M Lbs./Yr. of 650 psig steam savings. The Process Design Energy Checklist has been completed and is attached.

Safety and Health Impact Statement

This project will have no effect on plant safety. The Process Design Safety Checklist has been completed and is attached.

VCM PLANT

PROCESS DESIGN ENERGY CHECK LIST

DESIGN NO: AL-500-1003-PDD

Legend

✓	Item verified and action taken
OK	Item verified but no action required
NF	Item verified but not economically feasible
____	No action necessary

I. INSULATION

The economical insulation thickness was calculated and specified for the following equipment:

A. Permanent Insulation	Item No./Thickness(inches)			B. Reusable Insulation	Item No./Thickness(inches)		
1. Tank	/	/	/	1. Tank	/	/	/
2. Vessel	/	/	/	2. Vessel	/	/	/
3. Heat Exchangers	/	/	/	3. Heat Exchangers	/	/	/
4. Piping*	SM-1, 3"	/	/	4. Piping*	/	/	/
	/	/	/		/	/	/
	/	/	/		/	/	/
5. Control Valves	/	/	/	5. Instrumentation Flow Meter 3"	/	/	/
6. Process Valves	/	/	/	6. Process Valves 6" gate 3"	/	/	/
7. Piping to and from Steam Traps.	CM-1 1.5"	CM-2 1.5"	CM-3 1.5"	7. Piping to and from Steam Traps.	/	/	/

*Listed is only one line of a set of piping that have the same diameter and contain the same fluid at an identical temperature.

II. TURBINES AND ELECTRIC MOTORS

The design considered the following provisions when specifying the type of drive for the listed equipment.

Equipment Item	Pumps			Compressors		Agitators/ Mixers		Blowers		Fans	
a) High efficiency electric motors											
b) Variable speed and/or variable horsepower motors or turbines in order to provide flexibility during operations at low rates.											
c) Design specifies optimal motor phase and voltage (normal is 3 phase, 440V motors)											
d) Space or coil heaters for motors are included only when necessary.											
e) Steam or gas turbine (instead of an electric motor).											

Items to be considered when specifying a turbine

1. Compatibility with current and projected plant steam balance.
2. Use of exhaust gas or steam in other areas.

CCR 000016983

DESIGN NO: 192-500-1083-PDD

III. ROTATING EQUIPMENT

The design considered the following provisions when specifying the listed equipment.

A. Pumps	Item No.		B. Compressors	Item No.	
1) Use of a pressure system as a viable alternative.			1) Minimum/Maximum flow compatible with varying production rates.		
2) System pressure drop optimized by comparing cost of energy to the cost of the system (piping and equipment).			2) Parallel but different sizes economically feasible to provide flexibility.		
3) A comparison of the turndown vs. minimum flow requirements.			3) Efficiency at the normal flow rate =		
4) Efficiency at the normal flow rate =			4) Efficiency at the minimum expected rate =		
5) Efficiency at the minimum expected rate =			5) Comparison of single versus multi-stage.		

C. Mixers/Agitators	Item No.	
1) High efficiency blades and use of baffles for better mixing.		
2) Economic comparison of a larger size versus multiple mixers.		
3) Use of variable speed mixers		

IV. HEAT TRANSFER EQUIPMENT

The following provisions were considered in the design of heat transfer equipment.

A. General Considerations for All Types of Heat Transfer Equipment	Item No.			
1) Control instrumentation is included to prevent over-heating or over-cooling.				
2) Economics of an in-line spare if an onstream cleaning can not be performed.				
3) Calculating an accurate overall heat transfer coefficient. The HTRI design methods can be used in the calculation.				
4) Variation of the overall heat transfer coefficient versus turndown.				
5) A sufficient allowance for fouling.				
6) Using another process stream as a heating or cooling medium (interchanging).				

B. Reboilers and Steam Heaters	Item No.		C. Coolers and Condensers	Item No.	
1) Compatibility with steam balance			1) Economic comparison of a cooling water exchanger versus an air-cooled exchanger.		
2) Condensate returned to a header			2) Provide the necessary connections to perform an onstream back wash of the cooling water side of the exchanger.		
3) Allowances in the design for use of different pressure steam.					

D. Fired Heaters	Item No.		E. Interchangers	Item No.	
1) Insulating Refractory(Consult with MED)			1) Steam savings must be compatible with the plant's steam balance.		
2) Multi-fuel burners					
3) Preheat of combustion air					
4) Stack gas heat recovery					
5) Stack gas analyzer and/or excess oxygen controller					

DESIGN NO: 192-500-1083-PDD

V. STEAM TRAPS

Refer to Conoco Engineering Standard A-15 for design specifications.

	Item No.			
	ST-1	ST-2	ST-3	
1) Trap sized for proper flowrate and safety factor	✓	✓	✓	
2) Condensate is to be returned to the return system when economically feasible.	NF	NF	NF	
3) P&I notes for discharge piping into the top of the return header.	NF	NF	NF	
4) A three way test valve is to be installed downstream of traps discharging to a return header.	NF	NF	NF	

VI. MONITORING INSTRUMENTATION

The following items are necessary in order to monitor the energy usage of the designated item.

A. Heat Exchanger Number _____ _____ _____

1) Shell and tube side inlet and outlet temperatures. _____ _____ _____

2) Steam side pressure. _____ _____ _____

3) Steam flow meter. _____ _____ _____

B. Pump Number _____ _____ _____

1) Suction and discharge pressure gauges. _____ _____ _____

2) Outlet flow meter _____ _____ _____

C. Compressor Number _____ _____

1) Inlet pressure and temperature gauges for each stage. _____ _____

2) Discharge pressure and temperature gauges. _____ _____

3) Inlet flow meters for each stage _____ _____

4) Discharge flow meter. _____ _____

5) Recycle flow meter. _____ _____

D. Turbine Number _____ _____

1) Inlet pressure and temperature gauges. _____ _____

2) Outlet pressure and temperature gauges. _____ _____

VII. MAINTENANCE CONSIDERATIONS

A. Equipment Preparation for Maintenance Work

OK Procedures are included for the most efficient method of emptying, clearing, purging, and/or regenerating process equipment included in the design.

B. Maintenance

OK All preventive maintenance items that contribute toward maintaining the maximum efficiency of the process equipment are noted.

VIII. GENERAL

The following items should be considered for all designs.

A. Operating Procedures

_____ Normal operating procedures are included that note in detail those items which must be followed in order to achieve maximum energy efficiency.

_____ Supplemental operating procedures are included for maximum energy efficiency for operations at below normal rates or any other special conditions such as startups, shutdowns or abnormal operations.

B. Relief Valves

_____ Discharge of relief valves are returned to process or a collection vessel for product recovery.

C. Impact

_____ Installation of the project impacts energy consumption of existing plant equipment.

DESIGN NO: 92-500-1083-PPD

IX. ENERGY IMPACT STATEMENT

The following is a procedure for calculating the energy savings or usage of the project on the CMA Basis.

A. Steam

1) The amount of steam that is saved (used) by the project and its pressure = 36.6 MM Lbs/Yr
= 600 psig

2) From the plant steam balance the equivalent 600 psig steam savings (usage) 36.60 MM Lbs/Yr.

3) CMA Energy factor for steam. x 1655 BTU/Lb.

4) Total CMA Energy for steam saved (used). 60573 MM BTU/Yr. (1)

B. Electricity

1) The electricity saved (used) by the project. _____ MM KWH/Yr.

2) CMA Energy factor for electricity. x 10,000 BTU/KWH

3) Total CMA Energy for electricity saved (used). _____ MM BTU/Yr.

C. Natural Gas

1) The natural gas saved (used) by the project. _____ MM SCF/Yr.

2) CMA Energy factor for natural gas. x 1,040 BTU/SCF

3) Total CMA Energy for natural gas saved (used). _____ MM BTU/Yr.

D. Product Recovery and Loss

1) Additional VCM saved (lost) _____ MM Lbs/Yr.

2) Energy factor for VCM (obtain from energy coordinator) x _____ BTU/Lb. VCM

3) Energy saved (lost) due to VCM savings (losses). _____ MM BTU/Yr.

4) Additional EDC saved (lost). _____ MM Lbs/Yr.

5) Energy factor for EDC (obtain from energy coordinator). x _____ BTU/Lb. EDC

6) Energy saved (lost) due to EDC savings (losses). _____ MM BTU/Yr.

7) Additional HCl saved (lost). _____ MM Lbs./Yr.

8) Energy factor for HCl. 2681.1 BTU/Lb. HCl

9) Energy saved (lost) due to HCl savings (losses). _____

10) Total energy saved (lost) due to product recovery (loss). _____ MM BTU/Yr.

E. Summary

1) Total net savings (usage). Sum of lines A-4, B-3, C-3, and D-10. 60573 MM BTU/Yr.

2) Equivalent 1972 CMA energy usage based upon production of 670MM Lbs. VCM/Yr, no incremental EDC and no HCl sales. + 3,434,621 MM BTU/Yr.

3) Fractional decrease (increase) in energy consumption on the CMA Basis. x 100%

4) Percent decrease (increase) in energy consumption on the CMA Basis. 1.76 %

NOTES:

1. Actual Chemical Complex savings are 56,287MM BTU/Yr. based on savings of 65,442 MSCF/Yr. of natural gas and increased electricity consumption of 1,177 MKWH/Yr. at the Steam Plant.

VCM PLANT

PROCESS DESIGN SAFETY CHECK LIST

DESIGN NO: 97-500-1083-PDD

LEGEND

✓ Item verified as stated and specified action taken
OK Item verified but no action required
____ No action taken

I. OVERPRESSURE PROTECTION

A. Overpressure Design Basis

Overpressure protection was designed for the listed equipment for the condition(s) indicated below:

Pressure Vessels	Item No.		Exchangers	Item No.	
1. Blocked Valve			1. Blocked Valve - Cold Fluid Vaporization		
2. Cooling Water Failure			2. Blocked Valve - Cold Fluid Expansion		
3. Instrument Failure			3. Tube Rupture		
4. External Fire			4. External Fire		
5. Other (Specify)			Protection by RV-No. (Tube Side)		
Protection by RV-No.			Protection by RV-No. (Shell Side)		
Alternate Protection Noted Below			Alternate Protection Noted Below		

Rotating Equipment	Item No.		Piping	Line No.
Blocked Discharge Valve			Blocked In Line	6"SM-1
Positive Disp. Pump			Vaporization	OK
Positive Disp. Compressor			Thermal Expansion	
Steam Turbine			Protection by RV-No.	RV-507 CU508
Protection by RV-No.				

B. Relief Valves

Relief valves and inlet and outlet piping specifications were checked for the following conditions:

Relief Valve Number								
1. Liquid Flashing								
Effect on Valve Capacity								
Design Temperature								
2. Discharge Back Pressure								
3. Inlet Line Losses--Friction & Acceleration ΔP								
--Notes Included for Max. Length								
4. Inlet & Outlet Piping--Free Draining or Drain Valve Included								
5. Upstream Rupture Disc If In VOC Service								

II. VESSEL CLEARING

A. Clearing Connections

The design includes the following provisions for the clearing of equipment containing toxic or regulated vapors and liquids.

	Vessels			Exchangers		Pumps			Others		
Equipment Item											
Contents											
Permanent Piping for:											
1. Liquids to Closed Process Sewer											
2. Vent to Direct Chlorination Header											
3. Vent to Wet Vent Header											
4. Vent to Relief Vent Header											
5. Return to Process											
Connections for Temporary Hoses											
Isolation Capabilities for Clearing											
Bleeders for Clearing/Draining/Purging											

CCR 000016987

REV.1 - 3/81

REV.2 - 3/82

DESIGN NO: 192-500-1083 PDD

B. Prevention of Backflow

Protection against backflow in nitrogen connections used for clearing equipment and process lines has been provided in the design and listed below:

Equipment Item	Vessels	Exchangers	Pumps	Others
1. Check Valve in Permanent N_2 Line				
2. Hose Connection with Check Valve				
3. System Pressure <40 psig, Hoses to be Disconnected After Purge				

III. MECHANICAL & MAINTENANCE CONSIDERATIONS

A. Plant Design Standards are more restrictive than company standards in several areas. The design includes notes and specifications as required for the following items:

1. Gaskets

	Gasket Per Plant Standard	Piping Description	Applicable Piping Specifications
✓	Garlock 900 Round	CS, SS, Nickel, Monel Piping	A2-1, A2-7, A10-1, A13-4, A20-1, A21-1, B2-1, B2-12, B13-1, B13-3
	Flexitallic Spiral Wound	Steam & Condensate Service	A2-3, B2-6, D2-5, D2-6
	TFE Envelope - Ring Gasket	Lined Piping	X25-2, X26-2, X27-1
	TFE Envelope - Full Face	FRP & Furan	R37-1, R37-3

2. Materials of Construction--Design notes have been included for:

_____ Electric driven equipment specifying no bare aluminum parts.
_____ Dry chlorine piping (B2-12 Spec.) specifying CS valves with Hastelloy C trim.
_____ Minimizing copper or copper alloys in possible contact with acetylene.

B. Rotating Equipment

The following pumps, compressors, blowers, and agitators have been checked for the following requirements and the required specifications and notes have been included in the design.

Equipment No.				
Minimum Flow Requirements				
Shaft Seals--Type & Required Lubr./Flush				
Seal Vent System to Incinerator If In VOC Service				

C. Tie-in Points

OK Design includes note(s), to specify which (if any) tie-ins(s) to existing equipment or piping are turnaround items.

D. Preventive Maintenance

_____ Design includes notes on any new equipment that requires special PM to ensure safe operation.

CCR 000016988

REV.1 - 3/81
REV.2 - 3/82

DESIGN NO. 192-5110-1083-PDD

IV. PERSONNEL EXPOSURE & PROTECTION

A. Employee Exposure

_____ Design includes provisions where required to ensure that during normal operations, clearing for maintenance, or maintenance activity employee exposure is within regulations.

B. Handling of Hazardous Materials

_____ Design includes provisions for safety equipment (fire extinguishers, deluge systems, safety shower and eyewash stations, fresh air systems, etc.) where required.

C. Personnel Protection Insulation

OK Design includes specifications for insulation on hot lines (>150°F) where personnel protection is necessary.

D. Accessibility of Valves & Instruments

✓ Notes have been included to ensure that valves, instruments, motors, etc. are accessible from grade or platform to permit operation and maintenance where required.

E. Noise Limits

_____ Specifications have been included for equipment where required to ensure meeting noise limits as set by Standards H-7 (control valves) and X-5 (general) or 85 dB.

F. Spill Containment & Control

_____ Design includes provisions where required for spill containment and control such as diked areas, piping to process sewers, etc.

G. Lighting for Night Operations

_____ Design includes provisions for adequate lighting for night operations where required.

H. Communications System

_____ Design includes provisions for additional communications system lines as necessary.

REV.1 - 3/81
REV.2 - 3/82

DESIGN NO. 192-500-1053-PDD

V. PREVENTION OF POTENTIAL HAZARDS

A. Emergency Shutdown Requirements

Design specifications, considerations, and notes have been made as necessary for the following items:

_____ 1. Control valve failure position in event of air and/or electrical loss has been noted on spec. sheet and P&I.
_____ 2. Spare equipment has been provided as needed and verified with Operations.
_____ 3. Required alarms and their set points have been confirmed with Operations.
_____ 4. Consideration has been given to make the system failsafe, including automatic shutdown sequences and system interlocks where feasible.

B. Fire Prevention and Protection

The following items have been checked and specifications or notes included as required:

_____ 1. System flammability (both process streams and materials of construction) under normal and upset conditions.
_____ 2. Provision for inert or nonflammable atmosphere such as nitrogen blanketing or purging.
_____ 3. Need for flame arrestors to prevent flashbacks.
_____ 4. Need for additional fire protection systems such as sprinklers, types of extinguishers, etc.

C. Electrical Grounding/Bonding

_____ Design has been checked and specifications and/or notes included where necessary for the electrical grounding/bonding of vessels, pumps, and piping to dissipate build-up of static charge.

D. Locked or Chained Valves

_____ Notes have been included on the P&I for valves that must be locked or chained opened or closed for safety reasons.

E. Chemistry of Mixing Streams

_____ Design includes provisions, operating procedures, or notes as required to ensure that no chemical reactions which could create a potentially hazardous situation will occur as a result of mixing two or more process streams.

F. Minimum Clearances

_____ Design includes provisions or notes as required to ensure equipment and piping clearances meet with Standard X-3 or special plant requirements and that no pinch points exist where valves must be opened and closed.

REV.1-3/81
REV.2-3/82

WORK LIST

Refer to Drawing No. VCM-192-500-1083-PDD.

1. Tie in line 6"-SM-1-H-B2-6 to the 250 psig vent manifold between the vent control valve, PIC-574B and the vent stack. Refabricate the vent manifold and install a 6" gate valve and bleeder between the tie-in and the vent stack. Insulate the lines. The line steam system must be blinded for this tie-in.

2. Tie-in line 6"-SM-1-H-B2-6 to the 150 psig vent manifold between the vent control valve, PIC-575B and the vent stack. Refabricate the vent manifold and install a 6" gate valve and bleeder between the tie-in and the vent stack. Include a pressure gauge and bleeder and a temperature gauge and thermowell in the line. Include expansion loops as needed. Insulate the line. The live steam system must be blinded for this tie-in.

3. Tie-in line 6"-SM-1-H-B2-6 to the LCCP 6" low pressure vent header at the boundary limits. The pipe spec changes at this point from 300# (B2-6) to 150# (A2-3). Insulate the lines.

4,5,6. Tie-in lines 3/4"-CM-1,2,3-H-B2-6 to line 6"-SM-1 approximately every 200 linear feet. Extend the lines to grade and install a 3/4" block valve, a 3/4" "Y"-strainer and a steam trap. The steam trap will discharge to grade. Insulate the lines.

7. Install the flow meter and local flow recorder, FR-1 in the line upstream of the last block valve at the VCM Plant boundary.

Conoco Inc.
Engineering Center
Ponca City, Oklahoma

Flow Instruments

SPECIFICATION SHEET
PROJECT NO. A2-500-1083-PDD
A.F.E. NO. ____
REQ. NO. ____
DATE 10/4/83 APP'D BY ____
MADE BY PDD

PLANT Lake Charles VCM PROJECT VCM-LCCP Low Pressure Steam Transfer

GENERAL	1	TAG NO.			FE -1				
	2	SERVICE			Low Pressure Super-				
	3				heated Steam				
	4	INSTRUMENT TYPE			Vortex Flowmeter (3)				
	5	LOCATION			6"-SM-1-H-B2-6				
	6				Transfer Line				
ELEMENT	7	TYPE			—				
	8	LOCATION			—				
	9	LINE SIZE, IN.	SCHEDULE		6	40			
	10	BORE, IN.			—				
	11	RANGE, IN. H_2O			—				
	12	METER FACTOR			(1)				
	13	MATERIAL			(316) S.S.				
	14	TRANSMITTER: PNEU OR ELECT.			Electric to				
	15				Recording Circuit				
VALVE METER	16	TYPE							
	17								
	18	LOCATION							
	19	MATERIAL: BODY	~~TRIM~~		S.S. (2)	—			
	20	SIZE: BODY	~~PORT~~		6"	—			
	21	~~NUMBER OF PORTS~~			—				
	22	~~PLUG FORM~~			—				
	23	ΔP: MIN.	NORM.	MAX.			<1.0		
	24	CALC. CV — NORMAL FLOW		MAX. FLOW	—	—			
	25	VALVE CV — FULL OPEN			—				
	26	FAILURE POSITION			—				
	27	MAX. SHUT-OFF ΔP, PSIG			—				
	28	DESIGN PRESSURE			—				
	29								
VALVE METER SERVICE CONDITIONS	30	FLUID (NOTE LIQ/VAP)			Superheated Steam				
	31	TEMP. °F: NORM.		MAX.	360	433			
	32	PRESSURE, PSIG Norm.		Max.	33	270			
	33	°API (MW)			—				
	34	SP GR AT STD. COND.			—				
	35	~~SP GR~~ AT T&P Density, lb./ft³			0.110				
	36	VAPOR PRESS. AT T, PSI			155				
	37	CP/CV AT T&P	COMPRESSIBILITY		1.3	—			
	38	VISCOSITY AT T&P, lb·s/ft²			.321 x 10^{-6}				
	39	% LIQ., IN	OUT		0	0			
	40	RATE: NORMAL, lbs./hr.			10,000				
	41	RATE: lbs./hr. MAX.	MIN.		20,000	0			

NOTES

42 (1) Meter factor will correlate pulses/unit time to flow rate; value is
43 variable for different manufacturers.
44 (2) Cast body; material CF-3M or CF-8M.
45 (3) Vendors & Models under consideration: Foxboro Model E83F
46 Fisher Model DV2005
47 Yewflow Model YE-115
48
49
50
51

(X) INDICATES MANUFACTURER TO GIVE INFORMATION IN HIS QUOTATION.

SPEC NO. 1 REV. 0
SHEET 1 OF 6

CCR 000016992

4-571-S
2-81

ENGINEERING CENTER

PONCA CITY, OKLAHOMA

SPECIFICATION SHEET

INDICATORS, RECORDERS, CONTROLLERS

Design NO. 192-500-1083-PDD
DATE 10/5/83 W. O. NO.
MADE BY PDD ING. NO.
APP'D BY REQ. NO.
B. M. NO. P. O. NO.

PLANT LAKE CHARLES VCM PROJECT VCM-UCP LOW PRESSURE STEAM TRANSFER

ITEM NO.		FR-1			
SERVICE		Steam Transfer Recorder			
RECEIVER	INDICATOR OR RECORDER	Recorder			
	INPUT SIGNAL: PNEU. - ELEC.	Electrical			
	LOCATION: YARD - PANEL	Yard			
	MOUNTING: YOKE - FLUSH	Yoke			
	NO. OF PENS OR POINTERS	1			
	CHART: SIZE - CIRCULAR - STRIP	Circular			
	CHART RANGE	0-10 √			
	CHART NUMBER				
	CHART FACTOR	2000 (lbs./hr)			
	CHART DRIVE: MECH. - ELEC.	Electrical			
	SCALE RANGE	0-20,000			
	CALIBRATED ACCURACY				
	SENSITIVITY				
	REPEATABILITY				
CONTROLLER	CONTROLLER LOCATION				
	CONTROLLER ACTION — INPUT				
	CONTROLLER ACTION — OUTPUT				
	PROP. BAND PER CENT				
	AUTOMATIC RESET				
	DERIVATIVE				
	CASCADE - RESET BY				
	REPEATABILITY				
	SENSITIVITY				
	ACCESSORIES:				
MANUFACTURER		Foxboro (or equivalent)			
MODEL NO.		40PR-RPEIF/E84ZIAN			
PRICE					

GENERAL SPECIFICATIONS

RECORDER INK SUPPLY CAPILLARY WITH 6 MONTHS MIN. SUPPLY
ALL CONTROL STATIONS SHALL HAVE A VALVE POSITION INDICATOR, AUTOMATIC-MANUAL SWITCH, AND DIRECT - REVERSE SWITCH.
ELECTRONIC INSTRUMENTS SHALL HAVE A SOLID STATE SYSTEM
ELECTRIC CHART DRIVE 115 VOLT 60 CYCLE SYNCHRONOUS MOTOR
MECH. CHART DRIVE 24 HOUR SPRING WIND
PROPORTIONAL BAND COMPLETELY ADJUSTABLE
INSTR. ELEC. CLASSIFICATION IS CLASS 1 GROUP D, DIVISION 2, UNLESS OTHERWISE NOTED.

NOTES

CCR 000016993

SUPPLIER TO COMPLETE FORM BY FURNISHING INFORMATION FOR BLANK SPACES

SHEET 2 OF 6 REV 0

4-439-S

CONOCO

Engineering Center
Ponca City, Oklahoma

Temperature Gauges and Thermowells

SPECIFICATION DATA SHEET
PROJECT NO. 192-500-1083-PDD
A.F.E. NO. _____
REQ. NO. _____
DATE 10/4/83 APP'D BY _____
MADE BY PDD

PLANT LAKE CHARLES VCM PROJECT VCM-LCCP LOW PRESSURE STEAM TRANSFER

GENERAL	1	ITEM NO.	TG-1						
	2	SERVICE	Steam Transfer Line						
	3								
	4	MANUFACTURER							
SERVICE CONDITIONS	5	FLUID	S/H Steam						
	6	FLUID STATE	Vapor						
	7	PRESSURE, PSIG OPER	33	MAX	270				
	8	TEMPERATURE, °F OPER	360	MAX	433				
	9								
TEMPERATURE GAUGE	10	STEM LOCATION	Viewable from Grade						
	11	STEM LENGTH	(1)						
	12	DIAL RANGE, °F	0-600						
	13	STEM MATERIAL							
	14	CASE MATERIAL	S.S.						
	15	WINDOW MATERIAL	Glass						
	16	ACCESSORIES	-						
	17								
	18								
	19	MODEL NO.							
	20	DIAL SIZE: 5 "							
	21	ELEMENT: BI-METALLIC							
	22	THREADED CONNECTION: 1/2 " MALE NPT							
	23	STEM DIA: .250 "							
	24	ACCURACY: PLUS OR MINUS 1 PERCENT OF RANGE							
	25	EXTERNAL ADJUSTMENT							
	26	BLACK LETTERING ON WHITE DIAL							
	27								
	28								
	29								
THERMOWELL	30	TYPE: THR'D OR FLG'D	Flanged						
	31	FLANGE SIZE AND RATING	1 1/2" - 300#						
	32	FLANGE MATERIAL	C.S.						
	33	WELL CONSTRUCTION	Tapered						
	34	WELL BORE	3/4" NOM.						
	35	WELL MATERIAL	304 S.S.						
	36	LENGTH BELOW THD. OR FLG.	8"						
	37	LAGGING EXTENSION	1" (min.)						
	38	CAP AND CHAIN	NO						
	39								
	40								
	41								
	42	MODEL NO.							
	43	GAUGE CONN.: 1/2 " FEMALE NPT							
	44	PROCESS CONN : 1 " MALE NPT							
	45								
	46								
NOTES	47								
	48								
	49								
	50								
	51								

CCR 000016994

QUOTATION WILL NOT BE CONSIDERED IF MANUFACTURER DOES NOT COMPLETE FORM BY FURNISHING INFORMATION FOR BLANK SPACES.

SPEC NO. 2 REV. 0
SHEET 3 OF 6

4-720-S

conoco

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Ponca City, Oklahoma

Pressure Gages

SPECIFICATION SHEET
PROJECT NO. 192-500-1083-PDD
A.F.E. NO. _____
REQ. NO. _____
DATE 10/4/83 APP'D BY _____
MADE BY PDD

PLANT LAKE CHARLES VCM PROJECT VCM-LOOP LOW PRESSURE STEAM TRANSFER

	TAG NO.	REV.	QUANT.	RANGE TUBE	RANGE DIAL	OPER. PRESS.	TEMPERATURE NORM.	TEMPERATURE MAX.	SERVICE	ACCESSORIES	NOTES
3	PG-1		1	0-100	0-100	33psig	360	433°F	S/H Steam	Condensate Loop	

NOTES:

CCR 000016995

QUOTATION WILL NOT BE CONSIDERED IF MANUFACTURER DOES NOT COMPLETE FORM BY FURNISHING INFORMATION FOR BLANK SPACES

SPEC NO 3 REV 0
SHEET 4 OF 6

4-447-S

4-81

CONOCO

Engineering Center
Ponca City, Oklahoma

Specification Sheet

SPECIFICATION SHEET
PROJECT NO. M2-500-1083-PDD
A.F.E. NO. _____
REQ. NO. _____
DATE 10/4/83 APP'D BY _____
MADE BY PDD

PLANT LAKE CHARLES VCM PROJECT LOW PRESSURE STEAM TRANSFER; VCM-LCCP

ITEM NO.
SERVICE Steam Traps on 6"-SM-1-H-B2-6

Service: 33 psig superheated steam

Manuf: Armstrong (or equiv.)

Model: Series 2011
Orifice: 7/64"
Pipe Connections: 3/4" (threaded)
Number Required: 3 (2)
Working (Design) Pressure: 33 psig
Max Pressure: 250 psig

Differential Pressure: Normal 33psig
Max 270 psig
Max Allowable 400psig
Temperature: Normal 360 °F
Max 433
Max Allowable 800°F

Normal Flow: 250 lbs./hr. (1)

Accessories: Y-strainer with 0.045" perforated 304 SS screen.

NOTES: (1) Normal flow is specified for warm-up conditions. Typical operation will be for 33psig steam at 360°F, 65°F of superheat; no condensate collection is anticipated.
(2) Install steam traps every 200 feet.

CCR 000016996

SPEC NO. 4 REV. 0
SHEET 5 OF 6

4-441-S
4-81

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Engineering Center
Ponca City, Oklahoma

Specification Sheet

SPECIFICATION SHEET
PROJECT NO. MZ-SM0-1033-PDD
A.F.E. NO. _____
REQ. NO. _____
DATE 10/5/83 APP'D BY _____
MADE BY PDD

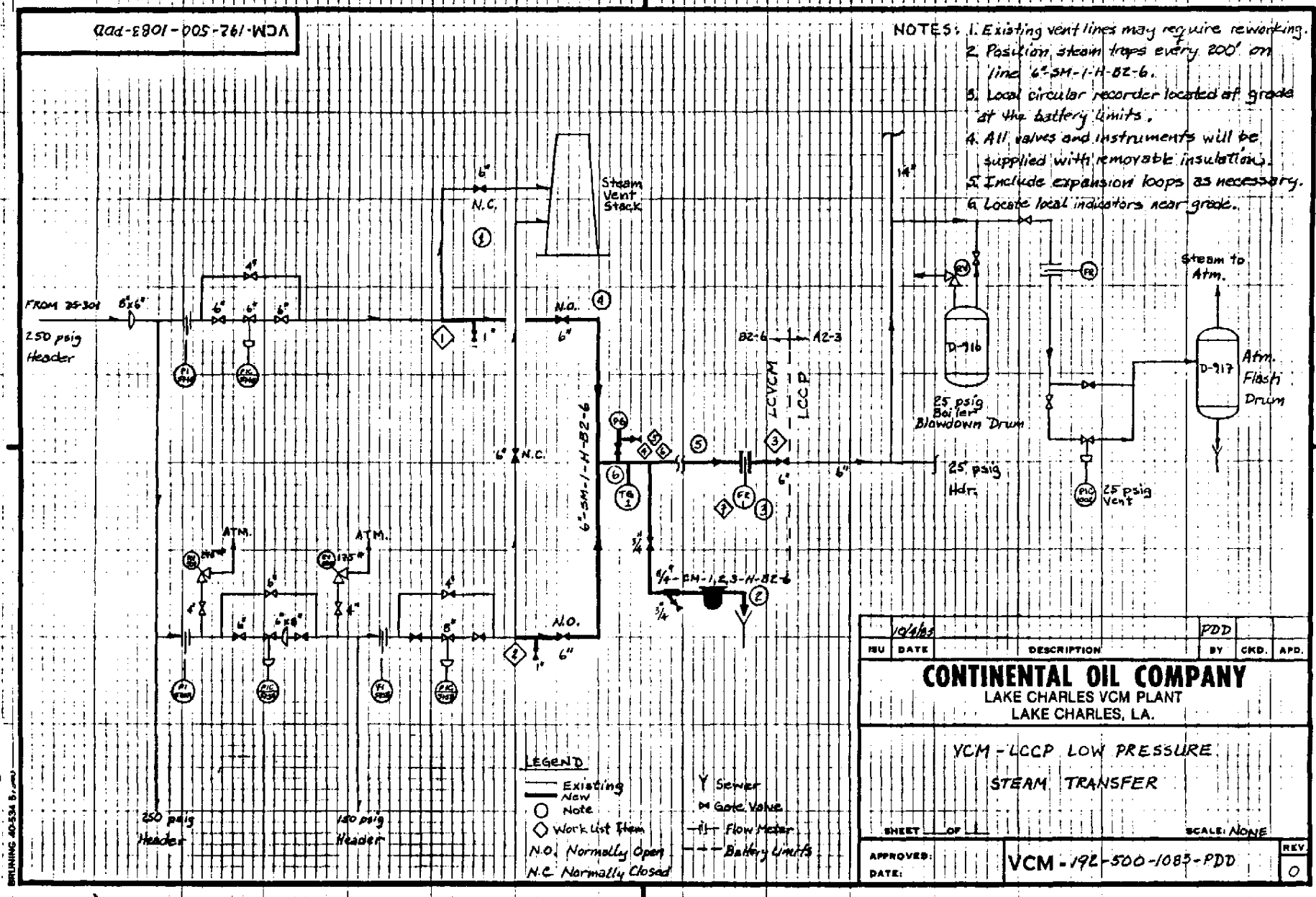
PROCESS PIPING SCHEDULE

PLANT LakeCharles VCM PROJECT VCM-LCCP Low Pressure Steam Transfer

Line Designation	Service From	Service To	V L	Flow Rate Lb/Hr (Hot BPSD)	Normal (4) °F	Normal (4) PSIG	At T and P LB/CF (SP GR)	At T and P Visc CP	Press Drop PSIG/100'	Vel ft/sec	Fluid
6"-SM-1-H-BZ-6 (1)(3)	VCM Vents	LCCP Low Pres. Steam Hdr.	V	10,000	360	33	.120	.0154	1	116	S/H Steam
3/4"-CM-1-H-BZ-6	Transfer Line	Grade	L	250 (2)	290	33	62	-	-	-	33psig Cond.
3/4"-CM-2-H-BZ-6	"	"	L	250 (2)	290	33	62	-	-	-	"
3/4"-CM-3-H-BZ-6	"	"	L	250 (2)	290	33	62	-	-	-	"

NOTES: (1) Min. insulation thickness: 3".
(2) Expected flow on warm up only.
(3) Flexitallic Spiral Wound Gaskets
(4) Max temp = 433°F; max pressure = 270 psig

CCR 000016997


VCM-192-500-1083-PDD
NOTES: 1. Existing vent lines may require reworking.
2. Position steam traps every 200' on line 6"-SM-1-H-B2-6.
3. Local circular recorder located at grade at the battery limits.
4. All valves and instruments will be supplied with removable insulation.
5. Include expansion loops as necessary.
6. Locate local indicators near grade.
Steam Vent Stack
N.C.
N.O.
FROM 25-301
250 psig Header
6"-SM-1-H-B2-6
LCCP
LCVCM
B2-6
A2-3
14"
D-916
25 psig Boiler Blowdown Drum
D-917
Atm. Flash Drum
Steam to Atm.
25 psig Hdr.
25 psig Vent
ATM.
175#
3/4"-CM-1,2,3-H-B2-6
150 psig Header
LEGEND
Existing
New
Note
Work List Item
N.O. Normally Open
N.C. Normally Closed
Sewer
Gate Valve
Flow Meter
Battery Limits
ISU
DATE
DESCRIPTION
BY
CKD.
APD.
10/4/85
PDD
CONTINENTAL OIL COMPANY
LAKE CHARLES VCM PLANT
LAKE CHARLES, LA.
VCM - LCCP LOW PRESSURE STEAM TRANSFER
SHEET ___ OF ___
SCALE: NONE
APPROVED:
DATE:
VCM-192-500-1083-PDD
REV.
0
CCR 00001699
BRUNING 40-534