

PLAINTIFF'S EXHIBIT

TEX-118

ADDENDUM TO THE OPERATING MANUAL

CATALYTIC POLYMERIZATION UNIT
PLANT 5J

TEXACO INC.
PUGET SOUND PLANT

ESTIMATE 3910

BECHTEL INCORPORATED
HOUSTON, TEXAS
1973

WA-TEX 000316

TABLE OF CONTENTS

WA-TEX 000317

TABLE OF CONTENTS

	Page No.
1. General Description	1
A. Introduction	1
B. Basis of Design	1
C. Description of Additions and Modifications to the Unit	1
2. Control Features	4
A. Principal Control Features	4
3. Preparations for Operation	6
4. Startup Procedure	7
A. General	7
B. Recovery Section	7
6. Shutdown Procedures	9
9. Safety Features and Regulations	10
10. Appendix	
10.1 Process and Utility Diagrams	
10.2 Vessel Drawings	
10.3 Heat Exchangers	
10.4 Pumps	
10.5 Instruments	

1. GENERAL
DESCRIPTION

I - GENERAL DESCRIPTION

A. INTRODUCTION

This addendum to the Operating Manual for the Catalytic Polymerization Unit at the Puget Sound Works of TEXACO Inc., Anacortes, Washington, covers the revamp of the Catalytic Polymerization Unit. The principal new equipment for this revamp is:

Saturated C₃-C₄ Amine Treater

Saturated C₃-C₄ Caustic Treater

Saturated C₃-C₄ Regenerated Caustic Treater

Saturated C₃-C₄ Salt Filter

Propane Stripper

Attendant facilities for heat exchange, transfer of liquids, and control of operations.

B. BASIS OF DESIGN

General

In the feed preparation section, the revamp is limited to the cracked C₃-C₄ treater and the saturated C₃-C₄ treaters. The cracked C₃-C₄ treaters are to treat 7,963 BPSD of C₃-C₄ from the Gas Recovery Unit. The saturated C₃-C₄ treaters are to treat a combined total of 7,017 BPSD of C₃-C₄ from the Crude Unit and the CRU.

In the recovery section, the revamp covers only the depropanizer. The depropanizer feed is the effluent from the saturated treaters in the feed preparation section. The condensed depropanizer overhead stream is fed to a new propane stripper from which 420 BPSD of propane product is recovered.

Process flow conditions for the revamped unit are shown on process flow diagrams 5-RA-1 and 5-RA-2.

C. DESCRIPTION OF ADDITIONS AND MODIFICATIONS TO THE UNIT

This section describes only additions and significant modifications to the Catalytic Polymerization Unit. Reference should be made to the Operating Manual for the Catalytic Polymerization Unit for a description of the existing facilities.

Feed Preparation Section (Reference P&ID's 5-RA-4 and 5-RA-25)

The cracked C_3-C_4 treaters are satisfactory, except that the 1-inch Raschig rings in the cracked C_3-C_4 water wash treater, 5J-C5, are replaced with 2-inch Raschig rings.

Due to the higher feed rate, the saturated C_3-C_4 treaters and salt filter are replaced. The existing treaters are left in place and may be used as standby for the cracked treaters in the future, if tie-ins are provided. The saturated C_3-C_4 amine treater, 5J-C57, has 23 sieve trays. The saturated C_3-C_4 caustic treater, 5J-C58, and the saturated C_3-C_4 regenerated caustic treater, 5J-C59, have packed beds of 2-inch carbon Raschig rings.

The saturated feed stream from the CRU and the Crude Unit flows in sequence through the saturated C_3-C_4 amine treater, 5J-C57, the saturated C_3-C_4 caustic treater, 5J-C58, the saturated C_3-C_4 regenerated caustic treater, 5J-C59, and the salt filter, 5J-C60. The treated stream flows through the depropanizer feed-bottoms exchanger, 5J-E57, to the cat. poly. depropanizer, 5J-C17.

Tie-ins are made at the suction and discharge lines of the amine charge pump, 5J-G6, and the rich amine charge line between the present amine regeneration unit and the new amine regeneration unit. These tie-ins will permit either unit or lean amine storage tank to be taken out of service for T&I. Each unit is capable of handling the total refinery MEA load when the FCCU is down and the CPU unsaturated treaters are out of service.

Recovery Section (Reference P&ID 5-RA-5)

The existing depropanizer, 5J-C17, is provided with a new feed-bottoms exchanger, 5J-E51. A new depropanizer feed bypass pump, 5J-G62, is also provided that permits saturated C_3-C_4 from the feed preparation section to be pumped directly to CRU No. 2. The bottoms product from the depropanizer, 5J-C17, flows through the depropanizer feed-bottoms exchanger, 5J-E57, and the depropanizer bottoms cooler, 5J-E59, to alkylation or storage. The cat. poly. debutanizer, 5J-C19, is not in service, since the Debutanizer in the atmospheric tower overhead section is in service.

Liquid overhead product from the depropanizer, 5J-C17, is pumped from the cat. poly. depropanizer accumulator, 5J-C18, to the propane stripper, 5J-C61. The propane stripper is packed with 30 feet of 1-1/2-inch carbon steel pall rings. Overhead vapor from the propane stripper, 5J-C61, is combined with vapor from the cat. poly. depropanizer accumulator, 5J-C18, and the combined stream is sent to fuel gas. Alternately, the propane stripper overhead vapor may be routed through the depropanizer condenser, 5J-E13. Reboil heat is supplied to the propane stripper, 5J-C61, in the propane stripper reboiler, 5J-E58, by 40 lb. steam. Propane stripper bottoms product is cooled in the LPG cooler, 5J-E18, and sent to storage.

Utilities

Utility consumption by new or modified equipment is given in the following table:

<u>Item No.</u>	<u>Service</u>	<u>Consumption</u>
<u>Exhaust Steam</u>		
5J-E58	Propane Stripper Reboiler	585 Lb./Hr.
<u>Cooling Water</u>		
5J-E59	Depropanizer Bottoms Cooler	146 GPM
<u>Electrical</u>		
5J-G62 & G62A	Depropanizer Feed Bypass Pump & Spare	7.7 HP

2. CONTROL FEATURES

11- CONTROL FEATURES

A. PRINCIPAL CONTROL FEATURES

This section describes only additions and significant modifications to the Catalytic Polymerization Unit controls. Reference should be made to the Operating Manual for the Catalytic Polymerization Unit for a description of existing controls.

Feed Preparation Section (Reference P&ID 5-RA-25)

The control scheme for the new saturated C_3-C_4 treaters is the same as the control scheme for the existing saturated C_3-C_4 treaters. A description of the principal control features of the saturated C_3-C_4 feed preparation section follows.

The flow rates of saturated C_3-C_4 streams from the Crude Unit debutanizer and the Platformer debutanizer are controlled in their respective units. The combined saturated C_3-C_4 stream flows in sequence through the saturated C_3-C_4 amine treater, 5J-C57, the saturated C_3-C_4 caustic treater, 5J-C58, the saturated C_3-C_4 regenerated caustic treater, 5J-C59, and the saturated C_3-C_4 salt filter, 5J-C60. The treated stream passes through the depropanizer feed/bottoms exchanger, 5J-E57, to the cat. poly. depropanizer, 5J-C17. The pressure in the saturated C_3-C_4 treater section is set by the pressure in the cat. poly depropanizer, 5J-C17. Control of the cat. poly. depropanizer pressure is described in the following section.

The flow rate of regenerated amine to the saturated C_3-C_4 amine treater, 5J-C57, is controlled by flow controller 5FIC-200. The flow rate of spent amine from the bottom of the saturated C_3-C_4 amine treater is controlled by interface level controller 5LIC-201 to maintain an amine solution-hydrocarbon interface in the top of the amine treater. High and low level alarms, 5LAH-201 and 5LAL-201, are provided for the amine solution-hydrocarbon interface.

Spent caustic is drained from the saturated C_3-C_4 caustic treater, 5J-C58, to spent caustic storage by manual control. The spent caustic is drained when the caustic-hydrocarbon interface appears in level glass 5LG-202. Care must be taken when draining the spent caustic to prevent hydrocarbons entering the spent caustic system. Fresh caustic and dilution water are charged to the saturated C_3-C_4 caustic treater, 5J-C58, by manual control. Fresh caustic is charged when the caustic-hydrocarbon interface appears in level glass 5LG-203.

The flow rate of regenerated caustic to the saturated C_3-C_4 regenerated caustic treater, 5J-C59, is controlled by flow controller 5FIC-201. The flow

rate of spent caustic from the bottom of the saturated C_3 - C_4 regenerated caustic treater is controlled by interface level controller, 5LIC-205, to maintain a caustic-hydrocarbon interface in the top of the regenerated caustic treater. High and low level alarms, 5LAH-205 and 5LAL-205, are provided for the caustic-hydrocarbon interface.

Water that accumulates in the bottom of the saturated C_3 - C_4 salt filter is drained to the oily water sewer by manual control. The water-hydrocarbon interface may be observed in level glass LG-506.

Recovery Section (Reference P&ID 5-RA-5)

The amount of saturated C_3 - C_4 from the feed preparation section that is pumped directly to CRU No. 2 is controlled by flow controller 5FIC-205.

When the propane stripper, 5J-C61, is in operation, a vapor product will be leaving the depropanizer-propane stripper system. For this case, 5HCV-6 and 5HC-20 should be positioned such that the depropanizer pressure controller, 5PIC-106, positions control valve 5PIC-106VB to adjust vapor flow from the system, and the cat. poly. depropanizer accumulator level controller, 5LIC-49, positions control valve 5PIC-106VA to regulate cooling water flow to the depropanizer condenser, 5J-E13. Feed to the propane stripper will be regulated by flow controller 5FIC-207.

When the propane stripper, 5J-C61, is not in operation, an all liquid cat. poly. depropanizer overhead product may be obtained. For this case, 5HCV-6 should be positioned such that the depropanizer pressure controller, 5PIC-106, positions control valve 5PIC-106VA to adjust cooling water flow to the depropanizer condenser, 5J-E13, and the cat. poly. depropanizer accumulator level controller, 5LIC-49, resets the net product flow controller, 5FIC-207. Noncondensibles may be vented from the system periodically by operating hand controller 5HC-20 to open control valve 5PIC-106VB in the accumulator vapor line. A description of other controls on the cat. poly. depropanizer is given on page 21 of the Operating Manual for the Catalytic Polymerization Unit.

The temperature of the propane stripper bottoms is controlled by temperature controller 5TIC-205 that adjusts condensate discharge from the propane stripper reboiler, 5J-E58. Level in the bottom of the propane stripper, 5J-C61, is controlled by level controller 5LIC-210 that adjusts discharge of LPG from the stripper.

3. PREPARATION FOR
STARTUP

III - PREPARATIONS FOR OPERATIONS

Reference should be made to the Operating Manual for the Catalytic Polymerization Unit for a description of preparations for operations.

4. STARTUP
PROCEDURES

IV - STARTUP PROCEDURE

A. GENERAL

Reference should be made to the Operating Manual for the Catalytic Polymerization Unit for a description of the startup procedure for existing equipment. The startup procedure for the new saturated C₃-C₄ treating section is similar to the startup procedure for the existing saturated C₃-C₄ treating section, and the existing procedure should be used.

B. RECOVERY SECTION

The cat. poly. depropanizer, 5J-C17, and its related equipment, can be started up by the procedure given in the Operating Manual for the Catalytic Polymerization Unit. The new depropanizer bottoms cooler, 5J-E59, and the new depropanizer feed/bottoms exchanger, 5J-E57, are steam purged, tightness-tested, filled with fuel gas, and brought onstream in conjunction with the cat. poly. depropanizer.

The following procedure for startup of the propane stripper, 5J-C61, and its related equipment, assumes that the cat. poly. depropanizer system is operating. The same procedure, with minor modifications, can be used for start-up of the propane stripper in conjunction with startup of the cat. poly. depropanizer. An outline of the startup procedure is as follows:

1. Steam-purge for elimination of air.
2. Tightness-test and gas-fill.
3. Inventory and circulate to dry.
4. Adjust operating conditions.

Introduce steam through the steamout connection of the propane stripper and vent steam and air through the 2-inch vent at the top of the propane stripper. Permit the tubes of the propane stripper reboiler, 5J-E58, to fill with steam condensate. When the propane stripper is thoroughly purged, as evidenced by a strong show of steam from the vent, throttle the vent. Purge the propane stripper overhead line, 5J-0-219-3", to the block valve at line 6"-5J-0-45. Purge line 5J-0-220-3" to the block valve at line 4"-5J-0-162.

NOTE: The propane stripper feed line, 5J-0-225-3", and the propane stripper bottoms line, 5J-0-224-3", have been purged and placed in service. These lines will contain hydrocarbons up to the block valves at the propane stripper when the cat. poly. depropanizer is in service.

Close the vent valve on the propane stripper and tightness-test at 25 psig with steam. Drain steam condensate from all low point drains. After a successful tightness test, reduce the steam pressure to about 5 psig. Slowly pressurize the propane stripper by allowing cat. poly. depropanizer overhead vapors to enter the propane stripper through line 5J-0-219-3".

Drain steam condensate from all low point drains. Inventory the propane stripper with liquid from the cat. poly. depropanizer accumulator, 5J-C18, through the propane stripper feed line. Commission the propane stripper reboiler, 5J-E58, and allow overhead vapor from the propane stripper to pass through the depropanizer condenser, 5J-E13, to the cat. poly. depropanizer accumulator, 5J-C18. Add inventory to the propane stripper as required. Continue operation in this manner until the propane stripper is free of water.

During the above propane stripper drying procedure, 5HCV-6 has been positioned such that the cat. poly. depropanizer pressure controller, 5PIC-106, regulates cooling water flow to the depropanizer condenser, and the cat. poly. depropanizer accumulator level controller, 5LIC-49, resets the net overhead product flow controller, 5FIC-207. The net liquid product passes through the LPG cooler, 5J-C20, to the chiller. After the propane stripper is dried, it may be brought onstream by the following steps:

1. Reroute propane stripper overhead vapor from the depropanizer condenser to the cat. poly. depropanizer accumulator vapor line, 4"-5J-0-162.
2. Reposition 5HCV-6 such that the cat. poly. depropanizer pressure controller, 5PIC-106, regulates vapor flow from the cat. poly. depropanizer accumulator, and the cat. poly. depropanizer accumulator level controller, 5LIC-49, regulates cooling water flow to the depropanizer condenser, 5J-E13. Flow of net liquid from the cat. poly. depropanizer accumulator is regulated by flow controller 5FIC-207.
3. Net liquid product from the cat. poly. depropanizer accumulator is rerouted from the LPG cooler, 5J-E18, to the propane stripper.
4. Bottoms product from the propane stripper is routed through the LPG cooler to the chiller. The propane stripper level controller, 5LIC-210, is put in service to regulate flow of propane stripper bottoms.
5. The propane stripper temperature controller, 5TIC-205, is put in service to regulate steam condensate flow from the propane stripper reboiler, 5J-E58.

6. SHUTDOWN
PROCEDURE

VI - SHUTDOWN PROCEDURES

Reference should be made to the Operating Manual for the Catalytic Polymerization Unit for a description of shutdown procedures for existing equipment. The shutdown procedure for the new saturated C_3-C_4 treating section is similar to the shutdown procedure for the existing saturated C_3-C_4 treating section, and the existing procedure should be used.

The propane stripper, 5J-C61, is shut down in conjunction with the cat. poly. depropanizer, 5J-C17, as follows:

1. Discontinue steam to the propane stripper reboiler, 5J-E58.
2. Pump out liquid products to storage as described in the Operating Manual for the Catalytic Polymerization Unit.
3. Depressure the system to flare.
4. Purge the system with steam to remove all hydrocarbon vapors and vent to the atmosphere.

Emergency shutdown procedures described in the Operating Manual for the Catalytic Polymerization Unit are applicable to the new saturated C_3-C_4 treating section and the propane stripper.

9. SAFETY FEATURES
& REGULATIONS

IX - SAFETY FEATURES AND REGULATIONS

Reference should be made to the Operating Manual for the Catalytic Polymerization Unit for a discussion of safety features and regulations.

The new relief valves installed are listed below:

<u>Relief Valve No.</u>	<u>Service</u>
SPSV-101	Saturated C ₃ -C ₄ Amine Treater, 5J-C57
SPSV-102	Saturated C ₃ -C ₄ Caustic Treater, 5J-C58
SPSV-103	Saturated C ₃ -C ₄ Regenerated Caustic Treater, 5J-C59
SPSV-104	Saturated C ₃ -C ₄ Salt Filter, 5J-C60
SPSV-105	Propane Stripper, 5J-C61

All of the new relief valves discharge through the existing header system to the existing blowdown drum, 5J-C29. Bypass valves are provided around each of the new relief valves, so that the related equipment can be vented to the existing header system.

10. APPENDIX

10. Appendix

10.1 Process and Utility Diagrams

10.2 Vessel Drawings

10.3 Heat Exchangers

10.4 Pump Data and Curves

10.5 Instruments

10.1 PROCESS & UTILITY
DIAGRAMS

TABLE OF CONTENTS

SECTION 10.1 PROCESS AND UTILITY DIAGRAMS

Process Flow Diagram	Feed Preparation Section - CPU	5-RA-1
Process Flow Diagram	Recovery Section - CPU	5-RA-2
P&ID	Feed Preparation Section - CPU	5-RA-4
P&ID	Recovery Section - CPU	5-RA-5
P&ID, Utility	Steam and Condensate Systems - CPU	5-AA-7
Plot Plan - CPU		5-AA-8
P&ID, Utility	Air and Blowdown System - CPU	5-AA-10
P&ID, Utility	Water System - CPU	5-AA-11
P&ID	Saturate Feed Preparation Section - CPU	5-RA-25

LEGEND

PIPING SYMBOLS

—○—	GATE VALVE	AFC	AIR FAILURE CLOSE
—●—	GLOBE VALVE	AFO	AIR FAILURE OPEN
—X—	CHECK VALVE	SC	SAMPLE CONNECTION
—○—	PLUG VALVE		
—○—	CONTROL VALVE (CLOSE ON AIR FAILURE)	B	SPECTACLE BLIND OPERATIONAL
—○—	CONTROL VALVE (CLOSE ON AIR FAILURE)	B	ANNEAL CONTROL VALVE
—○—	INSULATION STEAM TRACED FOR PERSONNEL PROTECTION	B	SPECTACLE BLIND TEST

INSTRUMENT SYMBOLS

○	FIELD MOUNTED	⊗	TRANSMITTER
○	BOARD MOUNTED		
—○—	PROCESS LINE G.M.S.C. CONTROL	—○—	INSTRUMENT ELECTRICAL LEAD
—○—	INSULATION CONTROL LINE	—○—	CATALYTIC TUBING

INSTRUMENT IDENTIFICATION

ALL INSTRUMENTS ARE CODED IN ACCORDANCE WITH U.S.A. STANDARD EXCEPT AS NOTED. FOR RELAYS REFER TO DWG 50-RA-5.

LINE IDENTIFICATION

FOR LINES WHERE VELOCITIES AND PRESSURE DROP MUST BE CALCULATED:

PIPING SPEC. — SIZE — LINE SERIAL NR. — COMMODITY — ET. CO. PLANT NR.

FOR LINES WHERE SMALLER NOT REQUIRED, PRESSURE DROP CALCULATION:

PIPING SPEC. — SIZE —

PIPING SPECIFICATIONS

JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.
JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.
JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.
JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.
JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.
JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.
JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.
JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.
JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.
JCM-32B	100" R.F. COCKS, 1/2" CORR. ALLOW.

COMMODITY DESIGNATION

CM	CONDENSER WATER	PF	PROCESS WATER
C	HYDROCARBON LIQUID OR VAPOR	ST	STEAM & CONDENSATE

ITEM NUMBERS

610	3/4" FLD. C.B. CASE VALVE 100 R.F.
620	1/2" FLD. C.B. CASE VALVE 100 R.F.

REFERENCE DRAWINGS

PROCESS P&ID - FIELD DIRECT CAT. POLY. UNIT	5-RA-4
PROCESS P&ID - RECOVERY SECTION	5-RA-5
UTILITY P&ID - STEAM & CONDENSATE SYSTEMS	5-RA-7
UTILITY P&ID - WATER SYSTEMS	5-RA-11
UTILITY P&ID - AIR & BLOWDOWN SYSTEMS	5-RA-10
P&ID - TAILGAS COUNTER CONNECTION LINES SHUT	21-RA-3
PILOT PLANT - CATALYTIC POLYMERIZATION UNIT	5-AL-8

NOTES

1. STEAM TRACING OF VESSEL BOOTS TO BE IN ACCORDANCE WITH DWG. 50-AL-193

SYMBOLS

EXISTING
NEW
REMOVE
RELOCATE
NOT USED (DO NOT REMOVE)

◇ DENOTES TIE-IN NUMBERS

NOTES

- REVISIONS OF MAJOR SYSTEMS ARE DESIGNATED BY THE SYMBOLS SHOWN ABOVE. MINOR REVISIONS ARE CIRCLED AND INCLUDE A TRIANGULAR REVISION MARK.
- PIPING SERVICE SPECIFICATIONS FOR NEW LINES ARE IN ACCORDANCE WITH GEMS J-208 TABLE 7.
- LINE NUMBER SUFFIXES FOR INSULATION ARE IDENTIFIED AS FOLLOWS:
PP PERSONNEL PROTECTION
CC COLD CONSERVATION
PHC PARTIAL HEAT CONSERVATION
FHC FULL HEAT CONSERVATION
OTC OPERATING TEMPERATURE CONTROL
ST STEAM TRACED
NI NO INSULATION
- TO KEEP HYDROCARBON FROM ENTERING STEAM CONDENSATE SYSTEM, THE BALL FLOAT SHALL BE SET TO SHUT OFF FOR LIQUID OF SPECIFIC GRAVITY LESS THAN WATER.
- INSTRUMENT STEAM TRACING SYMBOLS:
—○— TRACED
—○— TRACED & HOUSED

LINE IDENTIFICATION

1A - 0 - 432 - 0 - 112A - 11

TEXACO PLANT NUMBER SERVICE SYMBOL SIZE INSULATION REQUIREMENTS TEXACO PIPING MATERIAL SERVICE SPECIFICATION

BECHTEL CORPORATION

SAN FRANCISCO

THE TEXAS COMPANY

PUGET SOUND WORKS

PROCESS PIPING & INSTRUMENT DIAGRAM

RECOVERY SECTION
CATALYTIC POLYMERIZATION UNIT

BECHTEL

HOUSTON

TEXACO INC.

PUGET SOUND PLANT

PROCESS PIPING & INST. DIAGRAM

RECOVERY SECTION
CATALYTIC POLYMERIZATION UNIT

NO. 2525

5-RA-5

NO. 2525

5-RA-5

WA-TEX 000339

INSTRUMENT SYMBOLS	
	LOCAL MOUNTED
	TRANSMITTER
	BOARD MOUNTED
	PRESSURE LINE
	INSTRUMENT AIR LINE
	ELECTRICAL LEAD
	CAPILLARY TUBING
PLANT NUMBER INSTRUMENT IDENTIFICATION INSTRUMENT NUMBER INSTRUMENT LOCATED BY OTHERS INSTRUMENT IDENTIFICATION	
ALL INSTRUMENTS ARE CODED IN ACCORDANCE WITH ISA STANDARDS EXCEPT AS NOTED FOR RELATE REFER TO DWA-ME 2A-4	
LINE IDENTIFICATION FOR LINES WHERE VELOCITIES AND PRESSURE DROP MUST BE CALCULATED: 	
PIPING SPECIFICATION J20-110 300" NOM. RATING, 1/2" CORR. ALLOW. J20-110 150" R.F. GATES, 1/2" CORR. ALLOW. J20-110 800" R.F. GATES, 1/2" CORR. ALLOW. J20-110 100" NOM. RATING, 1/2" CORR. ALLOW. J20-110 150" R.F. GATES, 1/2" CORR. ALLOW. J20-110 150" R.F. COCKS, 1/2" CORR. ALLOW. J20-110 300" R.F. GATES, 1/2" CORR. ALLOW. J20-110 300" R.F. COCKS, 1/2" CORR. ALLOW.	
COMMODITY DESIGNATIONS C CAUSTIC FW PROCESS WATER CM COOLING WATER ST STEAM & CONDENSATE D HYDROCARBON LIQUID OR GAS W SERVICE WATER	
ITEM NUMBERS 604 150" FLOD C.S. GATE VALVE 1/2" R.F. 610 300" FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33K OR EQUAL 611 300" FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33K OR EQUAL 619 300" FLOD C.S. GATE VALVE 1/2" R.F. PACIFIC 350-LB OR EQUAL 500 150" FLOD C.S. LUB. PLUG VALVE 1/2" R.F. WRENCH OPERATED 910 300" FLOD C.S. LUB. PLUG VALVE 1/2" R.F. WRENCH OPERATED	
NOTES 1. DRAINING PIPING SERVICE (FROM 910-11, 910-12 & 910-13) TO DISCHARGE TO WEA DRAIN LINE 5" 910-11, 12, 13. 2. DRAINING IN CAUSTIC SERVICE (FROM 910-11, 910-12, 910-13, 910-14 & 910-15) TO DISCHARGE TO WEA DRAIN LINE 5" 910-11, 12, 13, 14, 15. 3. STEAM TRAPS OF TANKS & VESSELS SHOULD BE IN ACCORD WITH SP-AL-153	
REFERENCE DRAWINGS PROCESS PIPING & INSTRUMENT DIAGRAM 5-RA-5 PROCESS PIPING & INSTRUMENT DIAGRAM 5-RA-6 UTILITY PIPING & INSTRUMENT DIAGRAM 5-RA-7 UTILITY PIPING & INSTRUMENT DIAGRAM 5-RA-8 P&ID TANKAGE & INTERCONNECTING LINES, SHEET #2 5-RA-9 P&ID TANKAGE & INSTRUMENT DIAGRAM 5-RA-10 UTILITY PIPING & INSTRUMENT DIAGRAM 5-RA-11	
BECHTEL CORPORATION SAN FRANCISCO THE TEXAS COMPANY PUGET SOUND WORKS PROCESS PIPING & INSTRUMENT DIAGRAM FEED PREPARATION SECTION CATALYTIC POLYMERIZATION UNIT	
5400-3 APPROVED BY G-71-57 2525 5-RA-4	

DESIGNATED BY THE SYMBOLS SHOWN ABOVE. MINOR REVISIONS ARE CIRCLED AND INCLUDE A TRIANGULAR REVISION MARK.

2. PIPING SERVICE SPECIFICATIONS FOR NEW LINES ARE IN ACCORDANCE WITH GEMS J-208 TABLE 7.

3. LINE NUMBER SUFFIXES FOR INSULATION ARE IDENTIFIED AS FOLLOWS:

- PP PERSONNEL PROTECTION
- CC COLD CONSERVATION
- PHC PARTIAL HEAT CONSERVATION
- PHC FULL HEAT CONSERVATION
- OTC OPERATING TEMPERATURE CONTROL
- ST STEAM TRACED
- NI NO INSULATION

LINE IDENTIFICATION	
1A-0-432-6-112A-NI	INSULATION REQUIREMENTS
TEXACO PLANT NUMBER	TEXACO SERVICE SYMBOL
TEXACO PIPING MATERIAL	TEXACO PIPING MATERIAL SERVICE SPECIFICATION

DATE	DESCRIPTION	BY	CHKD	APPD
1/1/72	ADDED NOTE TO 5-RA-5, 5-RA-6, 5-RA-7, 5-RA-8, 5-RA-9, 5-RA-10, 5-RA-11, 5-RA-12, 5-RA-13, 5-RA-14, 5-RA-15, 5-RA-16, 5-RA-17, 5-RA-18, 5-RA-19, 5-RA-20, 5-RA-21, 5-RA-22, 5-RA-23, 5-RA-24, 5-RA-25, 5-RA-26, 5-RA-27, 5-RA-28, 5-RA-29, 5-RA-30, 5-RA-31, 5-RA-32, 5-RA-33, 5-RA-34, 5-RA-35, 5-RA-36, 5-RA-37, 5-RA-38, 5-RA-39, 5-RA-40, 5-RA-41, 5-RA-42, 5-RA-43, 5-RA-44, 5-RA-45, 5-RA-46, 5-RA-47, 5-RA-48, 5-RA-49, 5-RA-50, 5-RA-51, 5-RA-52, 5-RA-53, 5-RA-54, 5-RA-55, 5-RA-56, 5-RA-57, 5-RA-58, 5-RA-59, 5-RA-60, 5-RA-61, 5-RA-62, 5-RA-63, 5-RA-64, 5-RA-65, 5-RA-66, 5-RA-67, 5-RA-68, 5-RA-69, 5-RA-70, 5-RA-71, 5-RA-72, 5-RA-73, 5-RA-74, 5-RA-75, 5-RA-76, 5-RA-77, 5-RA-78, 5-RA-79, 5-RA-80, 5-RA-81, 5-RA-82, 5-RA-83, 5-RA-84, 5-RA-85, 5-RA-86, 5-RA-87, 5-RA-88, 5-RA-89, 5-RA-90, 5-RA-91, 5-RA-92, 5-RA-93, 5-RA-94, 5-RA-95, 5-RA-96, 5-RA-97, 5-RA-98, 5-RA-99, 5-RA-100			
1/1/72	ADDED 5" TO 5-RA-5, 5-RA-6, 5-RA-7, 5-RA-8, 5-RA-9, 5-RA-10, 5-RA-11, 5-RA-12, 5-RA-13, 5-RA-14, 5-RA-15, 5-RA-16, 5-RA-17, 5-RA-18, 5-RA-19, 5-RA-20, 5-RA-21, 5-RA-22, 5-RA-23, 5-RA-24, 5-RA-25, 5-RA-26, 5-RA-27, 5-RA-28, 5-RA-29, 5-RA-30, 5-RA-31, 5-RA-32, 5-RA-33, 5-RA-34, 5-RA-35, 5-RA-36, 5-RA-37, 5-RA-38, 5-RA-39, 5-RA-40, 5-RA-41, 5-RA-42, 5-RA-43, 5-RA-44, 5-RA-45, 5-RA-46, 5-RA-47, 5-RA-48, 5-RA-49, 5-RA-50, 5-RA-51, 5-RA-52, 5-RA-53, 5-RA-54, 5-RA-55, 5-RA-56, 5-RA-57, 5-RA-58, 5-RA-59, 5-RA-60, 5-RA-61, 5-RA-62, 5-RA-63, 5-RA-64, 5-RA-65, 5-RA-66, 5-RA-67, 5-RA-68, 5-RA-69, 5-RA-70, 5-RA-71, 5-RA-72, 5-RA-73, 5-RA-74, 5-RA-75, 5-RA-76, 5-RA-77, 5-RA-78, 5-RA-79, 5-RA-80, 5-RA-81, 5-RA-82, 5-RA-83, 5-RA-84, 5-RA-85, 5-RA-86, 5-RA-87, 5-RA-88, 5-RA-89, 5-RA-90, 5-RA-91, 5-RA-92, 5-RA-93, 5-RA-94, 5-RA-95, 5-RA-96, 5-RA-97, 5-RA-98, 5-RA-99, 5-RA-100			
1/1/72	REVISED PER DRAWING 5-RA-104 - REV. O			
1/1/72	ISSUED FOR CONSTRUCTION			
1/1/72	UPDATED TO JOB AWARD ISSUED FOR APPROVAL			

SCALE	NOTE	DESIGNED	DRAWN

BECHTEL	
HOUSTON	
TEXACO	TEXACO INC.
PUGET SOUND PLANT	
PROCESS PIPING & INST. DIAGRAM	
FEED PREPARATION SECTION	
CATALYTIC POLYMERIZATION UNIT	
5400-3	5-RA-4
APPROVED BY	TECHNICAL - 10055
G-71-57	TEXACO EST - 0910

JOB 2525 5-RA-4

R JOB N° C-1110 DWG N° Z2213 SHT N° 03-1-04

WA-TEX 000340

5J-E58
PROPANE STRIPPER
REBOILER

DUTY: 540 MBTU/HQ

WT%VAR	90
UNCLWT	503
7	115
F210	249

EXHAUST STEAM

0400
42
112

2110
14
110
225

CASE	DIVISION
LEV/ME	17,219
CAM	495
WAV	329
75	100
P31G	45

GAS MIX DRUM.

ATION

HYV. FCC. GASOLINE STORAGE (SEE NOTE 2)

九

1910	1889
0 914	45
LEB/ME	19,480
"5	186
2 116	74

CRU 40.2

DESIGN	
BPSD	2007
PMIC	300

NOTES

1. DESIGN BASIS OF RECOVERY SECTION :
 - 1. 90% CONVERSION OF BUTYLENE AND 87% CONVERSION OF PROPYLENE CHARGED TO THE CATALYTIC REACTOR.
 - 2. 90% PROPANE RECOVERY AT THE PLATFORMAR OFF PLANT.
2. GUM INHIBITOR IS INJECTED BY THE GAS RECOVERY UNIT
 - 1. INHIBITOR INJECTION FACILITIES OFF-PLANT.
3. BRED FIGURES MEASURED AT 50°F.
DPM FIGURES MEASURED AT OPERATING TEMPERATURES.
4. PROCESS CONDITIONS WERE REVISED ONLY FOR THE DEPROPANIZER. THE MATERIAL BALANCE THOIN IS FOR TOTAL AVAILABLE FEED. THE DC3 WILL HANDLE ABOUT 70% OF THIS FEED. ALL EXCHANGERS ARE ADEQUATE FOR TOTAL FEED.
5. THE DEPROPANIZER WILL NOT BE IN OPERATION,

SYMBOLS

	EXISTING
	NEW
	REMOVE
	RELOCATE
	NOT USED DO NOT REMOVE

REVISIONS OF MAJOR SYSTEMS ARE DESIGNATED BY THE SYMBOLS SHOWN ABOVE. MINOR REVISIONS ARE CIRCLED AND INCLUDE A TRIANGLE REVISION MARK.

REFERENCE DRAWINGS

PROCESS FLOW DIAG. GAS RECOVERY UNIT	2	4-RA-2
PROCESS FLOW DIAG. FIBER PREP. SECT. CAT. POLY. UNIT		3-RA-1
PROCESS FLOW DIAG. REACTOR SECTION CAT. POLY. UNIT		3-RA-3
PROCESS FLOW DIAG. FRAC. SECT. AUX. FLOW UNIT		8-RA-2

[illegible]

BECHTEL CORPORATION
SAN FRANCISCO

THE TEXAS COMPANY
PUGET SOUND WORKS

PROCESS FLOW DIAGRAM
RECOVERY SECTION
CATALYTIC POLYMERIZATION UNIT

	208 In.	504 V200 In.	WT.
	2525	5-RA-2	4A

8-19-57

6
ER
ORU
5

NOTES

1. NORMAL CASE IS OPERATING CASE WITH ALL PLANTS AT NORMAL CAPACITY.
2. ALTERNATE CASE IS OPERATING CASE WITH CAT POLY SHUTDOWN.
3. EQUIPMENT DESIGN IS BASED ON MAXIMUM CASE CONDITIONS SHOWN ON FLOW DIAGRAM.
4. FILLING TIME FOR BATCH CAUSTIC TREATERS IS 3.1 HRS. BASED ON 10 GPM OF 15% CAUSTIC PLUS WATER OF DILUTION.
5. STEAM COILS PROVIDED IN ALL STORAGE TANKS.
6. D.P.D. REBOILERS MEASURED AT 60°F. GPM MEASURED AT OPERATING TEMPERATURE.
7. SEE NOTE BELOW RELAYERS.
8. PROCESS CONDITIONS WERE REVISED DUE TO CRACKED C₃, C₄ AND SATURATED C₃, C₄ TREATERS.
9. RASCHIG RINGS BY OTHERS.

SYMBOLS (a)

- EXISTING
- - - NEW
- - - REMOVE
- - - RELOCATE
- - - NOT USED
- - - DO NOT REMOVE

REVISIONS OF MAJOR SYSTEMS ARE DESIGNATED BY THE SYMBOLS SHOWN ABOVE. MINOR REVISIONS ARE CIRCLED AND INCLUDE A PITCHHOLE REVISION MARK.

CASE INTERM
GPM 5
PDE 15
SEE NOTE 4

TO REFINERY FUEL GAS MIX DRUM

CAT POLY SPLITTER SHUTDOWN

TO CRUDE FURNACE

FROM REFINERY CAUSTIC SYSTEM

TO SPENT CAUSTIC STORAGE

TO LPG COOL. (CAT POLY SHUT DOWN)

TO CAT. POLY REACTOR SURGE DRUM

SATURATED C₃, C₄ TO CAT POLY DEPROPANIZER

TO WASTE WATER DISPOSAL

TO ALKYLATION UNIT

CASE	DEV
OPD	115
LAUW	12425
QPM	83
PF	110
PLG	110

CASE	NORM
LPD	3,300
LAUW	20,481
QPM	132
PF	110
PLG	150

REF	2193
LAUW	11,800
QPM	67
PF	115
PLG	235

CASE	NORM	ALT
OPD	115	157
LAUW	12,425	15,250
QPM	83	95
PF	110	120
PLG	110	120

REFERENCE DRAWINGS

PROCESS FLOW DIAGRAM RECOVERY SECTION CAT POLY UNIT	5-RA-2
PROCESS FLOW DIAGRAM DISTILLING/RECOVERY UNIT	4-RA-2
PROCESS FLOW DIAG. FEED. SECT. PLATFORMING UNIT	4-RA-9
PROCESS FLOW DIAGRAM ALKYLATION UNIT	5-RA-1
PROCESS FLOW DIAGRAM WASTE WATER DISPOSAL, FCCU	5-RA-1
PROCESS FLOW DIAGRAM REACTION SECT. CAT. POLY UNIT	5-RA-3

WA-TEX 000342

REVISIONS FOR ESTIMATE 2000	10/1	10/1	10/1
FOR LIST OF CHANGES, REV. 3	CC	CC	CC
FOR LIST OF CHANGES, REV. 1	CC	CC	CC
FOR LIST OF CHANGES, REV. 2	CC	CC	CC
ISSUED FOR APPROVAL	AKC	AKC	AKC

BECHTEL CORPORATION
SAN FRANCISCO

THE TEXAS COMPANY
PUGET SOUND WORKS

PROCESS FLOW DIAGRAM
FEED PREPARATION SECTION
CATALYTIC POLYMERIZATION UNIT

6400. I
APPROVED BY
THE TEXAS CO



2525

5-RA-1

3A

C3	CRACKED C ₂ -C ₄ CAUSTIC TREATER
C4	CRACKED C ₂ -C ₄ REGENERATED CAUSTIC TREATER
C5	CRACKED C ₂ -C ₄ WASH WATER TREATER
C6	DECASSING DRUM
C7	SATURATED C ₂ -C ₄ AMINE TREATER
C8	SATURATED C ₂ -C ₄ CAUSTIC TREATER
C9	SATURATED C ₂ -C ₄ REGENERATED CAUSTIC TREATER
C10	SATURATED C ₂ -C ₄ SALT FILTER
C11	CAUSTIC REGENERATOR
C12	CAUSTIC REGENERATOR ACCUMULATOR
C13	AMINE REGENERATOR
C14	AMINE REGENERATOR ACCUMULATOR
C15	CAT POLY SPLITTER
C16	CAT POLY SPLITTER ACCUMULATOR
C17	CAT POLY DEPROPANIZER
C18	CAT POLY DEPROPANIZER ACCUMULATOR
C19	CAT POLY DEBUTANIZER
C20	CAT POLY DEBUTANIZER ACCUMULATOR
C22	COMBINED FEED SURGE DRUM
C23A	REACTORS
C24A	CATALYST FILTER
C25	REACTOR EFFLUENT FLASH DRUM
C26	QUENCH SETTLER
C27	250" COND. FLASH DRUM
C28	40" COND. FLASH DRUM
C29	BLOWDOWN DRUM
C30	CAUSTIC REGENERATOR CONDENSATE POT
C31	AMINE REGENERATOR CONDENSATE POT
C32	SPLITTER CONDENSATE POT
C33	DEPROPANIZER CONDENSATE POT
C34	DEBUTANIZER CONDENSATE POT
C35	REACTOR FEED HEATER CONDENSATE POT
C36A	REACTOR FEED-WATER POTS
C37	M.E.A. RECLAIMER
D1	REGENERATED CAUSTIC STORAGE TANK
D2	AMINE STORAGE TANK
D3	AMINE "SUMM" TANK
D4	METERING TANK
D5	METERING TANK
D6	INHIBITOR BLENDING TANK
E1	CAUSTIC REGENERATOR CONDENSER
E2	CAUSTIC FEED HEATER
E3	CAUSTIC REGENERATOR FEED-BOTTOMS EXCHANGER
E4	REGENERATED CAUSTIC COOLER
E5	AMINE COOLER
E6A	AMINE REGENERATOR FEED-BOTTOMS EXCHANGER
E7	AMINE REGENERATOR CONDENSER
E8	AMINE REGENERATOR REBOILER
E9A	CAT POLY SPLITTER CONDENSER
E10	SPLITTER REBOILER
E11	SPLITTER FEED-BOTTOMS EXCHANGER
E12A	CAT POLY SPLITTER BOTTOMS COOLER
E13	DEPROPANIZER CONDENSER
E14	DEPROPANIZER REBOILER
E15	DEBUTANIZER O.H. CONDENSER
E16	DEBUTANIZER REBOILER
E17	POLY GASOLINE COOLER
E18	L.R.G. COOLER
E19A	EFFLUENT CHARGE EXCHANGER
E20	FEED HEATER
E21	EFFLUENT CONDENSER
E22	FLASH STEAM CONDENSER
F1	AMINE FILTER
F2	FILTER AID MIXING TANK
F3	WATER COALESCER
F4	N.C. FLASH POT (M.E.A. SYSTEM)

FOOTNOTES SHOWN - DIMENSIONS GIVEN FROM SOUTH EDGE & G. OF F.O.N'S.



1	REVISIONS	DATE	BY	APP'D
1	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
2	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
3	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
4	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
5	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
6	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
7	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
8	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
9	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
10	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE

1" = 10'

BECHTEL CORPORATION
SAN FRANCISCO

THE TEXAS COMPANY
PUGET SOUND WORKS

PLOT PLAN
CAT. POLY. UNIT

2525 5-AA-8



1	REVISIONS	DATE	BY	APP'D
1	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
2	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
3	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
4	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
5	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
6	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
7	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
8	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
9	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE
10	ISSUED FOR CONSTRUCTION	10/1/54	JR	LEE

SCALE: 1" = 10'

BECHTEL
HOUSTON

TEXACO INC.
PUGET SOUND PLANT

PLOT PLAN
CAT. POLY. UNIT

2525 5-AA-8

5-AA-8

GEND

SYMBOLS

UTILITY STATION
A-AIR 5-STEAM W-WATER

INSULATION
PERSONNEL PROTECTION

IDENT SYMBOLS

TRANSMITTER

BECHTEL - 10095

TEXACO EST-2910

SYMBOLS

EXISTING
NEW
REMOVE
RELOCATE
NOT USED (DO NOT REMOVE)

DEMOTES TIE-IN NUMBERS

IDENTIFICATION

IDENTIFICATION
NUMBER

IDENTIFICATION

PIPING SPEC. (BECHTEL)
LINE SERIAL NUMBER
TEXAS CO. SERVICE DESIGNATION
PLANT LETTER (C.L. CO.)
PLANT NUMBER (BECHTEL)
LINE SIZE

DESIGNATION

PIPE OR VAPOR, FUEL GAS
OR FEED WATER

NOTES

1. REVISIONS OF MAJOR SYSTEMS ARE DESIGNATED BY THE SYMBOLS SHOWN ABOVE. MINOR REVISIONS ARE CIRCLED AND INCLUDE A TRIANGULAR REVISION MARK.

2. PIPING SERVICE SPECIFICATIONS FOR NEW LINES ARE IN ACCORDANCE WITH GEMS J-208, TABLE 7.

3. LINE NUMBER SUFFIXES FOR INSULATION ARE IDENTIFIED AS FOLLOWS:

PP PERSONNEL PROTECTION
CC COLD CONSERVATION
PHC PARTIAL HEAT CONSERVATION
FHC FULL HEAT CONSERVATION
OTC OPERATING TEMPERATURE CONTROL
ST STEAM TRACED
NI NO INSULATION

PECIFICATION

CONSTRUCTION ALLOW.
OR ALLOW

LINE 10'-52'-0-700
LINE 10'-52'-0-715
TO LINE 10'-52'-0-727 & 40'
TO LINE 10'-52'-0-700

LINE IDENTIFICATION

1A-0-432-6'-J12A-NI

INSULATION REQUIREMENTS

TEXACO PLANT NUMBER

TEXACO SERVICE NUMBER

TEXACO PIPING MATERIAL SERVICE SPECIFICATION

DRAWINGS

CL. CAL. POLY. UNIT	5-0A-4
P. POLY. UNIT	5-0A-5
ST. POLY. UNIT	5-0A-6
CAL. POLY. UNIT	5-0A-7
POLY. UNIT	5-0A-11
RELIEF & BLOWDOWN	10-0A-1
	10-0A-2
	5-0A-8

OPERATION

COMPANY
ND WORKS

UMENT DIAGRAM
OWN SYSTEMS
UNIT

-AA-10

BECHTEL
HOUSTON

TEXACO INC.
PUGET SOUND PLANT

UTILITY PIPING & INSTRUMENT DIAGRAM
AIR & BLOWDOWN SYSTEMS
CAT. POLY. UNIT

Job No. 10095
TEXACO 177-3010

5-AA-10

5-AA-10

5-AA-11

TEXACO EST. 3910

3A

 EXISTING
 NEW
 REMOVE
 RELOCATE
 NOT USED - DO NOT REMOVE
 DENOTES TIE-IN NUMBERS

1. REVISION OF MAJOR SYSTEMS ARE DESIGNATED BY THE SYMBOLS SHOWN ABOVE. MINOR REVISIONS ARE CIRCLED AND INCLUDE A TRIANGULAR REVISION MARK.
2. PIPING SERVICE SPECIFICATIONS FOR NEW LINES ARE IN ACCORDANCE WITH GEMS J-2DB, TABLE 7.
3. LINE NUMBER SUFFIXES FOR INSULATION ARE IDENTIFIED AS FOLLOWS:

PP	PERSONNEL PROTECTION
CC	COLD CONSERVATION
PHC	PARTIAL HEAT CONSERVATION
FHC	FULL HEAT CONSERVATION
OTC	OPERATING TEMPERATURE CONTROL
ST	STEAM TRACED
NI	NO INSULATION

☐ - TRACED
☒ - TRACED & HOUSED

1A-O-432-6"-J13A-N1

TEXACO PLANT NUMBER TEXACO SERVICE SYMBOL SIZE INSULATION REQUIREMENTS

TEXACO PIPING MATERIAL SERVICE SPECIFICATION



7/14/73	REVISED SPEC. ON 53-260 ADDED INSTRUMENT STEAM TRACING SYMBOLS AS NOTED	240	26	TR J	27
7/14/73	ADDED FLGS TO LINE 53-0-260		28	TR J	28
8/20/73	DELETED "ST" FROM 53-C-52		29	TR J	29
2-27-73	REVISED PER DWG 5-AA-125 REV. 1A	FD	30	TR J	30
1/1/73	REVISED PER DRAWING 5-AA-125 REV. 0	T/C	31	TR J	31
7/20/72	ISSUED FOR CONSTRUCTION	27	32	TR J	32
10/13/71	REVISED 5-260 AVERAGE TYPED BY WZ REVISED VESSELS 53-C(51-52)/53-C(50) CCO (1) GUNITE LUTER OF 201212	210	33	TR J	33

No.	Date	Revisions	By	Check	Design	Eng.	Proj. Eng.	Asst.
SCALE NONE		DESIGNED		DRAWN				

TEXACO INC.
PUGET SOUND PLANT

PROCESS PIPING & INSTRUMENT DIAGRAM
SAT. FEED PREPARATION SECTION
CATALYTIC POLYMERIZATION UNIT



Job No.
BECHTEL - 10085
TEXACO - 3810

5-RA-25

7A

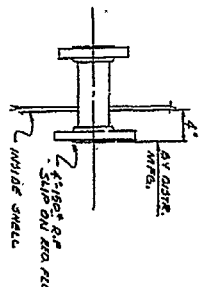
WA-TEX 000346

5-PA-25

10.2 VESSEL DRAWINGS

TABLE OF CONTENTS
SECTION 10.2 VESSEL DRAWINGS

Amine Treater	5-DC-40
Caustic Treater	5-DC-41
Regen. Caustic Treater	5-DC-42
Salt Filter	5-DC-43
Propane Stripper	5-DC-44

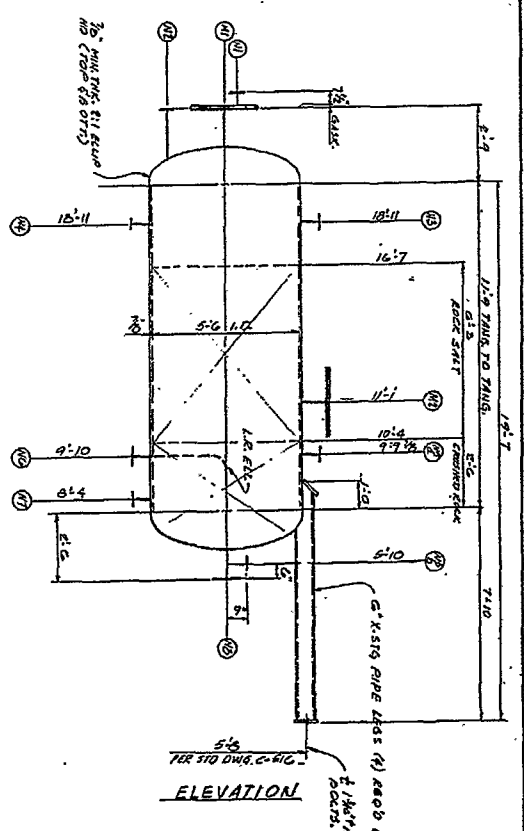
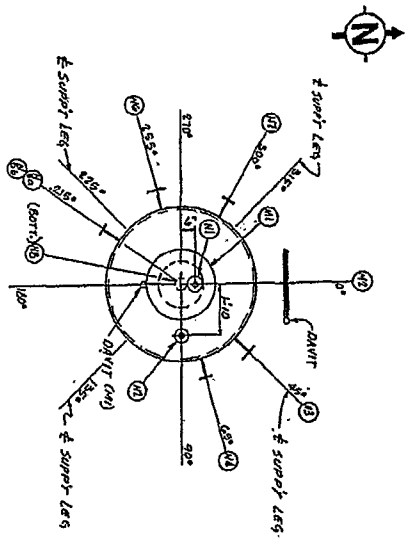
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DETAIL NOZZLE N13

[illegible]

WA-TEX 000351

			
TEKNO INC. HOUSTON PO BOX 6000 PLANT		TEKNO INC. HOUSTON PO BOX 6000 PLANT	
SATURATED C₂, CAUSTIC TREATMENT ITEM .5J-058		SATURATED C₂, CAUSTIC TREATMENT ITEM .5J-058	
CATALYTIC POLYMERIZATION UNIT - PLANT 5		CATALYTIC POLYMERIZATION UNIT - PLANT 5	
REACTOR REACTOR 1A REACTOR 2A		REACTOR REACTOR 1A REACTOR 2A	
5-DC-41		5-DC-41	
2.1		2.1	



GENERAL INFORMATION		DATE		TIME		PAGE		REMARKS	
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NAME	NO. 87	DATE	TIME	PAGE	REMARKS	NAME	NO. 88	DATE	TIME
NAME	NO. 89	DATE	TIME	PAGE	REMARKS	NAME	NO. 90	DATE	TIME
NAME	NO. 91	DATE	TIME	PAGE	REMARKS	NAME	NO. 92	DATE	TIME
NAME	NO. 93	DATE	TIME	PAGE	REMARKS	NAME	NO. 94	DATE	TIME
NAME	NO. 95	DATE	TIME	PAGE	REMARKS	NAME	NO. 96	DATE	TIME
NAME	NO. 97	DATE	TIME	PAGE	REMARKS	NAME	NO. 98	DATE	TIME
NAME	NO. 99	DATE	TIME	PAGE	REMARKS	NAME	NO. 100	DATE	TIME

BECHTEL
 HOUSTON
TEXACO INC.
 PLANT EQUIPMENT
SALT FILTER
 ITEM 5J-C60
 CATALYTIC POLYMERIZATION UNIT PLANT 5
 5-DC-43
 1A

WA-TEX 000362

10.3 HEAT EXCHANGERS

WA-TEX 000354

TABLE OF CONTENTS
SECTION 10.3 HEAT EXCHANGERS

Summary Table 10.3.1	Heat Exchangers
Data Sheets	Heat Exchangers

TABLE 10.3-1
EXCHANGER SUMMARY SHEET
CATALYTIC POLYMERIZATION UNIT PLANT 5J
ANACORTES, WASHINGTON

DATA				DESIGN			
Shell Data				Shell		Tube	
No. Passes	Diam. Inches	Material	No. Passes	Temp °F	Press PSIG	Temp °F	Press PSIG
2	15-1/4	C.S.	1	650	300	650	300
2	12	C.S.	1	400	65	200	275
6	19-1/4	C.S.	1	650	300	300	150

EXCHANGER SPECIFICATION SHEET

CUSTOMER AND PROJECT LOCATION		TEXACO INC.		EXCHANGER MFR. WESTERN SUPPLY													
PLANT		PUGET SOUND		REQ NO E-03													
EXCHANGER NO		5J-E57		ITEM NO 3													
SERVICE OF UNIT DEPROPANIZER FEED BOTTOM EXCHANGER																	
SIZE	15 x 240	TYPE	AES	CONNECTED IN	SERIES												
SURFACE PER UNIT	473	EFF	**	SHELLS PER UNIT	1												
				SURFACE PER SHELL	473												
PERFORMANCE OF ONE UNIT																	
		SHELL SIDE		TUBE SIDE													
FLUID CIRCULATED		DEPROPANIZER FEED		DEPROPANIZER BTMS.													
TOTAL FLUID ENTERING		55,357		49,257													
VAPOR																	
LIQUID		55,357		49,257													
STEAM																	
NON-CONDENSIBLES																	
FLUID VAPORIZED OR CONDENSED																	
STEAM CONDENSED																	
GRAVITY LIQUID		0.54 (IN) - 0.496 (OUT)		0.459 (IN) - 0.514 (OUT)													
VISCOSITY LIQUID		0.14 (IN) - 0.1 (OUT)		0.08 (IN) - 0.11 (OUT)													
MOLECULAR WEIGHT		55.8		58.7													
SENSIBLE HEAT - LIQUIDS		BTU/#		BTU/#													
LATENT HEAT - VAPORS		BTU/#		BTU/#													
TEMPERATURE IN		100		215													
TEMPERATURE OUT		154		154													
OPERATING PRESSURE		245		235													
NUMBER OF PASSES		1		2													
VELOCITY		FT/SEC		FT/SEC													
PRESSURE DROP		5		1.5													
ALLOW/CALC		7		1.5													
MIN		2		1.5													
PRESSURE RESISTANCE		0.001		0.001													
HEAT EXCHANGED - BTU/HR		1,850,000		N.T.D. (CORRECTED) 46													
TRANSFER RATE SERVICE		24.9		CLEAN ACTUAL FOULING FACTOR													
CONSTRUCTION																	
DESIGN PRESSURE		300		#/SQ IN													
TEST PRESSURE		450		#/SQ IN													
DESIGN TEMPERATURE		650		#/SQ IN													
TUBES CARBON STEEL NO 122		O.D. 1 1/4" BWG 14		LENGTH 240" PITCH 1" A													
SHELL CARBON STEEL		I.D. 15 1/4"		THICKNESS													
SHELL COVER CARBON STEEL				FLOATING HEAD COVER CARBON STEEL													
CHANNEL CARBON STEEL				CHANNEL COVER CARBON STEEL													
BUREAU SHEETS STATIONARY CARBON STEEL				FLOATING CARBON STEEL													
HAFFLES CROSS CARBON STEEL		TYPE SEGMENTAL		THICKNESS													
HAFFLE LONG		TYPE		THICKNESS													
TUBE SUPPORTS				THICKNESS													
GASKETS		METAL JACKETED ASBESTOS															
CONNECTIONS - SHELL - IN		3"		OUT 3"													
RATING		300* RF															
CONNECTIONS - CHANNEL - IN		4"		OUT 4"													
RATING		300* RF															
CORROSION ALLOWANCE - SHELL SIDE		1/8"		TUBE SIDE 1/8"													
CODE REQUIREMENTS		ASME SECTION VIII DIVISION CLASS R		SPEC E1M7													
WEIGHTS - EACH SHELL		BUNDLE		FULL OF WATER													
NOTE INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S.R.) AND WHETHER RADIOGRAPHED (X-R)																	
REMARKS - (1) BAFFLE SPACING 5 1/2". BAFFLE CUT 23%																	
<table border="1"> <tr> <td>REV</td> <td>A</td> <td>DATE</td> <td>1-28-73</td> <td>REVISION</td> <td>ISSUED FOR PURCHASE</td> </tr> <tr> <td>REV</td> <td>B</td> <td>DATE</td> <td>10-11-73</td> <td>REVISION</td> <td>ISSUED FOR PURCHASE</td> </tr> </table>						REV	A	DATE	1-28-73	REVISION	ISSUED FOR PURCHASE	REV	B	DATE	10-11-73	REVISION	ISSUED FOR PURCHASE
REV	A	DATE	1-28-73	REVISION	ISSUED FOR PURCHASE												
REV	B	DATE	10-11-73	REVISION	ISSUED FOR PURCHASE												

EXCHANGER SPECIFICATION SHEET

CUSTOMER AND PROJECT LOCATION		TEXACO INC		EXCHANGER MFR. WESTERN - SUPPLY																			
PLANT		PUGET SOUND		REQ. NO E-03																			
EXCHANGER NO		5J-E59		ITEM NO 4																			
SERVICE OF UNIT DEPROPANIZER BOTTOMS COOLER																							
SIZE	19 x 240	TYPE	AES	CONNECTED IN	SERIES PARALLEL																		
SURFACE PER UNIT	748	EFF	SHELLS PER UNIT	1	SURFACE PER SHELL 748 EFF																		
PERFORMANCE OF ONE UNIT																							
FLUID CIRCULATED		SHELL SIDE		TUBE SIDE																			
TOTAL FLUID ENTERING		DEPROPANIZER BTMS		COOLING WATER																			
VAPOR		49,257		73,000																			
LIQUID		49,257		73,000																			
STEAM																							
NON-CONDENSIBLES																							
FLUID VAPORIZED OR CONDENSED																							
STEAM CONDENSED																							
GRAVITY - LIQUID SP		0.514 (IN) - 0.554 (OUT)																					
VISCOSITY - LIQUID CP		0.11 (IN) - 0.145 (OUT)																					
MOLECULAR WEIGHT - VAPORS																							
SENSIBLE HEAT - LIQUIDS		BTU/°		BTU/°																			
LATENT HEAT - VAPORS		BTU/°		BTU/°																			
TEMPERATURE IN		154 °F		76 °F																			
TEMPERATURE OUT		100 °F		100 °F																			
OPERATING PRESSURE PSIG		230		40																			
NUMBER OF PASSES		1		6																			
VELOCITY		FT/SEC		FT/SEC																			
PRESSURE DROP ALLOW/CALC		4 / 4		12 / 12																			
FOULING RESISTANCE MIN		0.001		0.003																			
HEAT EXCHANGED - BTU/HR		1,750,000		M T D (CORRECTED) 29.8																			
TRANSFER RATE - SERVICE		78.5		CLEAN ACTUAL FOULING FACTOR																			
CONSTRUCTION																							
DESIGN PRESSURE		300		150																			
TEST PRESSURE		450		225																			
DESIGN TEMPERATURE		650		300																			
TUBES INH ADM		NO 193 O D 3/4 BNG 16		LENGTH 240" PITCH 1" 2 2 2 0																			
SHELL CARBON STEEL		I D 19 1/4"		THICKNESS																			
SHELL COVER CARBON STEEL				FLOATING HEAD COVER CARBON STEEL																			
CHANNEL CARBON STEEL				CHANNEL COVER CARBON STEEL																			
TUBE SHEETS STATIONARY NAVAL ROLLED BRASS				FLOATING NAVAL ROLLED BRASS																			
RAFFLES - CROSS CARBON STEEL		TYPE SEGMENTAL		THICKNESS																			
RAFFLE - LONG		TYPE		THICKNESS																			
TUBE SUPPORTS				THICKNESS																			
GASKETS METAL JACKETED ASBESTOS																							
CONNECTIONS - SHELL - IN		4"		OUT 4"																			
RATING		300 * RF																					
CHANNEL - IN		4"		OUT 4"																			
RATING		150 * RF																					
CORROSION ALLOWANCE - SHELL SIDE		1/8"		TUBE SIDE 1/8"																			
CODE REQUIREMENTS ASME SECTION VIII DIVISION CLASS		R		SPEC EJM7																			
WEIGHTS - EACH SHELL		BUNDLE		FULL OF WATER																			
NOTE INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S R) AND WHETHER RADIOGRAPHED (X-R)																							
REMARKS (1) BAFFLE SPACING 5". BAFFLE CUT 10%																							
<table border="1"> <tr> <td>REV</td> <td>DATE</td> <td>REVISION</td> <td>JOB NO</td> <td>DRWG NO</td> <td>REV</td> </tr> <tr> <td>1</td> <td>10-10-73</td> <td>REVISED, ISSUED FOR CONST</td> <td>10035</td> <td>DS-5-E-2</td> <td>1</td> </tr> <tr> <td>2</td> <td></td> <td>ISSUED FOR PURCHASE</td> <td></td> <td></td> <td></td> </tr> </table>						REV	DATE	REVISION	JOB NO	DRWG NO	REV	1	10-10-73	REVISED, ISSUED FOR CONST	10035	DS-5-E-2	1	2		ISSUED FOR PURCHASE			
REV	DATE	REVISION	JOB NO	DRWG NO	REV																		
1	10-10-73	REVISED, ISSUED FOR CONST	10035	DS-5-E-2	1																		
2		ISSUED FOR PURCHASE																					

WA-TEX 000358

EXCHANGER SPECIFICATION SHEET

65-15874-1000

WA-TEX 000359

10.4 PUMPS

TABLE OF CONTENTS

SECTION 10.4 PUMPS

Section 10.4 Pumps

Summary Table 10.4.1

Data Sheets - All Pumps

Pump Curves - All Pumps

TABLE 10.4-1
CENTRIFUGAL PUMP SUMMARY SHEET
CATALYTIC POLYMERIZATION UNIT PLANT 5J
ANACORTES, WASHINGTON

CONSTRUCTION DATA					DRIVER DATA			
Pump No.	Impeller Dia. Inches		Number of Stages	Shaft Seal	RPM	Rated H.P.	Type	Full Load Amps
	Rated	Max.						
1	9	10-1/4						
	9-1/2	10-1/2		Mech	3600	15	Motor	

CENTRIFUGAL PUMP DATA SHEET

APPLICABLE TO PROPOSALS () PURCHASE (X) AS BUILT ()
 NOTE () INDICATES INFORMATION TO BE COMPLETED BY PURCHASER.
 () BY MANUFACTURER

EXISTING PUMP
 JOB NO 10095. ITEM NO 55-G-3
 PURCHASE ORDER NO 10095-G-02
 REGISTRATION NO 10095-G-02
 INQUIRY NO
 DATE
 REVISION

FOR TEXACO, INC. SITE PUGET SOUND
 UNIT CAT. POLY SERVICE WATER WASH.
 NO PUMPS REQ'D 1 NO MOTORS REQ'D 1 ITEM NO 55-GM-3 PROVIDED BY EXISTING MTD BY
 NO TURBINES REQ'D — ITEM NO — PROVIDED BY — MTD BY —
 PUMP MFR WILSON-SNYDER SIZE AND TYPE 1 1/2 X 2 - 2 STG SERIAL NO 6541

OPERATING CONDITIONS, EACH PUMP				PERFORMANCE (A)	
LIQUID <u>WATER</u>	U.S. GPM @ FT. HOR. <u>120</u>	RATED <u>134</u>	PROPOSAL CURVE NO <u>29-190-300</u>		
PT. F. HOR. <u>80</u> MAX	DISCH. PRESS. PSIG <u>307</u>	RATED <u>35</u>	RPM <u>3550</u> NPSH (WATER) <u>11 1/4</u>		
SP. GR. @ PT. <u>1.0</u>	SUCT. PRESS. PSIG MAX <u>—</u>	RATED <u>35</u>	EFF. <u>52</u> BHP RATED <u>42.39</u>		
VAP. PRESS. @ PT. PSIA <u>0</u>	DIFF. PRESS. PSI <u>—</u>	RATED <u>35</u>	MAX. BHP RATED IMP. <u>50.83</u>		
VIS. @ PT. S.W. <u>—</u> CP <u>—</u>	DIFF. HEAD FT. <u>628</u>	RATED <u>35</u>	MAX. HEAD RATED IMP. <u>—</u>		
CORR. EROD. CAUSED BY <u>—</u>	NPSHA. FT. <u>730</u>	RATED <u>35</u>	MIN. CONTINUOUS GPM <u>—</u>		
	HYD. HP. <u>22.04</u>	RATED <u>35</u>	ROTATION (VIEWED FROM CPLG END) <u>—</u>		

CONSTRUCTION (A)					SHOP TESTS	
NOZZLES	SIZE	RATING	FACING	LOCATION	NON WIT. PERF.	WIT. PERF.
SUCTION	<u>2</u>	<u>300</u>	<u>RF</u>	<u>TOP</u>	NON WIT. HYDRO	WIT. HYDRO
DISCHARGE	<u>1 1/2</u>	<u>300</u>	<u>RF</u>	<u>TOP</u>	NPSH REQ'D	WIT. NPSH

CASE MOUNT ☒ CENTERLINE ☐ FOOT ☐ BRACKET ☐ VERT. (TYPE)
 SPLIT ☐ AXIAL ☒ RAD. TYPE VOLUTE ☒ SGL ☐ DBL ☐ DIFFUSER
 PRESS. ☒ MAX. ALLOW. 400 PSIG 60° F. ☒ HYDRO TEST 600 PSIG
 CONNECT ☒ VENT ☒ FRAIN ☐ GAGE
 IMPELLER DIA. ☐ RATED 8 3/4 ☒ MAX 13 ☐ TYPE CLOSED (A)
 MOUNT ☐ BETWEEN BRGS. ☒ OVERHUNG ☐ WEAR RG. DIAM. CLING
 BEARINGS TYPE ☐ RADIAL BALL ☐ THRUST BALL
 LUBE ☒ RING OIL ☐ FLOOD ☐ OIL MIST ☐ FLINGER ☐ PRESSURE
 COUPLING ☒ MRF FALK ☐ MODEL SPACER TYPE
 DRIVER HALF MTD BY ☐ PUMP MFR ☐ DRIVER MFR ☐ PURCHASER
 PACKING ☐ MFR & TYPE ☐ SIZE/NO. OF RINGS —
 MECH. SEAL ☒ MFR & MODEL CRANE 1B API CLASS CODE —
☐ MFR CODE —

SHOP INSPECTION
 DISMANT. & INSP. AFTER TEST
 OTHER NONE

MATERIALS
 API CASE TRIM CLASS GEMS-P-2M7
 GROUP 2A2
 CASE CI
 SHAFT 4140 HT

AUXILIARY PIPING
☐ C.W. PIPE PLAN ☐ C.W. OSS. TUBING ☐ PIPE
☐ TOTAL COOLING WATER REQ'D GPM — ☐ SIGHT FI REQ'D —
 WACKING COOLING INJECTION REQ'D ☐ TOTAL GPM — ☐ PSIG
 SEAL FLUSH PIPE PLAN ☐ C.W. OSS. TUBING ☐ PIPE
 EXTERNAL SEAL FLUSH FLUID ☐ GPM — ☐ PSIG
 AUXILIARY SEAL PLAN ☐ C.W. OSS. TUBING ☐ PIPE
 AUX. SEAL QUENCH FLUID —

BASEPLATE ☐
 VERTICAL PUMPS
 PIT OR SUMP DEPTH (C)
 MIN. SUBMERGENCE REQ'D ☐
 COLUMN PIPE ☐ FLANGED ☐ THREADED
 LINE SHAFT ☐ OPEN ☐ ENCLOSED
 BRGS. ☐ BOWL ☐ LINE SHAFT
 BRG. LUBE ☐ WATER ☐ OIL ☐ GREASE
 FLOAT & ROD CS SS BRZ NONE
 FLOAT SWITCH ☐
 PUMP THRUST LB ☐ UP ☐ DOWN

MOTOR DRIVER
 HP 50 RPM 3600 FRAME 4443 VOLTS/PHASE/CYCLES 440/3/60
 MFR GE BEARINGS BALL LUBE GRS
 TYPE SC IND INSUL. A FULL LOAD AMPS 61
 ENC. TEFC TEMP. RISE. C 55° LOCKED MOTOR AMPS —
 (V) VHS VSS VERT. THRUST CAP. LB — SERVICE FACTOR 1.0

APPROX. WT. PUMP & BASE
 MOTOR — TURBINE —

API STANDARD 610 GOVERNS UNLESS OTHERWISE NOTED EXISTING PUMP MODIFIED FOR ABOVE
SERVICE - NEW IMPELLER & WEAR RINGS

	2	11/5/73	AS BUILT - ISSUED FOR CONST.				JOB NO	DRAWING NO	REV
	1	12/4/73	ISSUED FOR PURCHASE						
	0	11/10/73	ISSUED FOR QUOTATION				10095	DS-5-G-2	1
	NO	DATE					SHEET	1	OF

JOB NO. 10095 ITEM NO. 5J-E 5214

PURCHASE ORDER NO. _____
 REQUISITION NO. 10075-G4.
 INQUIRY NO. _____
 DATE _____ REVISION _____

OPERATING CONDITIONS, EACH PUMP		PERFORMANCE
LIQUID <u>3/4</u>	U.S. GPM @ FT. HOR. <u>66</u> @ <u>1</u> RATED	PROPOSAL CURVE NO. <u>2424-1</u>
	DISCH. PRESS. PSIG <u>327</u>	RPM <u>3550</u> NPSH _R (WATER) <u>6</u>
PT. F. HOR. <u>100</u> MAX	SUCT. PRESS. PSIG MAX <u>330</u> RATED <u>250</u>	EFF. <u>39%</u> BHP RATED <u>7.5</u>
SP. GR. @ PT. <u>2.415</u>	DIFF. PRESS. PSI <u>27</u>	MAX. BHP RATED IMP. <u>13.0</u>
VAP. PRESS. @ PT. PSIA <u>232</u>	DIFF. HEAD, FT. <u>377.5</u> @	MAX. HEAD RATED IMP. <u>400</u>
VIS. @ PT. SSU <u>CP 2.1</u>	NPSH _A , FT. <u>> 30</u>	MIN. CONTINUOUS GPM <u>15</u>
CORR./EROS. CAUSED BY _____	HYD. HP <u>2.962</u> @	ROTATION (VIEWED FROM CPLG. END) <u>CCW</u>

CONSTRUCTION				
NOZZLES	SIZE	RATING	FACING	LOCATION
SUCTION	2	300#	RF	END
DISCHARGE	1 1/2	300#	RF	TOP
CASE MOUNT ☒ CENTERLINE ☐ FOOT ☐ BRACKET ☐ VERT (TYPE)				
SPLIT ☐ AXIAL ☒ RAD TYPE VOLUTE ☒ SGL ☐ DBL ☐ DIFFUSER				
PRESS ☐ MAX ALLOW. 667 PSIG 60 F ☐ HYDRO TEST 1200 PSIG				
CONNECT ☒ VENT ☒ FRAIN ☐ GAGE				
IMPELLER DIA ☐ RATED 9 1/2 ☐ MAX 10 1/2 ☐ TYPE CLOSED				
MOUNT ☐ BETWEEN BRGS ☒ OVERHUNG ☐ WEAR RG DIAM/CLUNG 0.920				
BEARINGS TYPE ☐ RADIAL ND3210LR ☐ THRUST ND-4509-A				
LUBE ☐ RING OIL ☐ FLOOD ☐ OIL MIST ☒ FLINGER ☐ PRESSURE				
COUPLING ☐ MRF FAST ☐ MODEL B				
DRIVER HALF MTD BY ☒ PUMP MFR ☐ DRIVER MFR ☐ PURCHASER				
PACKING ☐ MFR & TYPE ☐ SIZE/NO OF RINGS				
MECH SEAL ☐ MFR & MODEL EW-QB ☐ API CLASS CODE BSTFJ				
☐ MFR CODE 04-2125-504N				

SHOP TESTS	
☒ NON-WIT PERF	☐ WIT PERF
☐ NON-WIT HYDRO	☐ WIT HYDRO
☐ INSPH RED'D	☐ WIT INSPH
☒ SHOP INSPECTION	
☐ NONMANT & INSP AFTER TEST	
☐ OTHER	

MATERIALS	
API CASE - TRIM CLASS	
SEMI F-1-1	
SEMI F-1-1	
BASEPLATE ☐	ESDR
VERTICAL PUMPS	

AUXILIARY PIPING

☐ CW PIPE PLAN ☐ CU ☐ SS ☐ TUBING ☐ PIPE _____

☐ TOTAL COOLING WATER REQ'D GPM 0 ☐ SIGHT FL REQ'D _____

☐ PACKING COOLING INJECTION REQ'D ☐ TOTAL GPM ☐ PSIG

SEAL FLUSH PIPE PLAN 12 XCS ☐ SS ☐ TUBING ☒ PIPE 5/8" X 2' NIPER ^{SUGA}

☐ EXTERNAL SEAL FLUSH FLUID ☐ GPM ☐ PSIG

☐ AUXILIARY SEAL PLAN ☐ SS ☐ TUBING ☐ PIPE _____

☐ AUX SEAL QUENCH FLUID WATER QUENCH CONTROL REQ'D

PIT OR SUMP DEPTH ☐
MIN SUBMERGENCE REQ'D ☐
COLUMN PIPE ☐ FLANGED ☐ THREADED
LINE SHAFT ☐ OPEN ☐ ENCLOSED
BRGS ☐ BOWL ☐ LINE SHAFT
BRG LUBE ☐ WATER ☐ OIL ☐ GREASE
FLOAT & ROD CS SS BRZ NONE
FLOAT SWITCH ☐
PUMP THRUST ☐ UP ☐ DOWN

MOTOR DRIVER

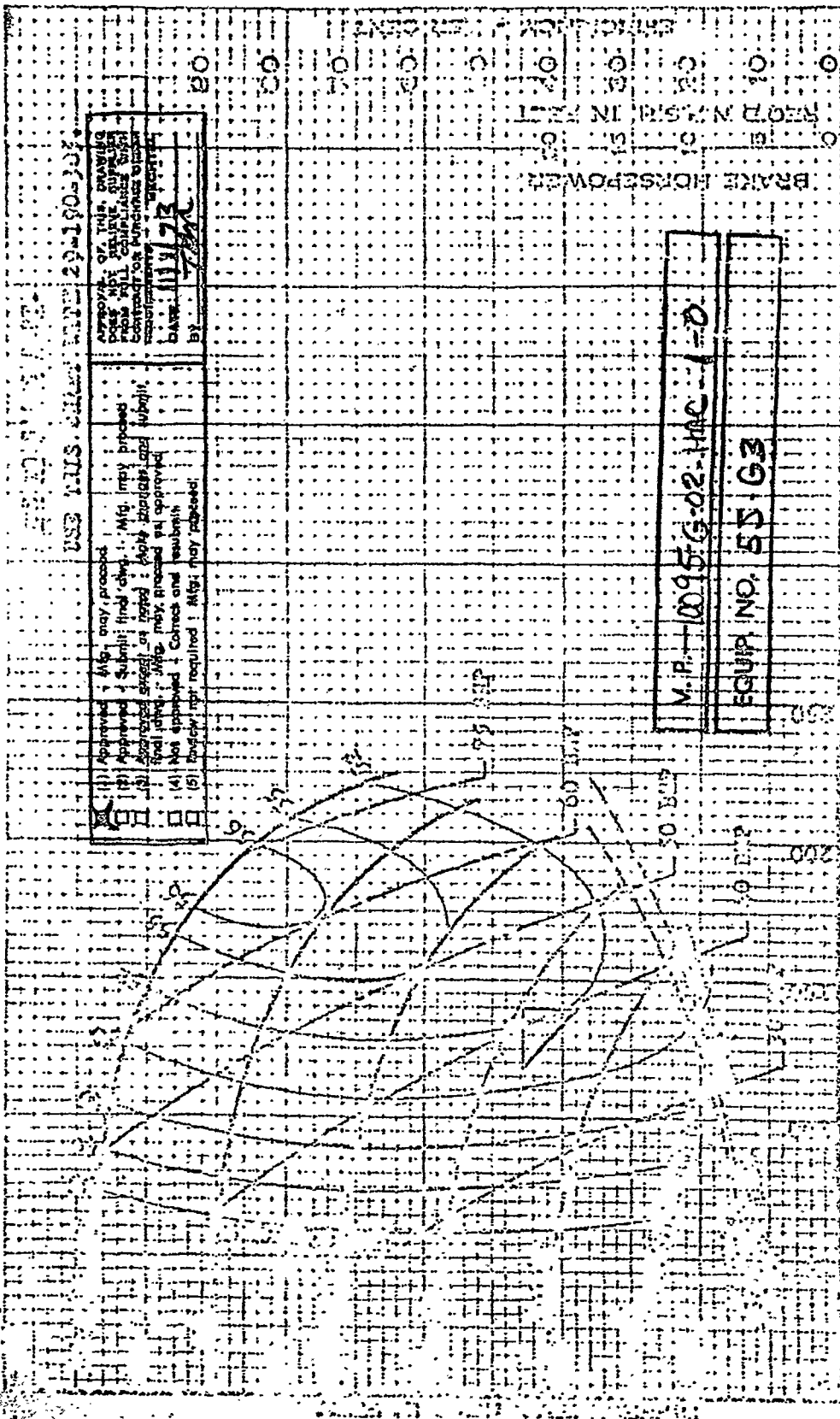
HP	15	RPM	3510	FRAME	254T	VOLTS/PHASE/CYCLES	460-3-60
MFR	AC	BEARINGS	BALL	LUBE	Oil		
TYPE	TK-12	INSUL	B	FULL LOAD AMPS	19.1		
ENC	TEFC	TEMP RISE C	50	LOCKED MOTOR AMPS	116		
WHS	VSS	VERT THRUST CAP. LB		SERVICE FACTOR	1.0		

APPROX WT PUMP & BASE 600
MOTOR 252 TURBINE

API STANDARD 610 GOVERNS UNLESS OTHERWISE NOTED

	2	12/5/73	45 BUILT - ISSUED FOR CONST.				JOB NO	DRAWING NO	REV
	1	12/5/73	ISSUED FOR PURCHASE	ST	TR		10795	CS-53-G-1	1
	0	10/73	ISSUED FOR QUOTATION						
	NO	DATE					SHEET	1	OF 1

CENTRIFUGAL PUMP PERFORMANCE CURVE



APPROVED: ☐ Mfg. may proceed
 (1) Approved: Submit final dwg. Mfg. may proceed
 (2) Approved: Submit final dwg. Mfg. may proceed
 (3) Approved: Submit final dwg. Mfg. may proceed
 (4) Not approved: Correct and resubmit
 (5) Resubmit not required: Mfg. may proceed

DATE: 11/1/73 BY: [Signature]

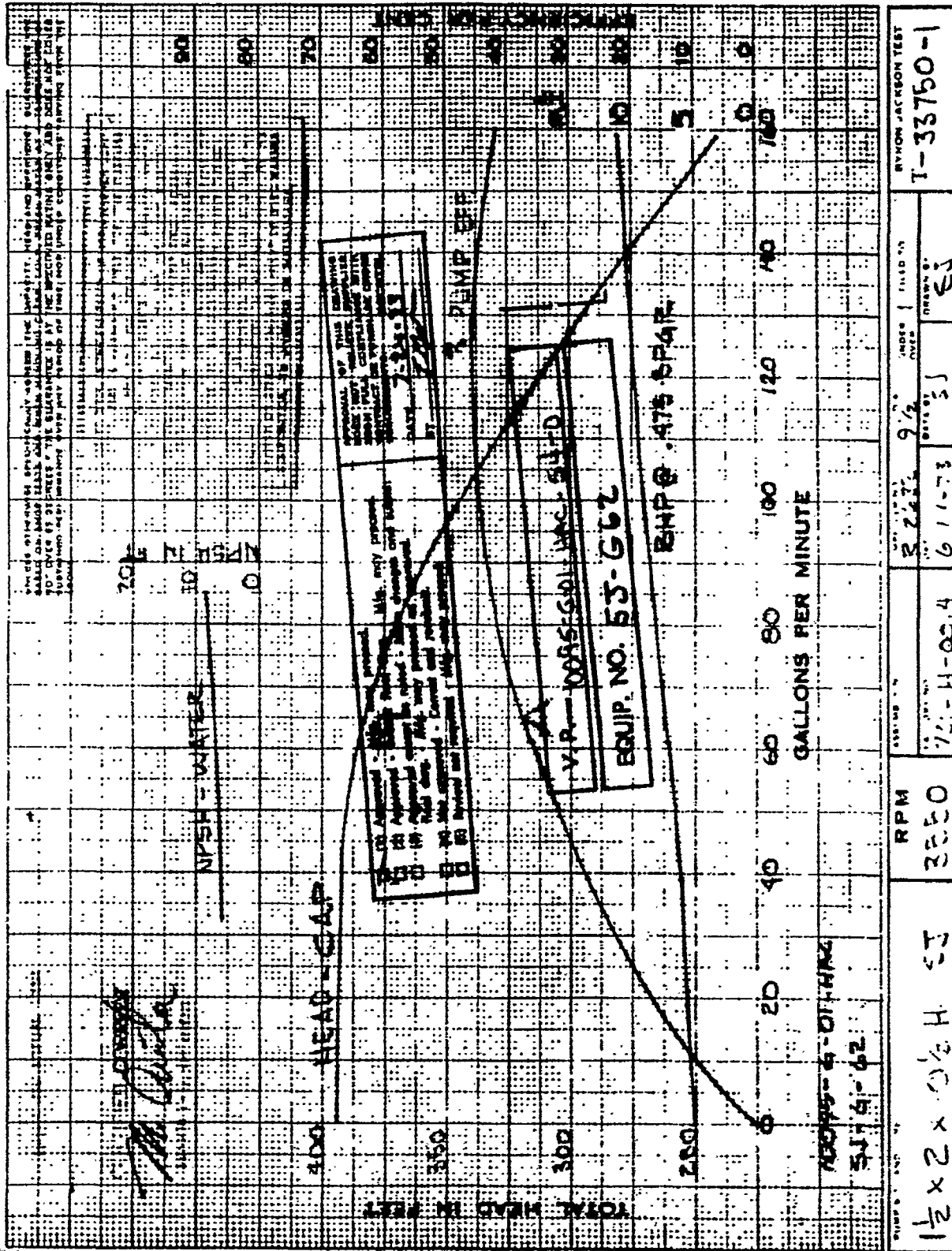
M.P. 10095-G-02-HAC-1-0
 EQUIP. NO. 55 G3

GALLONS PER MINUTE

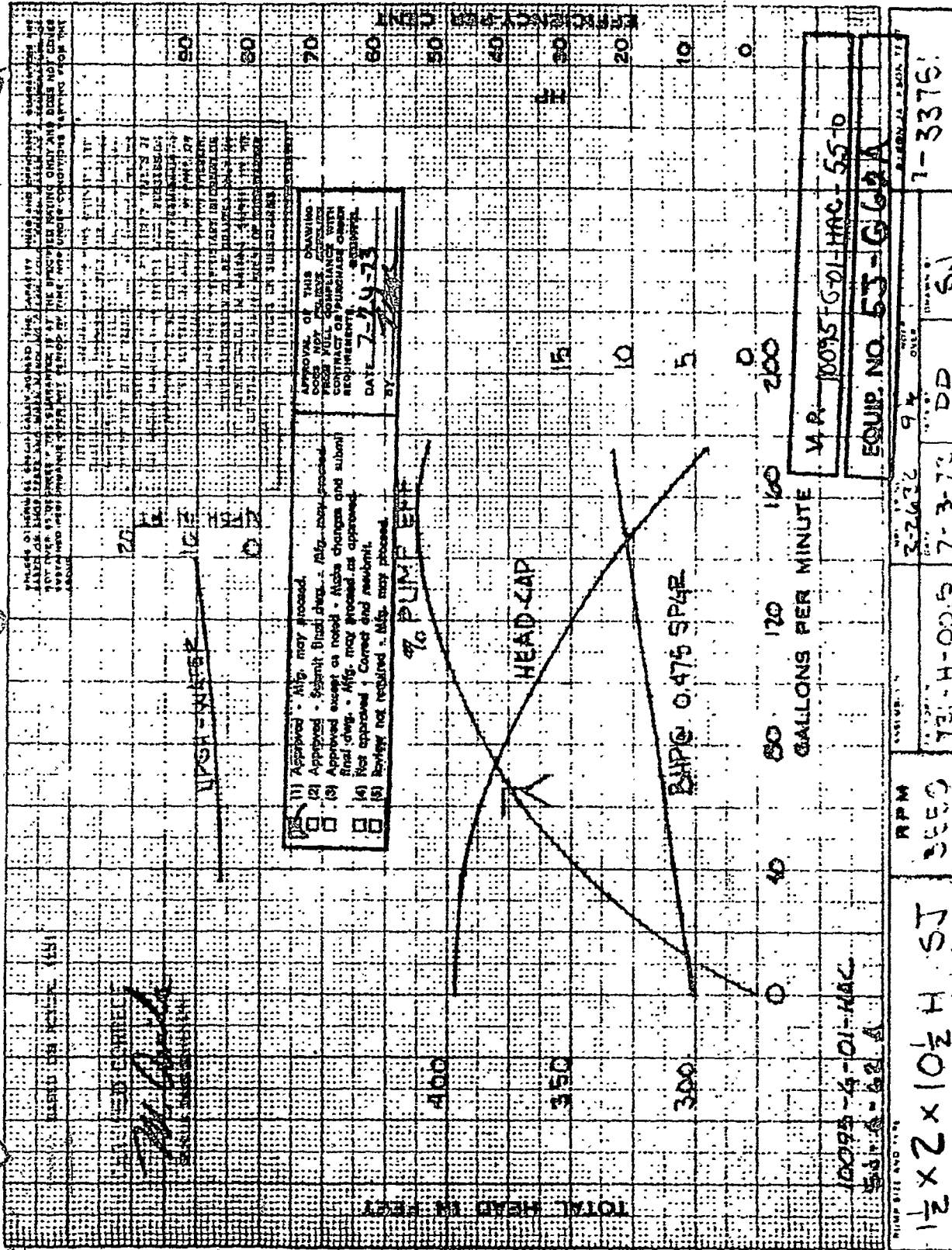
Whisper-Pump	SIZE 1-1/2 X 2	QPM 3520	CUSTOMER TEXACO
	TYPE 100-2000	IMPELLER 20-17-20 DIA. YAR.	ORDER NO. 4-65-41
	ITEM NO.	EYE AREA 4 1/2 SQ. IN.	CERTIFIED BY
	DATE	DRIVER HORNPOWER	CURVE NO. 20-20-20

W 124 REV 124

BYRON CKSON



BYRON JACKSON



10.5 INSTRUMENTS

TABLE OF CONTENTS

SECTION 10.5 - INSTRUMENTS

Summary Table - Flow Element	10.5.1
Summary Table - Relief Valves	10.5.2
Summary Table - Alarm and Shutdown Settings	10.5.3
Control Valve Data Sheet	

TABLE 10.5-2
RELIEF VALVE SUMMARY SHEET
CATALYTIC POLYMERIZATION UNIT PLANT 5.J
ANACORTES, WASHINGTON

Tag No.	Service	Size	Set P. psi
SPSV-101	5J-C57	2" x 3"	110 PSIG
SPSV-102	5J-C58	"	"
SPSV-103	5J-C59	"	"
SPSV-104	5J-C60	"	"
SPSV-105	5J-C61	1-1/2" x 2"	260 PSIG
SPSV-107	5J-ES	3/4" x 1"	75 PSIG
SPSV-220	5J-ES8	1-1/2" x 3"	65 PSIG

TABLE 10.5-14
FLOW ELEMENT SUMMARY SHEET
CATALYTIC POLYMERIZATION UNIT PLANT 5J
ANACORTES, WASHINGTON

Flow Element No.	Service	Orifice Size	Line Size	Header Coefficient
SFE-19	Bims. Cooler Outlet	2.132	3" Sch 40	40 BPH
SFE-200	Amine to 5J-C57	1.978	3" Sch 40	15 BPH
SFE-201	Caustic to 5J-C59	1.238	2" Sch 40	8 BPH
SFE-205	Deprop. Feed Bypass	1.123	2" Sch 40	8 BPH
SFE-206	Stm. to 5J-E58	1.959	3" Sch 40	100#/hr
SFE-207	Deprop. Reflux	0.901	2" Sch 40	4 BPH
SFE-208	Stripper Vapor Outlet	1.923	3" Sch 40	4000 SCFH

TABLE 10.5-3
ALARM AND SHUTDOWN SETTINGS
PLANT 5J - CATALYTIC POLYMERIZATION UNIT
ANACORTES, WASHINGTON

Alarm No.	Switch No.	Service	Switch Location	Switch Function	Switch Activator set	Switch Set Point	Switch Actuated by	Remarks
51AH-201	51SL-201	5J-C57	Main Panel	Low Level	5.4 PSIG	5.4 PSIG	Inst. Air	
51AH-201	51SH-201	5J-C57	Main Panel	High Level	12.8 PSIG	12.8 PSIG	Inst. Air	
51AH-205	51SL-205	5J-C59	Main Panel	Low Level	5.4 PSIG	5.4 PSIG	Inst. Air	
51AH-205	51SH-205	5J-C59	Main Panel	High Level	12.8 PSIG	12.8 PSIG	Inst. Air	

CONTROL VALVE DATA SHEET

WA-TEX 000373

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FLUID									
INLET PSIG	MIN. OPER. MAX.	275		265		234			
OUTLET PSIG	MIN. OPER. MAX.	75		65		220			
INLET TEMP °F	OPER. MAX.	110				112			
OPER. SP. GR.	MOL. WT.	1.0	-	1.2	-	2.47	-		
TEMP °F OR % FLASH	OPER. VISC. C.P.								VALVE 9220
CRIT. PRESS. P _c	VAPOR PRESS. P _v								BY TITANO
OPER. FLOW	SIZING FLOW	66	43	30	51	14	20		
MIN. FLOW	MAX. FLOW								
FLOW UNITS	ΔP SIZING	66M	200			36M	5		NO DATA
ΔP SHUT OFF	ΔP MIN.	275							
Cv @ SIZING ΔP & FLOW	MIN. Cv	6.57		3.9		6.1			FURNISHED
Cv-VALVE SELECTED	FACTORS	12.2		9.69		9.86			
		K _m = .91		K _m = .8		K _m = .86			
				SPLIT BODY					
SIZE	TYPE	1" GLOBE							2" GLOBE
PRESS. RATING	CONNECTIONS	300# RF		300# RF		300# RF			300# RF
MATERIAL	CLASS	C.S.		MA602		2.5			C.S.
BONNET TYPE	BOLTS	PLAIN	STD.						PLAIN STD.
PACKING	TYPE MAT'L	PLAIN	ASBESTOS						TEFLON
LUBRICATOR	ISOL. VALVE	YES	YES						YES YES
PORT SIZE	NO. OF PORTS	FULL	1	3/4"	1	1/2"	1		2 1/2" 1
CHARACTER.	PLUG TYPE	2"	M.FORM	2"	CNT	2"	M.FORM		LIN. CAGE
GUIDE TYPE	TRIM SPEC.		A		MA602		A		A
ACTION OPEN-CLOSE	FLOW. OPENS-CLOSES	CLOSE	OPEN						CLOSE
ACTUATOR TYPE		DIAP.						DIAP	
MOTIVE POWER	LINEAR / ROTARY	AIR	LIN.						AIR LIN
PRESS. / VOLTAGE	POS. ON POWER FAIL	-	C						- C
THRUST OR TORQUE REQ.	SHUT OFF OPER.								
SIZE	MAX. OUTPUT	30		30		30			
MANUAL O'RIDE	POS. FEEDBACK TYPE	-	-						-
POSITIONER OUTPUT	SINGLE/DUAL	3-15	C						-
INPUT SIGNAL	SUPPLY PSIG	2-15	20			2-15	-		2-15 -
BY-PASS	GAUGES	YES	YES						-
MISC.				CS. FLANGES					
PURCH.		AIRSET MTR & APED		YES					
M. R. / P. O. NUMBER		J-411						J-411	
MANUFACTURER		FISHER						FISHER	
MODEL NO.		667 ES		667 E		667 ES		667 ED	
P. & I. D. NUMBER		S-RA 25		S-RA 25		S-RA 5		4-RA-6	
SERVICE		SPENT MEA		SPENT MEA		SPENT MEA		2ND STG SEP. 66	
LINE SIZE - NO. - SPEC.		3" J35A		2" J35B		3" J32		4" J041B	
INSTRUMENT TAG NO.		SLV-201		SLV-205		SLV-210		4LV-72	
NO.	DATE	REVISIONS		NOTES					
1	2-7-75	GEN REVISION		JT					
0	1-31-73	ISSUED FOR PURCHASE		JT					
ORIGIN R&C ENG.		CONTROL VALVES		JOB NO		10095			
		TEXACO-EST 3910 FISHER MAIN PLANT 10095		DATA SHEET NUMBER		REV.			
				DS-5-131		4			

WA-TEX 000374



WA-TEX 000375