

PLAINTIFF'S EXHIBIT

TEX-119

ADDENDUM TO THE OPERATING MANUAL

CATALYTIC POLYMERIZATION UNIT

PLANT 5J

TEXACO INC.

PUGET SOUND PLANT

ESTIMATE 3910

BECHTEL INCORPORATED

HOUSTON, TEXAS

1973

WA-TEX 000376

I. GENERAL
DESCRIPTION

1 - 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. 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 amine charge pump, 5J-G6, between the present Amine Regeneration Unit and the new Amine Regeneration Unit (Estimate 3600). The saturated C_3 - C_4 amine treater, 5J-C57, and the cracked C_3 - C_4 amine treater, 5J-C2, may be continued in operation when the present Amine Regeneration Unit is down for turnaround and inspection, by using regenerated amine from the new Amine Regeneration Unit.

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 compressor fuel. 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 exhaust 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 PSD 5-RA-5)

The amount of saturated C_3-C_4 from the feed preparation section that is pumped directly to GRU 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 PROCEDURE

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 C_3-C_4 treating section is similar to the startup procedure for the existing saturated C_3-C_4 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>
5PSV-101	Saturated C ₃ -C ₄ Amine Treater, 5J-C57
5PSV-102	Saturated C ₃ -C ₄ Caustic Treater, 5J-C58
5PSV-103	Saturated C ₃ -C ₄ Regenerated Caustic Treater, 5J-C59
5PSV-104	Saturated C ₃ -C ₄ Salt Filter, 5J-C60
5PSV-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

10.1 PROCESS AND UTILITY DIAGRAMS

PROCESS FLOW DIAGRAM

5-RA-1

WA-TEX 000395

PROCESS FLOW DIAGRAM

5-RA-2

TEJALCO EST. 3910

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

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 GENS J-208
 - TABLE 7.
3. LINE NO. SUFFIXES FOR INSULATION ON NEW LINES 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 & INSULATED
 - NI NO INSULATION

TA-O-432-6"-312A-N1
 TEXACO PLANT NUMBER TEXACO SERVICE STAMP SIZE INSULATION REQUIREMENTS
 NUMBER NUMBER TEXACO PIPING MATERIAL SERVICE SPECIFICATION



No.	Date	Description	By	Chk.	Exp.	App.
(A)	9/4/78	ADDED LINE NO'S ST-25-104-JS ST-25-104-JS (REVISED PER DRAWING 2-A-101 REV.O.)	JS		PL	PLH
(A)	9-4-78	REVISIT PER DRAWING 2-AA-101 REV.O.	JS		PL	PLH
(A)	1/9/79	ADDED CITY STRATIONS & ST- ST-15-112-JDA-PHC	SG		PL	PLH
(A)	1/26/79	ISSUED FOR CONSTRUCTION	JP		PL	PLH
(A)	2/9/79	UPDATED TO JOB AWARD ISSUED FOR APPROVAL	DJB		PL	PLH

SCALE	SECTION	BRAND
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REQUITEL

HOUSTON



TEXACO INC.



PUGET SOUND PLANT

UTILITY PIPING & INSTRUMENT DIAGRAM
STEAM & CONDENSATE SYSTEMS
CATALYTIC POLYMERIZATION UNIT



DATE	10/10/78
TIME	10:00
LOCATION	10075
REMARKS	3010

5-AA-7. 11A

WA-TEX 000398


 NEW
 REMOVE
 RELOCATE
 NOT USED (DO NOT REMOVE)


 DENOTES TIE-IN NUMBERS

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



LINE IDENTIFICATION

1A-Q-422-6'-J12A-M1

INSULATION REQUIREMENTS

TEXACO PIPING MATERIAL SERVICE SPECIFICATION

TEXACO PLANT NUMBER

TEXACO SERVICE SYMBOL

SIZE NUMBER



ADDENDUM ON 2-11-10

TUGS	
17. UNIT	5-02-8
117	5-02-5
UNIT	5-02-6
UNIT	5-02-7
17	5-02-11
6 BLON DOWN	15-02-5
	15-02-1
	5-02-8



24-75	REVISED PER DRAWING 5-AA-10 REV. 1A	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
24-75	REVISED PER DRAWING 5-AA-10 REV. 0	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
24-75	REVISED FOR CONSTRUCTION UPDATED TO JOB AWARD ISSUED FOR APPROVAL	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
24-75	REVISED FOR CONSTRUCTION UPDATED TO JOB AWARD ISSUED FOR APPROVAL	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
24-75	REVISED FOR CONSTRUCTION UPDATED TO JOB AWARD ISSUED FOR APPROVAL	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
24-75	REVISED FOR CONSTRUCTION UPDATED TO JOB AWARD ISSUED FOR APPROVAL	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
24-75	REVISED FOR CONSTRUCTION UPDATED TO JOB AWARD ISSUED FOR APPROVAL	24	25	26	27	28	29	30	31	32	33	34	35																																																																	

TEXACO EST-3910

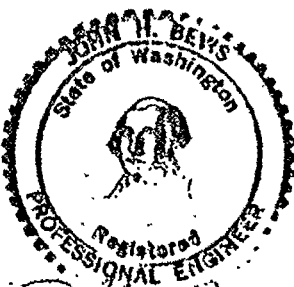
 EXISTING
 NEW
 REMOVE
 RELOCATE
 NOT USED - (DO NOT REMOVE)
 DENOTES TIE-IN NUMBERS

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 V-208, TABLE 7.
3. LINE NUMBER SUFFIXES FOR INSULATION ON NEW 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
HI NO INSULATION

1A-0-422-67-113A-N1

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

△ 1A



J. B. [unclear]
10/8/73

2/27/72	REVISED PER DRAWING 5-A-111 REV.0	72	44	72/27	72/27
2/28/72	SENDER DILITY NATION HYDRANT VALVES	56	48	72/28	72/28
2/28/72	ISSUED FOR CONSTRUCTION	56	48	72/28	72/28
2/28/72	UPDATED TO LOG AWARD	56	48	72/28	72/28
2/28/72	ISSUED FOR APPROVAL	56	48	72/28	72/28
DATE	DESCRIPTION	BY	CHKD	EXAM	APPR

SCALE DEPENDO DRAWN

BECHTEL
HOUSTON

TEXACO INC.
NUGGET, CONCRETE PLANT

TEXACO **TEXACO**

UTILITY PIPING & INSTRUMENT DIAGRAM
WATER SYSTEM
CATALYTIC POLYMERIZATION UNIT

	Job No.		Est. No.	
	WENTZ - 10095		5-AA-11	6A
	TERACE EST - 3810			

WA-TEX 000400

[illegible]

CONTROL VALVE (OPEN ON AIR FAILURE) 	CONTROL VALVE (CLOSE ON AIR FAILURE) 	SPECIAL BLIND OPERATIONAL
SAFETY VALVE 	SPECIAL BLIND TEST 	
INSULATION PERSONNEL PROTECTION 		
INSTRUMENT SYMBOLS		
LOCAL MOUNTED 	TRANSMITTER 	
BOARD MOUNTED 		
PRESSURE LINE 		
INSTRUMENT AIR LINE 		
ELECTRICAL LEAD 		
CAPILLARY TUBING 		
PLANT NUMBER 		
INSTRUMENT IDENTIFICATION 		
INSTRUMENT NUMBER 		
INSTRUMENT PURCHASED BY OTHERS 		
INSTRUMENT IDENTIFICATION		
ALL INSTRUMENTS ARE CODED IN ACCORDANCE WITH ISA STANDARDS EXCEPT AS NOTED: FOR ALAYS REFER TO DWS NO. 2A-6		
LINE IDENTIFICATION		
FOR LINE SERIAL NO. LOCATION AND PRESSURE DROP MUST BE CALCULATED 		
PIPING SPECIFICATIONS		
300" D.D.	300"	NOM. RATING, 1/2" CORR. ALLOW.
150" D.D.	150"	R.F. GATES, 1/2" CORR. ALLOW.
100" D.D.	100"	R.F. GATES, 1/2" CORR. ALLOW.
75" D.D.	75"	NOM. RATING, 1/2" CORR. ALLOW.
50" D.D.	50"	R.F. GATES, 1/2" CORR. ALLOW.
30" D.D.	30"	R.F. GATES, 1/2" CORR. ALLOW.
15" D.D.	15"	R.F. GATES, 1/2" CORR. ALLOW.
10" D.D.	10"	R.F. GATES, 1/2" CORR. ALLOW.
5" D.D.	5"	R.F. GATES, 1/2" CORR. ALLOW.
3" D.D.	3"	R.F. GATES, 1/2" CORR. ALLOW.
COMMODITY DESIGNATION		
C	CLUSTIC	PW PROCESS WATER
W	TAPPING WATER	ST STEAM & CONDENSATE
H	HYDROCARBON LIQUID OR GAS	W SERVICE WATER
ITEM NUMBERS		
300"	300"	FLOD C.S. GATE VALVE 1/2" R.F.
150"	150"	FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33X OR EQUAL
100"	100"	FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33X OR EQUAL
75"	75"	FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33X OR EQUAL
50"	50"	FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33X OR EQUAL
30"	30"	FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33X OR EQUAL
15"	15"	FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33X OR EQUAL
10"	10"	FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33X OR EQUAL
5"	5"	FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33X OR EQUAL
3"	3"	FLOD C.S. GATE VALVE 1/2" R.F. CRANE 33X OR EQUAL
NOTES		
1. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
2. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
3. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
4. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
5. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
6. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
7. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
8. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
9. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
10. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
11. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
12. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
13. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
14. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
15. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
16. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
17. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
18. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
19. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
20. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
21. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
22. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		
23. DISCHARGE TO AIR (FORM 10-19, 20-20 & 30-20) TO DISCHARGE		

NOTES

- ## 4.7150 MATERIAL & SPECIFICATION



13A	4/10/73	ADDED ST TO 5J-C-52-3	TC
13B	4/10/73	REVISED PER ORAWING	TC
13C	4/10/73	5-AA-102 - REV. O	TC
13D	4/10/73	UPDATED TO JOB AWARD	TC
13E	4/10/73	ISSUED FOR APPROVAL	TC

NONE

BEVERLY

TEXACO INC. TEXA

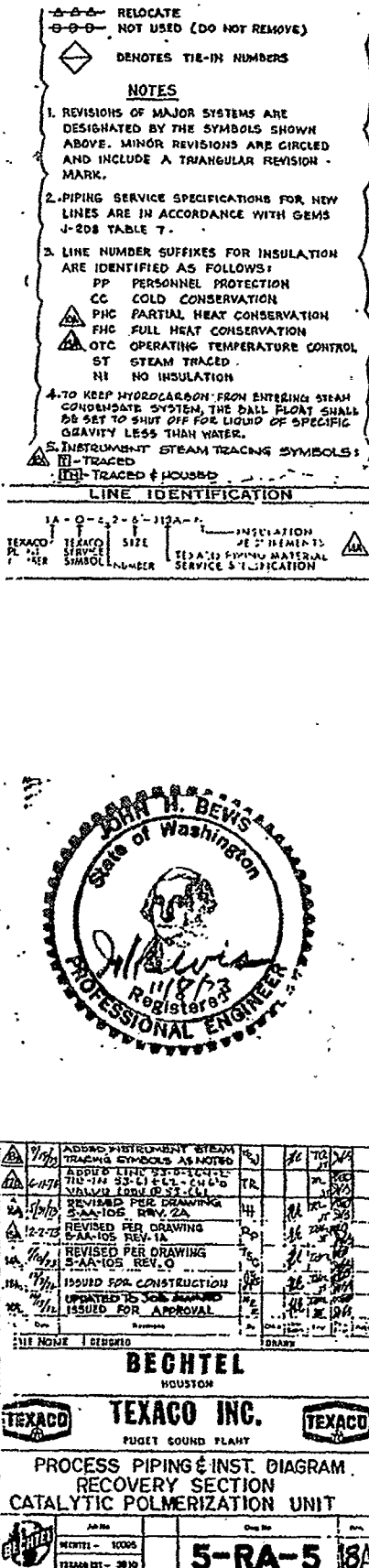
PROCESS PIPING & INST. DIAGRAM
FEED PREPARATION SECTION
CATALYTIC POLYMERIZATION UNIT

5-RA-4 146

MS-R JOB N° C-11110 DWG N° 22213 SHT. N° 05-1-04

WA-TEX 000401

~~SECRET~~



WA-TEX 000402

LITY LEGEND

R-OILY WATER

STEAM

1-SERVICE

NOTES

SUFFIXES FOR INSULATION
D AS FOLLOWS:
NNEL PROTECTION
CONSERVATION
AL HEAT CONSERVATION
HEAT CONSERVATION
TING TEMPERATURE CONTROL
I TRACED & INSULATED
ULATION
IWISE SPECIFIED, THE VALVE
ALL BE BY THE CONTRACTOR

AS J-ID, PARA. 513 FOR
LOSOPHY WITH REGARDS
BE SUPPLIED BY THE
PARTICULAR ATTENTION
EN TO THE MODIFICATION
WHICH COVERS SHUTDOWN

WLL-SUBMIT A PRECIPITATOR--
FOR SALT FILTER

BECHTEL-10095

TEXACO EST. 3910

SYMBOLS

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



NOTES

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

4. INSTRUMENT STEAM TRACING SYMBOLS:
[Symbol] - TRACED
[Symbol] - TRACED & INSULATED

LINE IDENTIFICATION

1A-0-437-6"-J13A-NI
TEXACO PLANT NUMBER | TEXACO SERVICE SYMBOL | SIZE | NUMBER | INSULATION REQUIREMENTS | TEXACO PIPING MATERIAL SERVICE SPECIFICATION



NOTICE

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ACO INC.

IG DEPARTMENT

TON, TEXAS



IG FLOW DIAGRAM
ARATION SECTION
MERIZATION UNIT

None

IN ASSIGNED DATE
NO RECORD ENTERED 1-21-72

5-RA-25

BECHTEL
HOUSTON



TEXACO INC.

PUGET SOUND PLANT



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



Sub No
BECHTEL - 10095
TEXACO EST - 3910

Des. No.
5-RA-25

Rev.

7A

WA-TEX 000403

10.2 VESSEL DRAWINGS

DRAWING

5-DC-40

WA-TEX 000405

DRAWING

5-DC-41

WA-TEX 000406

DRAWING

5-DC-42

WA-TEX 000407

DRAWING

5-DC-4²

WA-TEX 000408

DRAWING

5-DC-44

WA-TEX 000409

10.3 EXCHANGERS

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

DATA					DESIGN			
1	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

WA-TEX 000411

EXCHANGER SPECIFICATION SHEET

CUSTOMER AND PROJECT LOCATION		TEXACO INC		EXCHANGER MFR. HUGHES-ANDERSON	
PLANT		PUGET SOUND		REQ. NO. E-02	
EXCHANGER NO.		SJ-E52		ITEM NO 13	
SERVICE OF UNIT PROPANE STRIPPER					
SIZE	12x72	TYPE	AEU	CONNECTED IN	SERIES PARALLEL
SURFACE PER UNIT	95	EFF. DR.	SHELLS PER UNIT 1	SURFACE PER SHELL	95 EFF DR.
PERFORMANCE OF ONE UNIT					
FLUID CIRCULATED		SHELL SIDE		TUBE SIDE	
TOTAL FLUID ENTERING LBS/HR		STEAM 585		PROPANE STRIPPER BTMS 9600	
VAPOR					
LIQUID				9600	
STEAM		585			
NON-CONDENSIBLES					
FLUID VAPORIZED OR CONDENSED				3825	
STEAM CONDENSED		585			
GRAVITY-LIQUID				0.46	
VISCOSITY-LIQUID CP				0.009 (IN) - 0.09 (OUT)	
MOLECULAR WEIGHT-VAPORS				43.3	
SPECIFIC HEAT-LIQUIDS		B.T.U./#		B.T.U./#	
LATENT HEAT-VAPORS		B.T.U./#		B.T.U./#	
TEMPERATURE IN		281 °F		112 °F	
TEMPERATURE OUT		281 °F		116 °F	
OPERATING PRESSURE PSIG		35		235	
NUMBER OF PASSES		1		2	
VELOCITY		FT./SEC.		FT./SEC.	
PRESSURE DROP ALLOW/CALC.		1.0 / 0 #/SQ.IN.		0.5 / 0.5 #/SQ.IN.	
FOULING RESISTANCE MIN.		0.0005		0.001	
HEAT EXCHANGED-B.T.U./HR		540,000		M.T.D. (CORRECTED) 162	
TRANSFER RATE-SERVICE		35.1		CLEAN ACTUAL FOULING FACTOR	
CONSTRUCTION					
DESIGN PRESSURE		65 #/SQ.IN.		275 #/SQ.IN.	
TEST PRESSURE		100 #/SQ.IN.		415 #/SQ.IN.	
DESIGN TEMPERATURE		400 °F		200 °F	
TUBES CARBON STEEL NO. 80		O.D. 3/4" 100085		LENGTH 72 PITCH 1" Δ 4 1/2"	
SHELL CARBON STEEL		I.D. 12"		THICKNESS	
SHELL COVER CARBON STEEL				FLOATING HEAD COVER	
CHANNEL CARBON STEEL				CHANNEL COVER CARBON STEEL	
TUBE SHEETS-STATIONARY CARBON STEEL				FLOATING	
BAFFLES-CROSS CARBON STEEL		TYPE SEGMENTAL		THICKNESS	
BAFFLE-LONG		TYPE		THICKNESS	
TUBE SUPPORTS				THICKNESS	
GASKETS		METAL JACKETED ASBESTOS			
CONNECTIONS-SHELL-IN 2"		OUT 1"		RATING 150# RF	
-CHANNEL-IN 3"		OUT 3"		RATING 300# RF	
CORROSION ALLOWANCE-SHELL SIDE 1/8"				TUBE SIDE 1/8"	
CODE REQUIREMENTS ASME SECTION VIII DIV 1		TENSILE 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 -					
51					
REV. DATE		1-24-77		REVISED, DRAWN FOR CONST.	
REV. DATE		12-14-77		ISSUED FOR PURCHASE	
JOB NO.		10095		DRWG. NO. DS-2-E-3	
REV.		1			

WA-TEX 000412

EXCHANGER SPECIFICATION SHEET

CUSTOMER AND PROJECT LOCATION		TEXACO INC.		EXCHANGER	
PLANT		PUGET SOUND		MFR. WESTERN SUPPLY	
EXCHANGER NO.		5J-E57		REQ. NO. E-03	
SERVICE OF UNIT		DEPROPANIZER FEED BOTTOM EXCHANGER		ITEM NO. 3	
SIZE	15 x 240	TYPE	AES	CONNECTED IN	SERIES
SURFACE PER UNIT	473	EFF.		SHELLS PER UNIT	1
		EFF.		SURFACE PER SHELL	473
PERFORMANCE OF ONE UNIT					
FLUID CIRCULATED		SHELL SIDE		TUBE SIDE	
TOTAL FLUID ENTERING		DEPROPANIZER FEED		DEPROPANIZER BTMS.	
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-VAPORS		55.8		58.7	
SPECIFIC HEAT-LIQUIDS		B.T.U./#		B.T.U./#	
LATENT HEAT-VAPORS		B.T.U./#		B.T.U./#	
TEMPERATURE IN		100 °F		215 °F	
TEMPERATURE OUT		154 °F		154 °F	
OPERATING PRESSURE		245 PSIG		235	
NUMBER OF PASSES		1		2	
VELOCITY		FT./SEC.		4 FT./SEC	
PRESSURE DROP		ALLOW/GALC. 5 / 2		1.5 / 1.5	
FOULING RESISTANCE		MIN. 0.001		0.001	
HEAT EXCHANGED - BTU./HR		1,850,000		M.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		°F	
TUBES CARBON STEEL NO 122		O.D. 1 1/4" BWG 14		LENGTH 240" PITCH 1" A 1/4" X	
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	
TUBE SHEETS - STATIONARY CARBON STEEL				FLOATING CARBON STEEL	
BAFFLES - CROSS CARBON STEEL		TYPE SEGMENTAL		THICKNESS	
BAFFLE - LONG		TYPE		THICKNESS	
TUBE SUPPORTS				THICKNESS	
GASKETS		METAL JACKETED ASBESTOS			
CONNECTIONS - SHELL - IN		3"		OUT 3"	
- CHANNEL - IN		4"		OUT 4"	
CORROSION ALLOWANCE - SHELL SIDE		1/8"		TUBE SIDE 1/8"	
CODE REQUIREMENTS		ASME SECTION VIII DIV 1		ITEMA CLASS R	
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%					
51					
REV.		DATE		JOB NO.	
REV.		1-24-77		10095	
REV.		12-11-77		DS-5-E-1	
REV.		REVISED: ISSUED FOR CONSTR.		REV.	
REV.		ISSUED FOR PURCHASE		REV.	

FORM H-158 PART B 9/66

WA-TEX 000413

EXCHANGER SPECIFICATION SHEET

CUSTOMER AND PROJECT LOCATION		TEXACO INC		EXCHANGER MFR. WESTERN - SUPPLY	
PLANT		PUGET SOUND		REV. 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
PERFORMANCE OF ONE UNIT					
		SHELL SIDE		TUBE SIDE	
FLUID CIRCULATED		DEPROPANIZER BTMS		COOLING WATER	
TOTAL FLUID ENTERING		49,257		73,000	
VAPOR					
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					
SPECIFIC HEAT-LIQUIDS				B.T.U./#	
LATENT HEAT-VAPORS				B.T.U./#	
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.	
PRESSURE DROP		ALLOW/CALC. 4 / 4		#/SQ.IN.	
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		#/SQ.IN.	
TEST PRESSURE		450		#/SQ.IN.	
DESIGN TEMPERATURE		650		°F	
TUBES INH ADM		NO. 193		O.D. 3/4	
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	
BAFFLES - CROSS CARBON STEEL		TYPE SEGMENTAL		THICKNESS	
BAFFLE - LONG		TYPE		THICKNESS	
TUBE SUPPORTS				THICKNESS	
GASKETS METAL JACKETED ASBESTOS					
CONNECTIONS - SHELL - IN		4"		OUT 4"	
- CHANNEL - IN		4"		OUT 4"	
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". BAFFLE CUT 10%					

FORM M-156 PART B 9/66



REV.	DATE	REVISION	DESIGNED	CHECKED	APPROVED	JOB NO.	DRWG. NO.	REV.
1	1-24-73	REVISED, ISSUED FOR CONST	ML	ML	ML	10095	US-5-E-2	1
2	10-11-73	ISSUED FOR PURCHASE	ML	ML	ML			

WA-TEX 000414

10.4 PUMPS

TABLE 10.4-1
 UGAL PUMP SUMMARY SHEET
 POLYMERIZATION UNIT PLANT 5J
 MACORTES, WASHINGTON

DRIVER DATA			
<u>RPM</u>	<u>Rated H.P.</u>	<u>Type</u>	<u>Full Load Amps</u>
3600	15	Motor	

WA-TEX 000416

CENTRIFUGAL PUMP DATA SHEET

APPLICABLE TO: PROPOSALS ☐ PURCHASE ☒ AS BUILT ☐
 NOTE: () INDICATES INFORMATION TO BE COMPLETED BY PURCHASER:
☐ BY MANUFACTURER

EXISTING PUMP

JOB NO. 10095 ITEM NO. 5J-G-3
 PURCHASE ORDER NO. 10095-G-02
 REQUISITION NO. 10095-G-02
 INQUIRY NO. _____
 DATE _____ REVISION _____

FOR TEXACO, INC. SITE POGET SOUND
 UNIT CAT. POLY SERVICE WATER WASH
 NO. PUMPS REQ'D 1 NO. MOTORS REQ'D 1 ITEM NO. 55-GM-3 PROVIDED BY TEXACO, INC. MTD BY _____
 NO. TURBINES REQ'D _____ ITEM NO. _____ PROVIDED BY _____ MTD BY _____
 PUMP MFR WILSON-SNYDER SIZE AND TYPE 1 1/2-25TG SERIAL NO. 6541

OPERATING CONDITIONS, EACH PUMP				PERFORMANCE ☒	
LIQUID <u>WATER</u>	U.S. GPM at PT. HOR. <u>120</u>	RATED <u>134</u>	DISCH. PRESS. PSIG <u>307</u>	PROPOSAL CURVE NO. <u>29-190-300</u>	
PT. F. HOR. <u>80</u> MAX.	SUCT. PRESS. PSIG MAX. _____	RATED <u>35</u>	SP. GR. at PT. <u>1.0</u>	RPM <u>3550</u> NPSH (WATER) <u>11 1/4</u>	
VAP. PRESS. at PT. PSIA <u>0</u>	DIFF. PRESS. PSI <u>272</u>		EFF. <u>52</u> BHP RATED <u>42.39</u>	MAX. BHP RATED IMP. <u>50.83</u>	
VIS. at PT. SSM _____	DIFF. HEAD. FT. <u>62.8</u>		MAX. HEAD RATED IMP. _____	MIN. CONTINUOUS GPM _____	
CORR./EROS. CAUSED BY _____	CP _____	NPSHA. FT. <u>7.30</u>	ROTATION (VIEWED FROM CPLG END) _____		
		HYD. HP. <u>22.04</u>			

CONSTRUCTION ☒					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. _____ PSIG _____ F: ☐ HYDRO TEST _____ PSIG
 -CONNECT: ☐ VENT ☐ FRAIN ☐ GAGE
 IMPELLER DIA. ☐ RATED 9" ☐ MAX 10 1/2" ☐ TYPE CLOSED ☒
 MOUNT: ☐ BETWEEN BRGS ☐ OVERHUNG ☐ WEAR RG. OMM/CLRM
 BEARINGS-TYPE: ☐ RADIAL ☐ THRUST
 LUBE: ☐ RING OIL ☐ FLOOD ☐ OIL MIST ☐ FLINGER ☐ PRESSURE
 COUPLING: ☐ MFR _____ ☐ MODEL _____
 DRIVER HALF MTD BY: ☐ PUMP MFR ☐ DRIVER MFR ☐ PURCHASER
 PACKING: ☐ MFR & TYPE _____ ☐ SIZE/NO. OF RINGS _____
 MECH. SEAL: ☐ MFR & MODEL _____ API CLASS. CODE _____
☐ MFR CODE _____

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

AUXILIARY PIPING
☐ C.W. PIPE PLAN _____ ☐ CU: ☐ S.S.: ☐ TUBING: ☐ PIPE
☐ TOTAL COOLING WATER REQ'D. GPM _____ ☐ SIGHT FL. REQ'D _____
☐ PACKING COOLING INJECTION REQ'D: ☐ TOTAL GPM _____ ☐ PSIG
☐ SEAL FLUSH PIPE PLAN _____ ☐ C.S. ☐ S.S. ☐ TUBING ☐ PIPE
☐ EXTERNAL SEAL FLUSH FLUID _____ ☐ GPM _____ ☐ PSIG
☐ AUXILIARY SEAL PLAN _____ ☐ C.S. ☐ S.S. ☐ TUBING ☐ PIPE
☐ AUX. SEAL QUENCH FLUID _____

VERTICAL PUMPS
 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 & MOD ☐ C.S. ☐ S.S. ☐ BRZ ☐ NONE
 FLOAT SWITCH ☐ _____
 PUMP THRUST, LB ☐ UP ☐ DOWN

MOTOR DRIVEN
 HP _____ RPM _____ FRAME _____ VOLTS/PHASE/CYCLES _____
 MFR _____ BEARINGS _____ LUBE _____
 TYPE _____ INSUL _____ FULL LOAD AMPS _____
 ENC _____ TEMP RISE C _____ LOCKED MOTOR AMPS _____
☐ VHS ☐ VSS VERT. THRUST CAP. LB _____ SERVICE FACTOR _____
 APPROX. WT. PUMP & BASE _____ MOTOR _____ TURBINE _____

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

FORM NO 130 (REVISED APRIL 71)



NO.	DATE	ISSUED FOR	JOB NO.	DRAWING NO.	REV.
1	12-4-72	ISSUED FOR PURCHASE	10095	DS-5-G-2	1
0	11-10-72	ISSUED FOR QUOTATION			
SHEET 1 OF 1					

WA-TEX 000417

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

FOR	TEXACO INC	SITE	PURGET SOUND
UNIT	CATALYTIC POLYMERIZATION	SERVICE	DEPROPANIZER FEED BYPASS
NO. PUMPS REQ'D	2	NO. MOTORS REQ'D	2
ITEM NO.	51-662/A	PROVIDED BY	PUMPER MTD BY PUMPER
NO. TURBINES REQ'D	—	ITEM NO.	—
PUMP MFR	BYRON JACKSON	SIZE AND TYPE	12X2X10 1/2 H-5T
		SIGNAL NO.	—

OPERATING CONDITIONS, EACH PUMP				PERFORMANCE	
LIQUID <u>G3/CA</u>		U.S. GPM @ PT. NOR. <u>65</u> RATED		PROPOSAL CURVE NO. <u>2424-1</u>	
		DISCH. PRESS. PSIG <u>327</u>		RPM <u>3650</u> NPSHR (WATER) <u>6</u>	
PT. F. NOR. <u>100</u> MAX.		SUCTION PRESS. PSIG MAX. <u>330</u> RATED <u>250</u>		EFF. <u>39%</u> BHP RATED <u>7.7</u>	
SP. GR. @ PT. <u>0.475</u>		DIFF. PRESS. PSI <u>77</u>		MAX. BHP RATED HMP <u>13.0</u>	
VAP. PRESS. @ PT. PSIA <u>232</u>		DIFF. HEAD. FT. <u>376</u>		MAX. HEAD RATED HMP <u>400</u>	
VIS. @ PT. Sav. <u>CP.0.1</u> NPSHA, FT. <u>> 30</u>				MIN. CONTINUOUS GPM <u>15</u>	
CORR./EROS. CAUSED BY _____		HYD. HP _____		ROTATION (VIEWED FROM CPLG END) <u>CCW</u>	
CONSTRUCTION				SHOP TESTS	
NOZZLES	SIZE	RATING	FACING	LOCATION	
SUCTION	<u>2</u>	<u>300#</u>	<u>RF</u>	<u>END</u>	
DISCHARGE	<u>1 1/2</u>	<u>300#</u>	<u>RF</u>	<u>TOP</u>	
CASE MOUNT: ☒ CENTERLINE ☐ FOOT ☐ BRACKET ☐ VENT. (TYPE) _____					
SPLIT: ☐ AXIAL ☒ RAD. TYPE VOLUTE ☐ ISOL ☐ BBL ☐ DIFFUSER					
PRESS: ☐ MAX. ALLOW. <u>667</u> PSIG F. ☐ HYDRO TEST <u>1000</u> PSIG					
CONNECT: ☒ VENT ☒ FRAM ☐ GAGE					
IMPELLER DIA. ☐ RATED <u>9 1/2</u> ☐ MAX <u>10 1/2</u> ☐ TYPE <u>CLOSED</u>					
MOUNT: ☐ BETWEEN DRGS ☒ OVERHUNG ☐ WEAR. RG. DIAM./CLINC. <u>0.020</u>					
BEARINGS-TYPE: ☐ RADIAL <u>ND3210LR</u> ☐ THRUST <u>ND-4529UA</u>					
LUBE: ☐ RING OIL ☐ FLOOD ☐ OIL MIST ☒ FLINGER ☐ PRESSURE					
COUPLINGS: ☐ MRF <u>FAST</u> ☐ MODEL <u>B</u>					
DRIVER HALF MTD BY: ☒ PUMP MFR ☐ DRIVER MFR ☐ PURCHASER					
PACKING: ☐ MFR & TYPE _____ ☐ SIZE/NO. OF RINGS _____					
MECH. SEAL: ☐ MFR & MODEL <u>BN-QB</u> API CLASS CODE <u>BSTFJ</u>					
☐ MFR CODE <u>QB-2125-5D4N</u>					
AUXILIARY PIPING					
☐ C.W. PIPE PLAN _____ ☐ C.O. ☐ S.S. ☐ TURNING ☐ PIPE					
☐ TOTAL COOLING WATER REQ'D. GPM <u>0</u> ☐ SIGHT F.I. REQ'D. _____					
☐ PACKING COOLING INJECTION REQ'D. ☐ TOTAL GPM ☐ PSIG					
☐ SEAL FLUSH PIPE PLAN <u>12</u> ☐ C.S. ☐ S.S. ☐ TURNING ☒ PIPE <u>5CH-80 WELD</u>					
☐ EXTERNAL SEAL FLUSH FLUID _____ ☐ GPM ☐ PSIG					
☐ AUXILIARY SEAL PLAN _____ ☐ C.S. ☐ S.S. ☐ TURNING ☐ PIPE					
☐ AUX. SEAL QUENCH FLUID <u>WATER</u> ☐ QUENCH CONN REQ'D					
MOTOR DRIVER					
HP. <u>15</u> RPM <u>3600</u> FRAME <u>254T</u> VOLTS/PHASE/CYCLES <u>440-3-60</u>					
MFR. <u>AC</u> BEARINGS <u>BALL</u> LUBE <u>GRS</u>					
TYPE <u>HORIZ</u> INSUL _____ FULL LOAD AMPS _____					
ENC. <u>TEFC</u> TEMP RISE C. <u>50</u> LOCKED MOTOR AMPS _____					
☐ VHS ☐ VSS VERT. THRUST CAP. LB. _____ SERVICE FACTOR _____					
MATERIALS					
API CASE/TNM CLASS <u>0</u>					
<u>GEMS P-2M7</u>					
<u>GEMS P-2A1</u>					
VERTICAL PUMPS					
PIT OR SUMP DEPTH <u>0</u>					
MIN. SUBMERGENCE REQ'D. ☐ _____					
COLUMN PIPE: ☐ FLANGED ☐ THREADED					
LINE SHAFT: ☐ OPEN ☐ ENCLOSED					
BRGS: ☐ BOWL ☐ LINE SHAFT _____					
BRG. LUBE ☐ WATER ☐ OIL ☐ GREASE					
FLOAT & ROD ☐ C.S. ☐ S.S. ☐ BRZ ☐ NONE					
FLOAT SWITCH ☐ _____					
PUMP THRUST, LB ☐ UP ☐ DOWN _____					
APPROX. WT. PUMP & BASE <u>600</u>					
MOTOR <u>252</u> TURNING _____					

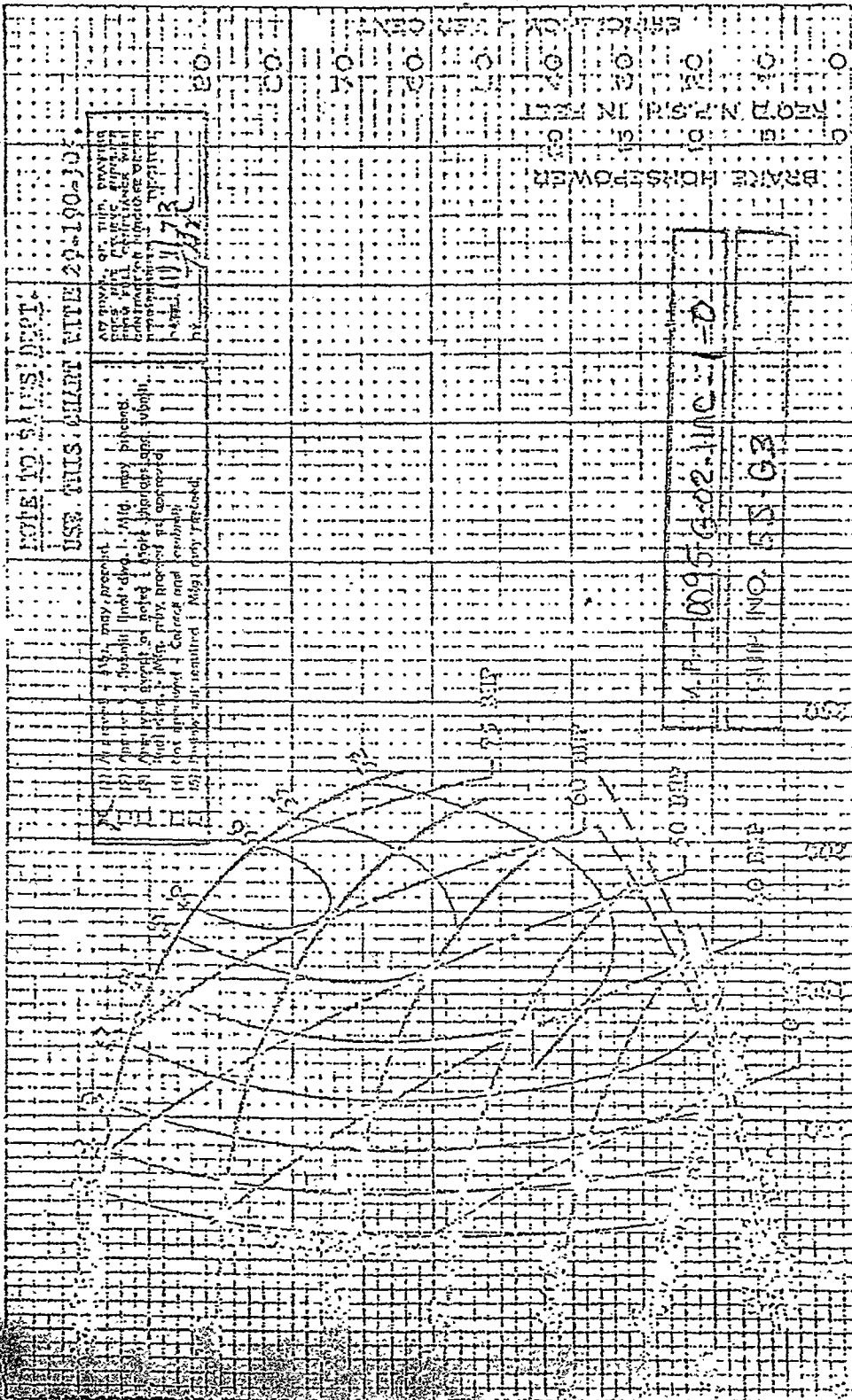
FORM NO 130 (REVISED APRIL 71)



					JOB NO.	DRAWING NO.	REV
1	12/6/72	ISSUED FOR PURCHASE	VT	TAB	10095	DS-58-Q-1	1
0	10-3-72	ISSUED FOR QUOTATION					
NO.	DATE				SHEET	OF	
					1	1	

WA-TEX 000418

CENTRIFUGAL PUMP PERFORMANCE CURVE



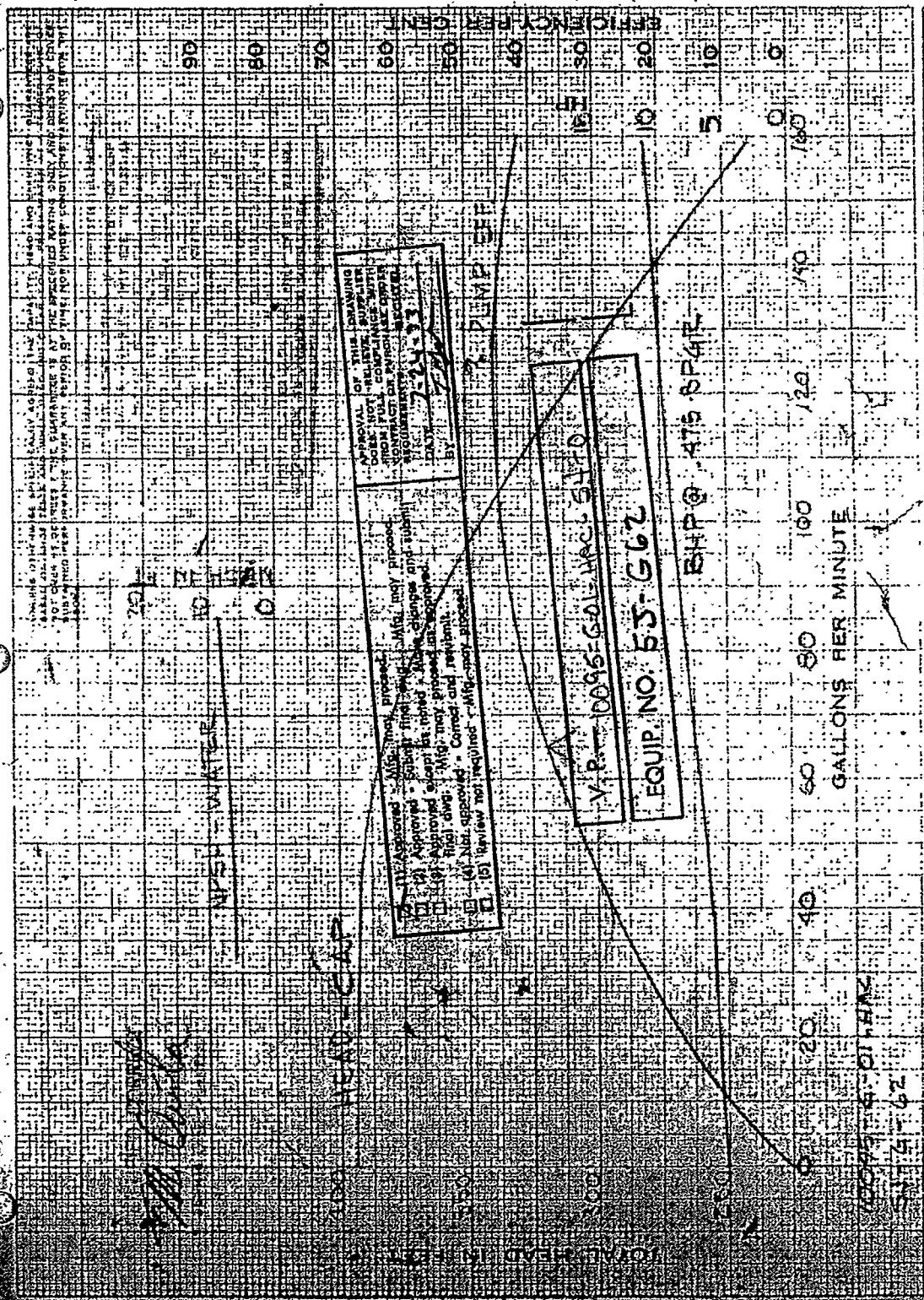
NOTE TO SALES DEPT.
USE THIS CURVE WITH 29-190-10.

ADJUSTMENT OF THIS PUMPING
CURVE WILL
CONSIDERATION BE GIVEN
TO THE
APPROX. 1005 6-02-11 NC

GALLONS PER MINUTE

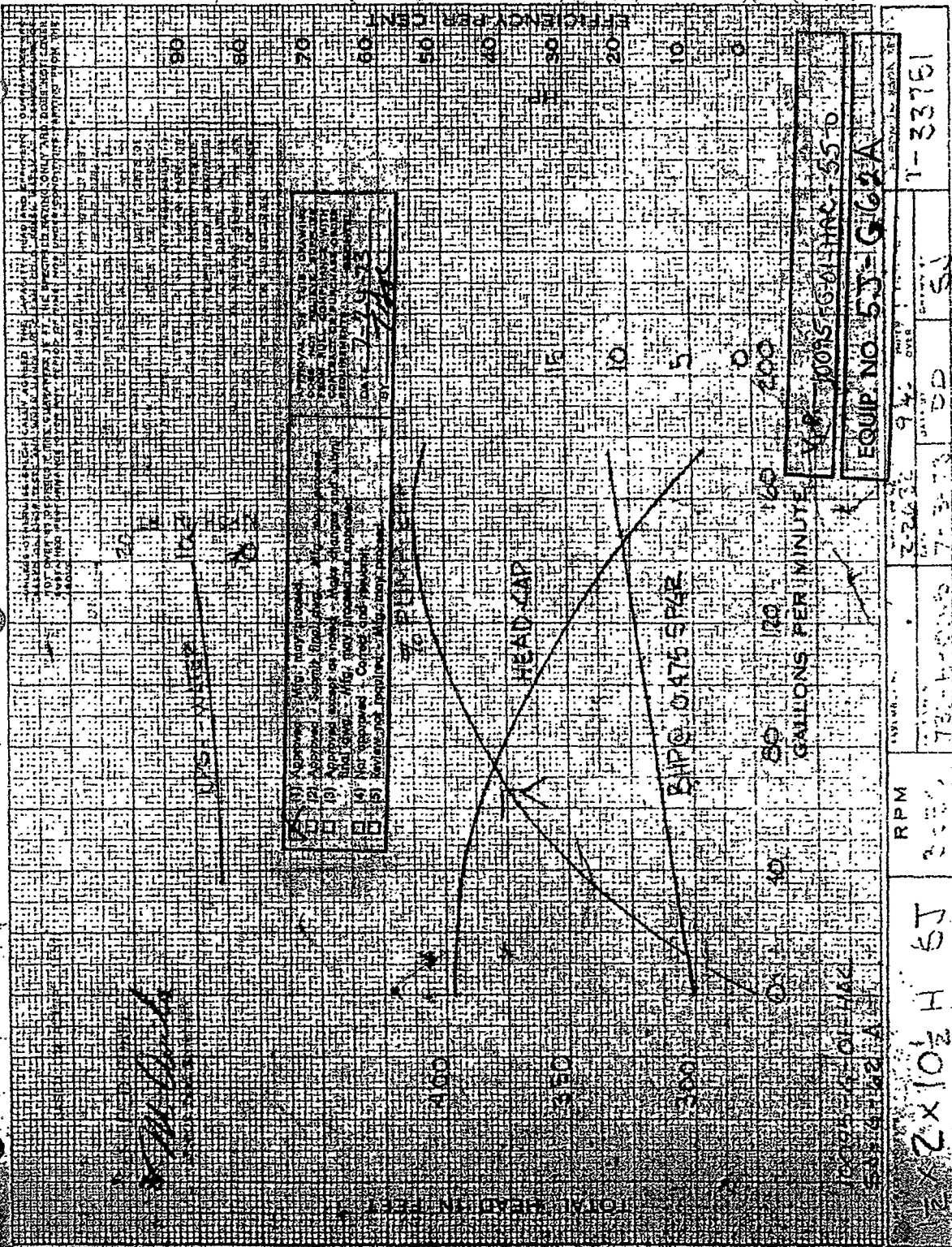
SIZE 1-1/2 X 2 TYPE W.C. STAINLESS ITEM NO. DATE	RTM 3550 IMPELLER 29-10-020 DIA. VAR. EYE AREA 4 1/2 SQ. IN. DRIVER HORSEPOWER	CUSTOMER TEXACO ORDER NO. 4654 CERTIFIED BY CURVE NO. 29-190-10
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BYRON JACKSON



2 x 2 x 10 H. 52	RPM	475	2/2	1-33750-1
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BYRON JACKSON



10.5 INSTRUMENTS

TABLE 10.5-1
FLOW ELEMENT SUMMARY SHEET
CATALYTIC POLYMERIZATION UNIT PLANT 5J
ANACORTES, WASHINGTON

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

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

<u>Tag No.</u>	<u>Service</u>	<u>Size</u>	<u>Set. P. ess</u>
5PSV-101	5J-C57	2" x 3"	310 PSIG
5PSV-102	5J-C58	"	"
5PSV-103	5J-C59	"	"
5PSV-104	5J-C60	"	"
5PSV-105	5J-C61	1-1/2" x 2"	260 PSIG
5PSV-107	5J-E5	3/4" x 1"	75 PSIG
5PSV-220	5J-E58	1-1/2" x 3"	65 PSIG