SJ000 4750.005 DmD
#41223

SJ-OP-930-001
30 June 1994
Change 1 - 28 February 1995

SITE OPERATIONS MANUAL

SAINT JAMES SITE

MECHANICAL EQUIPMENT

U.S. Department of Energy

Strategic Petroleum Reserve

000029

DynMcDermott Petroleum Operations
Contract DE-AC96-93PO018000

SPR

DOCUMENTATION CHANGE NOTICE REVISION AND HISTORY SUMMARY

DCN NUMBER	DOCUMENT NUMBER: **SJ-OP-930-001**	REV. NO: 0
1	DOCUMENT TITLE: **SAINT JAMES SITE OPERATIONS MANUAL-MECHANICAL**	

This DCN authorizes revisions to Document Number: **SJ-OP-930-001** as identified in the below description for DCN Number **1**. Please remove the attached pages and insert into the manual in the required locations noted on each changed page. Remove the superseded page and destroy. Place this page in the front of the document.

DCN NO	DESCRIPTION	PROJECT AUTH. NO. (PAN)	PREPARED BY / DATE	CHECKED BY / DATE	APPROVED BY / DATE	ERU / DATE
1	**Revised WP 004 00, App. A sheet 1 and App. B sheet 1.**	**70577**	**Steve Brothers** Steve Brothers 10/1/96	**Denise Celious** D. Celious 10/2/96	**Ray Gould** Ray Gould 10/2/96	M Brown 10/8/96
	Revised 008 00.	**70362**				
	Revised 009 00.	**70521**				
	Revised 014 00.	**70578**				

OSF92-0002 1/92
W:\E&C_STDS\FORMS\DCNRHS.DOT

RETURN BY
09/05/96

SPR

DOCUMENTATION CHANGE NOTICE REVIEW AND COMMENT SHEET

DOCUMENT NO.	DOCUMENT TITLE
SJ-OP-930-001 WP 008 00 WP 009 00 WP 014 00	St. James Site Operations Manual-Mechanical CRUDE OIL BOOSTER PUMPS CRUDE OIL STORAGE TANKS DOCK FIRE WATER PUMP SYSTEM

The attached page changes are based on implementation of ECR(s) 70578, 70521, 70362. Configuration Management procedure requires your review.
Comments can be made on the attached sheets.

REVIEWER	CONCURRENCE/ DATE	COMMENTS
CHECKER D. Celious D. Celious	8/22/96	No Comment.
SITE OPERATIONS MANAGER S. Landry		
SITE MAINT. MANAGER T. Breaux		
MECHANICAL ENGINEERING DESIGN MANAGER M. Watson		
PROCESS ENGINEER R. Gould R Gould	9/13/96	No Comment

CONTACT STEVE BROTHERS AT 4571 IF YOU HAVE ANY QUESTIONS.

RETURN TO:	EF-	SIGNATURE OF PREPARER
Denise Celious	25	Steve Brothers

FILE:(W:FORMS/DCNR&C)

30 June 1994
Revision 1 - 30 September 1996

SITE OPERATIONS MANUAL

SAINT JAMES SITE

MECHANICAL EQUIPMENT

U.S. Department of Energy

Strategic Petroleum Reserve

DynMcDermott Petroleum Operations
Contract DE-AC96-93PO018000

NUMERICAL INDEX OF EFFECTIVE WORK PACKAGES/PAGES

List of Current Changes

Original 0....... 30 June 1994
Change 1........28 February 1995
Revision 1.......30 September 1996

Only those work packages assigned to the manual are listed in this index. Insert Revision 1 dated 30 September 1996. Dispose of superseded work packages. If changed pages are issued to a work package, insert the changed pages in the applicable work package.

Total number of pages in this manual is 416 consisting of the following:

WP	PAGE NUMBER	REVISION NUMBER	WP	PAGE NUMBER	REVISION NUMBER
Title		0	009 00	1-28	1
Page	A	1	010 00	1-22	0
Page	B	0	011 00	1-20	0
Page	C	1	012 00	1-14	0
001 00	1-2	0	013 00	1-37/(38 Blank)	0
001 01	1-4	0	014 00	1-53/(54 Blank)	1
002 00	1-18	0	015 00	1/(2 Blank)	0
003 00	1-8	0	016 00	1-20	0
004 00	1-25/(26 Blank)	1	017 00	1-17/(18 Blank)	0
005 00	1-19/(20 Blank)	0	018 00	1-21/(22 Blank)	0
006 00	1-12	0	019 00	1-14	0
007 00	1-12	0	020 00	1-17/(18 Blank)	0
008 00	1-40	1			

Strategic Petroleum Reserve

Contract DE-AC96-93PO018000

SITE OPERATIONS MANUAL
SAINT JAMES SITE
MECHANICAL EQUIPMENT

PUBLICATION NO. SJ-OP-930-001

ORIGINAL PUBLICATION: 30 June 1994

This manual has been reviewed and approved for use at Department of Energy, Saint James facility. This Site Operations Manual for Mechanical Equipment supersedes all mechanical equipment operating procedures currently being used at St. JAMES.

APPROVED BY:

H. A. Kubicek, Director
Engineering and Construction

R. E. McGough, Director
Operations and Maintenance

Billy L Mitchell

for R. E. Gump, Manager
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Development Group

REVISION LOG

REV. NO.	CHANGE NO.	DATE APPROVED	PAGES AFFECTED	DESCRIPTION OF MODIFICATION	ERU
0	0	06-30-94	ALL	Initial Issue	MB
0 0 0 0 0 0 0	1 1 1 1 1 1 1	02-28-95 02-28-95 02-28-95 02-28-95 02-28-95 02-28-95 02-28-95	A, C 001 00 (ALL) 001 01 (ALL) 002 00 (ALL) 003 00 (ALL) 004 00 (ALL) 020 00 (ALL)	General revisions for work packages 001 00, 001 01, 002 00, and 003 00. Modified 004 00 for task WR-92-155, added new package, 020 00 Dock Fire Suppression Systems.	MB 4/6/95
1 1 1 1 1		09-30-96 09-30-96 09-30-96 09-30-96 09-30-96	A,C 004 00 008 00 009 00 014 00	Revised 004 00 due to the Pig Launcher Crossover Connection, PAN 70577. Revised 008 00 due to PAN 70362 to revise pump start sequence. Revised 009 00 due to PAN 70521 to add chemical injection port to SJT tanks. Revised 01400 due to PAN 70578 to add remote start/stop buttons for P1 and P3.	

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List of Effective Work Package Pages

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1 thru 2	0		

Record of Applicable Technical Directives

None

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SAINT JAMES SITE

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List of Effective Work Package Pages

Page No.	Change No.	Page No.	Change No.
1 thru 4	0		

Record of Applicable Technical Directives

None

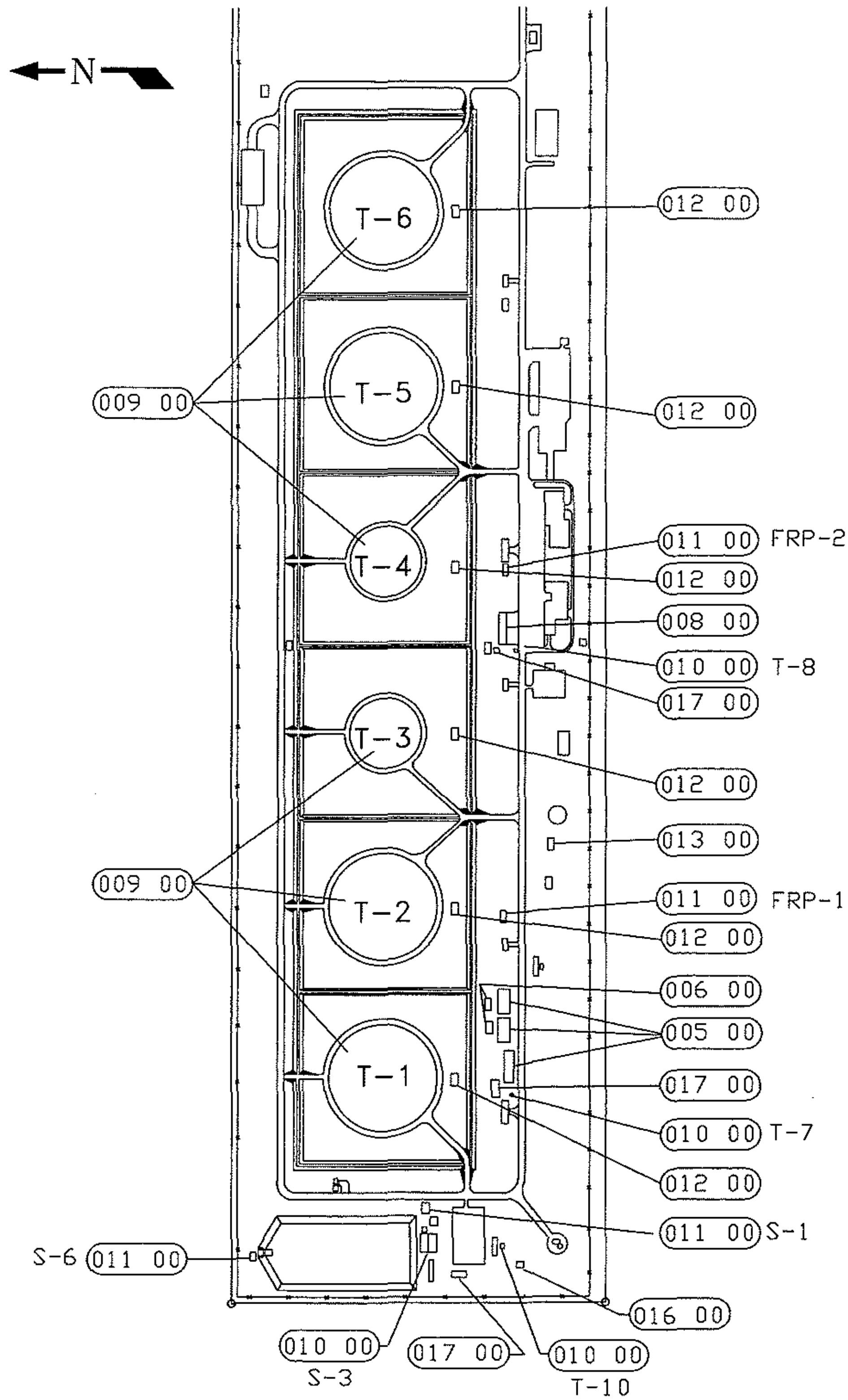
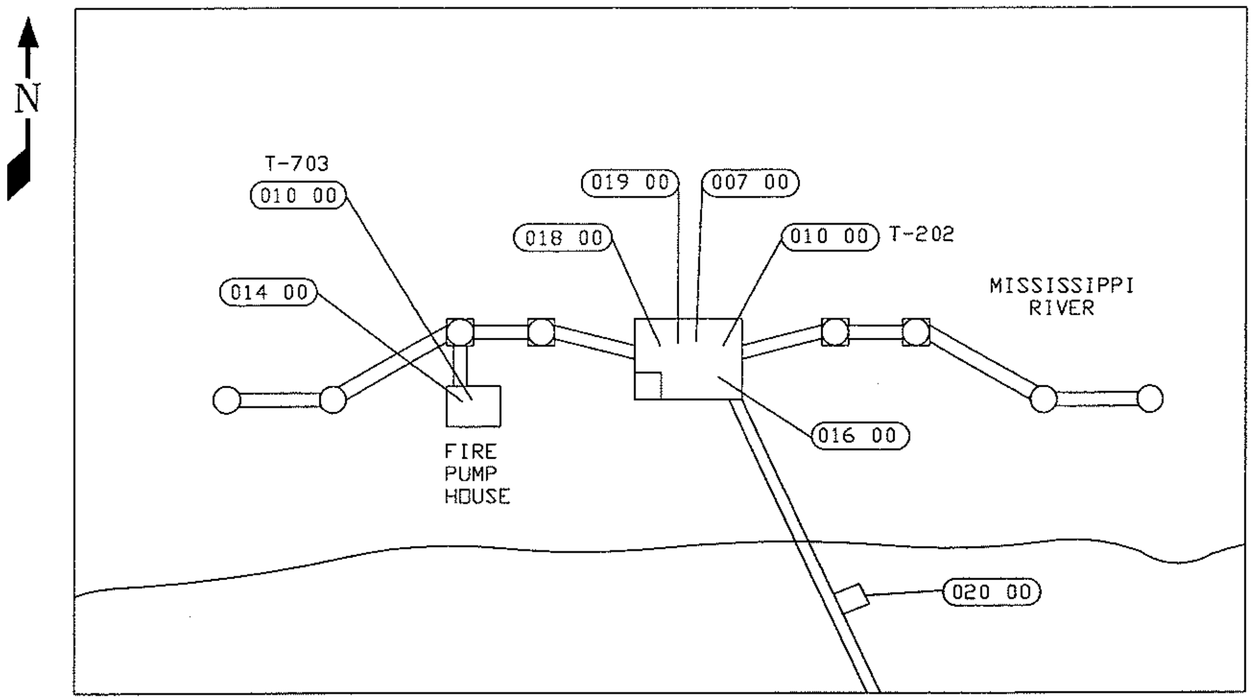
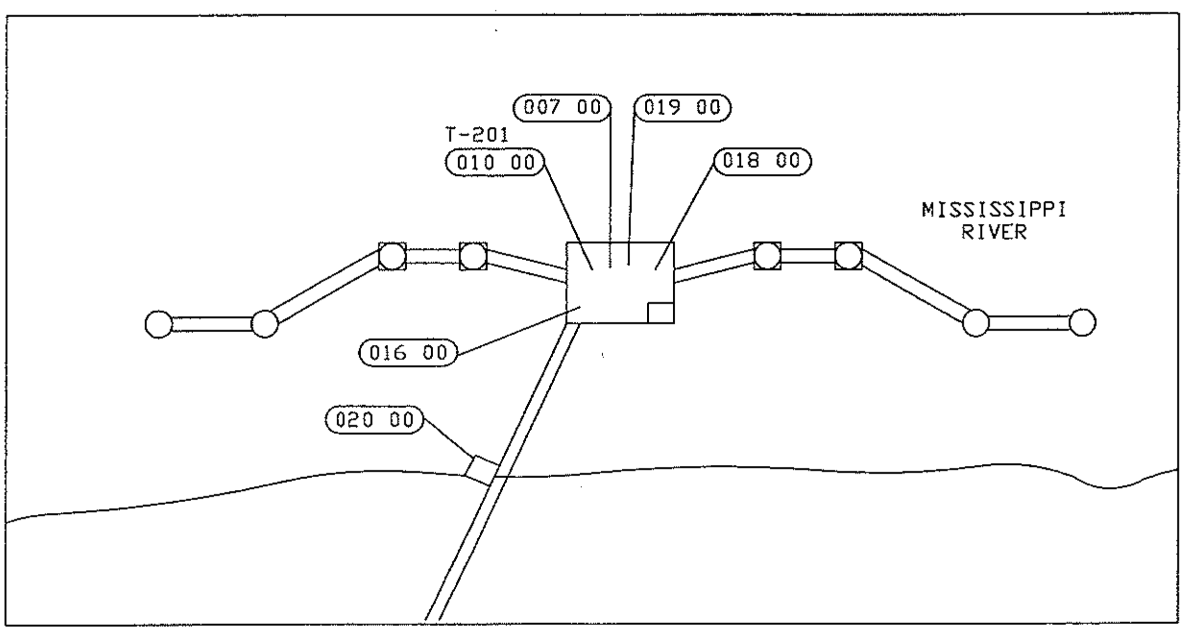


Figure 1. **Site Plan for Locating Mechanical Equipment Operating Procedures (Sheet 1 of 2)**



DOCK 1



DOCK 2

Figure 1. Site Plan for Locating Mechanical Equipment Operating Procedures (Sheet 2)

WP	OPERATING PROCEDURE
005 00	Meter Skids and Prover
006 00	Crude Oil Automatic Sampling Units Weeks Island and Bayou Choctaw Meter Skids
007 00	Crude Oil Automatic Sampling Units Docks 1 and 2
008 00	Crude Oil Booster Pumps SJT-1, -2, -3, -4, and -5
009 00	Crude Oil Storage Tanks T-1, -2, -3, -4, -5, and -6
010 00	Oil Collection System
011 00	Oily Water Environmental Collection System
012 00	Stripping Pumps SJTP-101, -102, -103, -104, -105, and -106
013 00	Main Site Fire Water Pump System
014 00	Dock Fire Water Pump System
015 00	Fire Water Systems - Media
016 00	Corrosion Inhibitor System
017 00	Surge Relief Control System
018 00	Loading Arms
019 00	Purge Pumps SJTP-11 and SJTP-13
020 00	Dock Fire Suppression Systems

Table 1. Mechanical Equipment Operating Procedures

INTRODUCTION

SAINT JAMES SITE

MECHANICAL EQUIPMENT

MECHANICAL EQUIPMENT

SAINT JAMES SITE

INTRODUCTION

List of Effective Work Package Pages

Page No.	Change No.	Page No.	Change No.
1 thru 18	0		

Record of Applicable Technical Directives

None

NOTE

This manual is the basic tool for operating major mechanical equipment and systems at Saint James. To gain the maximum benefits from this manual, read and understand this introduction work package.

TABLE OF CONTENTS

1. **INTRODUCTION.**

A. The U.S. government documents that were used as guides in preparation of this manual are as follows:

(1) DOE-STD-1029-92, DOE Standard Writer's Guide for Technical Procedures.

(2) DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities.

(3) MIL-M-81927B, General Style and Format of Technical Manuals (Work Package Concept).

B. Operating procedures in this manual were prepared in work package format for use with major mechanical equipment systems. The St. James site mechanical equipment systems are:

(1) Crude Oil System.

(2) Drainage Collection System.

(3) Fire Protection.

2. **PURPOSE.**

A. Mechanical equipment work packages provide guidance and instructions for SPR personnel who perform normal operating procedures at the St. James site.

B. These work packages provide specific equipment and systems data for site operations.

C. The detailed procedures in the work packages are intended to supplement and be integrated into each fluid movement procedure as they are written.

D. These work packages can be used to train new SPR personnel in normal mechanical equipment operations.

3. **SCOPE.**

A. Mechanical equipment work packages have an introduction; purpose; scope; applicability; reference documents; precautions and limitations; prerequisite actions; and operating procedures for specific equipment as applicable.

B. Mechanical equipment work packages may include definitions, acronyms, records, post performance activities, support equipment and safety envelope.

C. Mechanical equipment work packages apply to screens, pumps, ponds, sumps, tanks, and separators. Work package procedures also apply to oxygen scavenging and potable water systems.

D. Mechanical equipment work packages do not include fire equipment except diesel and electric fire pump procedures. Other fire equipment procedures are covered in another manual.

E. Mechanical equipment work packages do not include emergency shutdown (ESD) system operation. The software program for ESD is under the DCS in a separate document.

4. RECORD OF APPLICABLE TECHNICAL DIRECTIVES.

A. A record of technical directives is limited to those directly affecting mechanical components that are supported in this manual. The record is provided in all operating procedure work packages. The record indicates incorporation of information from technical directives and engineering change proposals.

B. The record identifies the directives by type, number, category, title, and issue date. If the directive is a result of an ECP, the ECP number in parentheses is shown after the directive title. If no ECP is associated with the directive, the cognizant office code in parentheses is shown after the directive title. Technical directives are issued to provide instructions for changing operating procedures or to add, revise, or delete procedures or precautionary instructions. The record of applicable technical directives is listed in Appendix A.

5. QUALITY ASSURANCE REQUIREMENTS.

Procedures that are essential to mechanical equipment performance or to safety of personnel should be observed or checked by a quality assurance (QA) inspector. After a QA check the technician proceeds to the next step. Examples of QA procedures are torque indications, gage readings, and tasks that may be subsequently covered and not verified. Quality assurance procedures are highlighted by the addition of (QA) after the procedure or step.

6. ABBREVIATIONS, SYMBOLS, AND TERMS.

Abbreviations, symbols, and terms found in the Mechanical Equipment manual are listed in Appendix B.

7. **SUPPORT EQUIPMENT.**

Support equipment that is required for normal operating procedures is listed in Appendix C. When an item of support equipment is not available, an approved alternate identified in the St. James Site List may be substituted.

8. **CONSUMABLE MATERIALS.**

Consumable materials that are required for normal operating procedures for mechanical equipment are listed in Appendix D.

9. **REFERENCE MATERIALS.**

Reference materials that are required for operating procedures are listed in Appendix E.

10. **WARNINGS, CAUTIONS, AND NOTES.**

Procedures or practices that, if not correctly followed, could result in injury to personnel or damage or destruction of equipment, are highlighted by cautions, or warnings. Warnings and cautions precede the text to which they apply. Notes may precede or follow the step as applicable. Warnings, cautions and notes do not contain procedural steps. When a warning, caution, or note consists of two or more paragraphs, each paragraph is numbered. When a combination of data is used, the order appears as follows: warning, caution, note. Such inserts in text are used to emphasize important and critical instructions. Explanation of usage is as follows:

A. WARNING:

WARNING

Refers to a procedure or practice that, if not correctly followed, could result in injury, death, or long term health hazard of personnel.

B. CAUTION:

CAUTION

Refers to a procedure or practice that, if not correctly observed, could result in damage to or destruction of equipment.

C. NOTE:

NOTE

Refers to a procedure or condition that requires emphasis.

11. WARNINGS AND CAUTIONS APPLICABLE TO HAZARDOUS MATERIALS.

Warnings and cautions for hazardous materials listed in this manual are designed to inform personnel of hazards associated with such items when they come in contact with them. Additional information related to hazardous materials is provided in material safety data sheets (MSDS) and during safety and health training. Personnel protective equipment, if required, should be included during training courses. Consult the site safety and health staff concerning specific personnel protective equipment requirements and appropriate handling of hazardous materials.

12. HOW TO USE THIS MANUAL.

A. Locate the applicable work package by one of the following methods:

(1) Refer to Table of Contents in work package 001 00 for the operating procedure and corresponding work package number.

(2) Refer to site plan Figure 1 in work package 001 01. Find the work package number pointing to applicable equipment.

B. Refer to the applicable work package identified. Perform the procedure required by the operations manager or fluid movements procedure.

C. Each user shall be responsible for maintaining and updating the manual. Refer to the Revision Log on Page C to determine the latest manual change/revision number and date. Prompt insertion of manual updates will result in a complete and up-to-date manual. Destroy all superseded and updated manual pages. The numerical index of effective work package pages on Page A, lists the current changes to each work package/page.

D. Errors or areas requiring improved procedures should be submitted to Operations Engineering - Operations Manual Development Group (OMDG). Use the SPR change recommendation form as shown in Appendix G. Your conscientious effort will materially aid in making this manual more useful.

13. MANUAL UPDATES.

A. A change to this manual is prepared by OMDG when authorized by an approved engineering change. OMDG is responsible for issuing all changes to this manual. Site managers are responsible for notifying OMDG of all field changes. Changes to this manual will be prepared by OMDG on a timely basis. Each changed work package is inserted in the manual as required. Superseded work packages are then destroyed. Document Control is responsible for distribution and control of all changes to this manual.

B. If 60% or more of the work packages are affected by changes, then the entire manual will be revised. The revision incorporates all changed or added material and deletes material no longer applicable to the subject of the work package or manual. Document Control is responsible for distribution and control of all revisions to this manual.

APPENDIX A

RECORD OF APPLICABLE TECHNICAL DIRECTIVES

Type/No.	Date	Title and ECP No.	Date Inc.	Remarks

APPENDIX B

ABBREVIATIONS, SYMBOLS AND TERMS
(Sheet 1 of 4)

ABBREVIATION	TERM
A, AMP, AMPS	Amperes
AMB	Ambient
ANSI	American National Standards Institute
API	American Petroleum Institute
AUTO	Automatic
BBLS	Barrels
BC	Bayou Choctaw
BPD	Barrels Per Day
BHP	Brake Horsepower
BLDG	Building
BOD	Biochemical Oxygen Demand
BPD	Barrels Per Day
BPH	Barrels Per Hour
C	Centigrade
CSC	Car Seal Closed
CSO	Car Seal Open
COMS	Crude Oil Meter System
COPS	Conduct of Operations
CRO	Control Room Operator
DCS	Distributed Control System
DM	DynMcDermott
DOE	Department of Energy
ECN	Engineering Change Notice
ECP	Engineering Change Proposal
ELN	Equipment Line Number
EPA	Environmental Protection Agency
ERT	Emergency Response Team
ESD	Emergency Shutdown
ESO	Electrical Switching Order
F	Fahrenheit
FAH	Flow Alarm High
FAL	Flow Alarm Low
FCV	Flow Control Valve
FE	Flow Element
FPM	Feet Per Minute
FPS	Feet Per Second
FR	Flow Recorder
FRP	Foam Retention Pond
FSH	Flow Switch High
FSL	Flow Switch Low
FT	Feet
GAL	Gallon(s)
GPH	Gallons per Hour

APPENDIX B

ABBREVIATIONS, SYMBOLS AND TERMS
(Sheet 2)

ABBREVIATION	TERM
GPM	Gallons Per Minute
H_2S	Hydrogen Sulfide
HG	Mercury
HI	High
HOA	Hand-Off-Automatic Switch
HP	Horsepower
HPP	High Pressure Pump
HPU	Hydraulic Powered Unit
HV	Hand Valve
Hz	Hertz
ID	Inside Diameter
INC.	Incorporated
IN/S, IN/SEC, IPS	Inches Per Second
JSA	Job Safety Analysis
L	Left
LAH	Level Alarm High
LAL	Level Alarm Low
LC	Level Controller
LCC	Lock Chained Close
LCO	Lock Chained Open
LE	Level Element
LO	Low
LSH	Level Switch High
LSL	Level Switch Low
LSHL	Level Switch High Low
LT	Level Transmitter
M	Motor
MAN	Manual
MAOP	Maximum Allowable Operating Pressure
MAWP	Maximum Allowable Working Pressure
MAX	Maximum
MBD	Thousand Barrels Per Day
MBH	ThousandsBarrels per Hour
MCC	Motor Control Center
MECH.	Mechanical
MG/L	Milligrams Per Litre
MIN	Minimum
MMBD	Million Barrels Per Day
MOV	Motor-Operated Valve
MRC	Maintenance Requirement Card
MSDS	Material Safety Data Sheet
MSL.	Mean Sea Level
N_2	Nitrogen
NA	Not Applicable

APPENDIX B

ABBREVIATIONS, SYMBOLS AND TERMS
(Sheet 3)

ABBREVIATION	TERM
NE	Vibration Element
NEMA	National Equipment Manufacturers Association
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NLL	Normal Low Water Level
NPSH	Net Positive Suction Head
OD	Outside Diameter
OMDG	Operations Manual Development Group
ORC	Operations Requirement Checklist
OSHA	Occupational Safety and Health Administration
PA	Public Address
PAH	Pressure Alarm High
PAHH	Pressure Alarm High High
PAL	Pressure Alarm Low
PB	Pushbutton
PDI	Pressure Differential Indicator
PDIS	Pressure Differential Indicator Switch
PI	Pressure Indicator
P&ID	Piping and Instrumentation Diagram
PRV	Pressure Reduction Valve
PS	Pressure Switch
PSH	Pressure Switch High
PSHH	Pressure Switch High High
PSHL	Pressure Switch High Low
PSI	Pounds Per Square Inch
PSIA	Pounds Per Square Inch Atmosphere
PSIG	Pounds Per Square Inch Gauge
PSL	Pressure Switch Low
PSLL	Pressure Switch Low Low
PSV	Pressure Safety Valve
PT	Pressure Transmitter
PVC	Polyvinyl Chloride
QA	Quality Assurance
RPM	Revolutions Per Minute
RWIS	Raw Water Intake Structure
SJ	Saint James
SEC	Second

APPENDIX B

ABBREVIATIONS, SYMBOLS AND TERMS
(Sheet 4)

ABBREVIATION	TERM
SDS	Sphere Detector Switch
SF	Standard Form
SF	System Factor
SG, SP GR	Specific Gravity
SS	Stainless Steel
SPR	Strategic Petroleum Reserve
STR	Strainer
TAH	Temperature Alarm High
TDH	Total Dynamic Head
TDLO	Time Delay Lockout
TE	Temperature Element
TEMP	Temperature
TS	Temperature Switch
TT	Temperature Transmitter
TYP	Typical
V	Volt(s)
VAC	Vacuum
WI	Weeks Island
WP	Work Package
WT	Wall Thickness
@	At
o	Degree
%	Percentage
+	Plus
-	Minus
#	Number
&	And

APPENDIX C

SUPPORT EQUIPMENT

REFERENCE NUMBER	ITEM
MIL-P-37564	OSHA Approved Ear Muffs
A-A-53127	OSHA Approved Ear Plugs
A-A-1974	OSHA Approved Portable Flashlight
MIL-T-12625	Thermometer
A-A-1110 A	Safety Goggles
ASTM D120-87E1	Rubber Gloves
A-A-2375	Face Shield
MIL-B-1505A	Pint Size Sample Bottle
A-A-51360A	Flask
A-A-54796	Hydrometer, Crude Oil
	Innage Gauge and Bob

APPENDIX D

CONSUMABLE MATERIALS

REFERENCE NUMBER	ITEM
	Rubber Apron
	Gear Box Lubricant
NALCO 4952	Biocide
A-A-1224	Cloth, Oil Absorbent

APPENDIX E

REFERENCE MATERIALS
(Sheet 1 of 2)

REFERENCE NUMBER	TITLE
ANSI/ASTM-D270-65	API Standard 2546 Sampling
ANSI/ASTM-D1085	API Standard 2545 Gauging
ANSI/ASTM-D1086	API Standard 2543 Temperature
Application & Permit No. TX0074012	Environmental Protection Agency (EPA)
Application No. TX0092827	Authorization to Discharge Under the National Pollution Discharge Elimination
SJ-M-103-018 thru SJ-M-103-036 and SJ-FP-103-037 thru SJ-FP-103-049	Piping and Instrument Diagrams, St. James
SJ-M-910-001	Systems Description Manual, Volume I
SJ-OP-930-002	St. James Electrical Operations Manual
OM-79	Operating Instructions for Implementing and Format of Fluid Movement Procedures
	API Manual of Petroleum Measurement Standards
NALCO 4952	Material Safety Data Sheet (MSDS) for BIOCIDE
	SPR Performance Criteria Level II
NFPA 20	Standard for the Installation of Centrifugal Fire Pumps

APPENDIX E

REFERENCE MATERIALS
(Sheet 2)

REFERENCE NUMBER	TITLE
Operating Procedure ASR4330.5	Interim Repair/Mitigation Procedure
Operating Procedure ASR7000.9	Conduct of Operations Procedure for Fluid Movements
Code of Federal Regulations, Title 29, Part 1910.95	Occupational Safety and Health Administration - Occupational Noise Exposure
DOE Order 5000.3B	Occurrence Reporting and Processing of Operations Information
DOE Order 5480.19	Conduct of Operations Requirements for DOE Facilities
DOE-STD-1029-92	DOE Standard Writer's Guide for Technical Procedures
ASI7000.12 (D506-01149-09)	Crude Oil Quantity and Quality Procedures Manual
ASI4330-15 (D506-01182-09)	Corrosion Control Procedures
ASI5480.19 (D506-02246-09)	Conduct of Operations at the SPR
MIL-M-81972B	General Style and Format of Technical Manuals (Work Package Concept)

APPENDIX F

SPR CHANGE RECOMMENDATION FORM

SPR CHANGE RECOMMENDATION

TO BE FILLED IN BY ORIGINATOR AND FORWARDED TO OMDG MANAGER

FROM *(Originator)*	SITE	DATE
TO *(OMDG Manager)*	SITE	

COMPLETE NAME OF MANUAL	REVISION DATE	CHANGE DATE	WORK PACKAGE	PAGE	PARAGRAPH

RECOMMENDATION *(Be specific)*

☐ CHECK IF CONTINUED ON BACK

JUSTIFICATION

SIGNATURE	MAIL STOP	TITLE

ADDRESS OF SITE

TO BE FILLED IN BY OMDG MANAGER (Return to Originator)

FROM	DATE
TO	

REFERENCE
YOUR CHANGE RECOMMENDATION DATED ______________

☐ YOUR CHANGE RECOMMENDATION DATED ______________ IS ACKNOWLEDGED. IT WILL BE HELD FOR ACTION OF THE REVIEW CONFERENCE PLANNED FOR ______________ TO BE HELD AT ______________.

OMDG MANAGER	SITE

3400/FR/SE/J/CHANGE RECOMM./12-92

APPENDIX G

OPERATIONAL SUPPLEMENT EXAMPLE

SJ-OP-930-001
30 June 1994

Page 1/(2 Blank)

OPERATIONAL SUPPLEMENT

SAINT JAMES SITE

MECHANICAL OPERATIONS MANUAL

THIS PUBLICATION SUPPLEMENTS DOCUMENT SJ-OP-930-001 DATED 30 JUNE 1994. Reference to this supplement will be made on the title page and each affected page of the manual by personnel responsible for maintaining the publication in current status.

SITE MANAGERS ARE RESPONSIBLE FOR BRINGING THIS SUPPLEMENT TO THE ATTENTION OF ALL AFFECTED SPR PERSONNEL.

Change work package 019 00 as follows:

1. Page 3, paragraph 1.2 is changed to read as follows:

   1.2 **Scope.** The following sub-paragraphs describe the operations, requirements, and facility conditions that are covered by this work package.

2. Page 4, paragraph 2, is changed to read as follows:

   2. **PRECAUTIONS AND LIMITATIONS.**

      G. All personnel working with the corrosion inhibitor system must read and apply the information contained in the material safety data sheet (MSDS) for ammonium bisulfite.

THE END

OPERATIONAL SUPPLEMENT

SYSTEM DESCRIPTION

SAINT JAMES SITE

MECHANICAL EQUIPMENT

MECHANICAL EQUIPMENT

ST. JAMES SITE

SYSTEM DESCRIPTION

List of Effective Work Package Pages

Page No.	Change No.	Page No.	Change No.
1 thru 8	0		

Record of Applicable Technical Directives

None

TABLE OF CONTENTS

1. INTRODUCTION.

The Strategic Petroleum Reserve (SPR) was established in 1976 to store crude oil for use in case of a national emergency. The St. James Site is one of six SPR sites in Texas and Louisiana. These sites are linked to commercial oil distribution systems. The St. James terminal is a tank facility with two docks located near the main site and on the Mississippi River.

The 151 acre site is located at St. James, Louisiana in St. James Parish, 45 miles southeast of Baton Rouge.

1.1 **Purpose.** This work package describes the major mechanical equipment systems and components at the St. James Site near Baton Rouge, Louisiana.

1.2 **Scope.** This work package describes only the major mechanical equipment systems and components at St. James Site. The site static lineup sheets are shown in work package 004 00. The normal operating procedures for mechanical equipment systems are shown in work packages 005 through 019 00. Refer to SJ-OP-930-002 Electrical Operations Manual for electrical Operations that are associated with mechanical equipment. Pigging procedures are not covered. Pigging procedures are covered separately and are in accordance with DOT/DOC specifications.

1.3 **Applicability.** The mechanical equipment systems in this work package are applicable for St. James Site and the two docks included with the main site.

1.4 **Reference Documents.**

A. SJ-OP-930-002, St. James Electrical Operations Manual.

B. SJ-M-910-001, Systems Design Description Manual, Volumes I and II.

C. SJ-M-103-018 through SJ-FP-103-049, Piping and Instrument Diagrams, St. James.

D. DOE Order 5480.19, Conduct of Operations (COPS).

E. Operating Procedure ASR4330.5, Interim Repair/ Mitigation Authorization Procedure.

2. DESCRIPTION OF SYSTEMS.

The mechanical equipment systems are described in sections that follow.

3. CRUDE OIL SYSTEM.

A. The crude oil system consists of equipment used for the transfer, storage, and drawdown of crude oil. The tanks are used to store Type I, Type II and Type III sweet oil and sour oil. The tanks have a combined storage capacity of 2.0 million barrels.

B. Two 36-inch pipelines interconnect the St. James site with the Bayou Choctaw and Weeks Island sites. Oil transferred or received to and from the terminal is metered on both ends of the pipelines.

C. The crude oil system includes a meter station, operating sampler, surge relief control system, crude oil booster pumps, dock loading arms, crude oil storage tanks, and corrosion inhibitor system.

3.1 Meter Station.

A. Crude oil is received through a 36-inch pipeline from Bayou Choctaw or Weeks Island through the pig launchers/receivers at St. James. From the launchers/receivers, the oil flows to the meter station's inlet header.

B. The meter station consists of two meter skids, each with three complete 12" meter run assemblies. A 24-inch unidirectional prover is used to calibrate each meter.

C. Crude oil can be transferred from any of the site's six tanks or routed through the booster pumps to the meter station's inlet header.

D. See work package 005 00 for the meter skids and prover operating procedure.

3.2 Crude Oil Sampling.

A. Crude oil entering the site is monitored by an in-line sampler. Two samplers are located at the main site and three samplers are located on each dock.

B. See work packages 006 00 for Crude Oil Automatic Sampling Units, Weeks Island and Bayou Choctaw Meter Skids and 007 00, Crude Oil Automatic Sampling Units, Dock 1 and 2 operating procedures.

3.3 Surge Relief Control System.

A. The surge relief control system provides surging protection to the St. James pipeline network. The main components of the system are the surge relief valve, the surge relief nitrogen control system, the surge oil tank (either T-1 or T-2 storage tank), and the associated interconnecting piping, instrumentation, and valving.

B. See work package 017 00 for surge relief control system operating procedures.

3.4 Crude Oil Booster Pumps.

A. The crude oil booster pumps can be configured to take suction from the crude oil storage tanks and pump to other locations such as Weeks Island, Bayou Choctaw, and the docks. In addition, they can be configured to pump oil from one tank to another.

B. See work package 008 00 for the crude oil booster pumps operating procedure.

3.5 Crude Oil Storage Tanks.

A. The six crude oil tanks provide holding capacity for oil transfer operations to or from Bayou Choctaw and Weeks Island, between the dock facilities, to or from the LOCAP system, and to the CAPLINE pipeline. The tanks are currently used for custody transfer between suppliers and purchasers of oil. The surge relief valves use tank T-1 for overflow.

B. See work package 009 00 for the Crude Oil Storage Tanks operating procedure.

3.6 Stripping Pumps.

A. The primary purpose of the six stripping pumps is to pump out the residual crude oil from the tanks. The crude oil booster pumps will pump out the majority of the tank inventory. The stripping pumps are used to complete the oil removal from the tank.

B. The stripping pumps are used to make transfers between tanks, to "pack" (pressurize and vent air from) the line between the docks and the terminal, pack CAPLINE or LOCAP pipelines, and pressure test equipment.

C. See work package 012 00 for the Stripping Pumps operating procedures.

3.7 Corrosion Inhibitor System.

A. The corrosion inhibitor system consists of four tanks and a pump at the terminal. There is also a tank and a pump at Dock No. 1 and another tank and pump at Dock No. 2.

B. The corrosion inhibitor system is used to reduce the corrosion that occurs in the crude oil pipelines. Corrosion inhibitor solution is injected into the crude oil during operations.

C. See work package 016 00 for the Corrosion Inhibitor System operating procedures.

3.8 Loading Arms.

A. The loading arms, located on Dock No. 1 and Dock No. 2, function to connect the site piping to ships for on-loading and off-loading. At each dock, two arms deliver the dock design flow rate of 960 MBD. The third arm is an installed spare in standby service.

B. See work package 018 00 for the Loading Arms operating procedure.

3.9 Purge Pumps.

A. There is a purge pump located at both Dock No. 1 and Dock No. 2. They are used to remove residual crude oil that will not drain out of the loading arms or the dock strainer piping. They take suction from either the loading arm drain manifold or the dock strainer drain manifold. They deliver the crude oil to the main header going to/from the site. This operation removes crude oil from the dock portion of the line after the last MOV that can be operated from the main site control room.

B. See work package 019 00 for the Purge Pumps operating procedures.

4. DRAINAGE COLLECTION SYSTEMS.

A. The oil collection system collects, separates, and distributes fluids from oil spills and contaminated rainwater.

B. The oily water collection system collects, separates, and distributes water effluent from drainage sources. The water is pumped into the Mississippi River.

4.1 Oil Collection System.

A. The oil collection system collects, separates, and distributes fluids from minor oil spills and piping drains. All major collection equipment is piped to a closed oil sump system. This system consists of collection and distribution piping, tanks, and pumps. The collected oil is pumped into site tankage.

B. See work package 010 00 for the Oil Collection System operating procedures.

4.2 Oily Water Environmental Collection.

A. The oily water environmental collection system collects, separates, and distributes water effluent from drainage sources. The water is pumped into the Mississippi River.

B. See work package 011 00 for the Oily Water Environmental Collection System operating procedures.

5. FIRE PROTECTION SYSTEM.

The main fire water system provides fire protection for the main terminal area. The docks fire water system provides fire protection for Dock 1 and Dock 2. In addition, the two systems are interconnected to provide protection in both areas. Both fire water systems are capable of using either water or foam to extinguish a fire.

5.1 Fire Water System Main Site.

A. The main fire water system consists of an electric driven pump, a diesel driven pump, and an electric jockey pump located in the fire water pump house on the main terminal site. A fire water tank, located next to the pump house, contains the water for this fire water system that provides fire protection for the main terminal site and docks.

B. See work package 013 00 for the Main Site Fire Water Pump System operating procedures.

5.2 Fire Water System Docks.

A. The docks fire water system consists of two electric driven pumps, two diesel driven pumps and an electric jockey pump located in the fire pump house fire dock adjacent to Dock 1. The water supply for the fire water pumps comes from the Mississippi River. This system provides fire protection for the main terminal site, Dock 1 or Dock 2.

B. See work package 014 00 for the Dock Fire Water Pump System operating procedures.

C. See work package 020 00 for the Dock Fire Suppression Systems operating procedure.

5.3 Fire Water Systems - Media.

A. The terminal and docks fire suppression/proportioner system provides automatic proportioning and induction of low expansion foam for the fire turrets, foam monitors and fire hoses to extinguish a fire on the main terminal site, Dock 1 or Dock 2.

B. See work package 015 00 for the site Fire Water Systems - Media operating procedures.

C. See work package 020 00 for the Dock Fire Suppression Systems operating procedure.

MECHANICAL EQUIPMENT

SAINT JAMES SITE

LINEUP SHEETS AND STATIC VALVE ALIGNMENT CHECKLIST

List of Effective Work Package Pages

Page No.	Change No.	Page No.	Change No.
1 thru 25/(26 Blank)	0		

Record of Applicable Technical Directives

None

TABLE OF CONTENTS

1. INTRODUCTION.

This work package contains the St. James site lineup sheets, the static lineup sheets, and the static valve alignment checklists.

The site lineup sheets, which are schematic drawings depicting the site's main process equipment, are in Appendix A. These schematics cover the crude oil system.

The site static lineup sheets are in Appendix B. These are the same schematics as the site lineup sheets in Appendix A except that they show valve positions (open or closed) for each valve when the site is in the static mode.

The static valve alignment checklists, which tabulate all valves shown on the site static lineup sheets, are in Appendix C.

1.1 **Purpose.** The primary purpose of the site lineup sheets is to provide a general overview of site process equipment for fluid movement planning. They are a good tool in completing the valve alignment checklist for a specific movement.

The sheets can also be used by site operations in monitoring the overall fluid movement, and by engineering as a reference schematic. They are not intended to replace the more detailed piping and instrumentation diagrams (P&IDs).

The primary purpose of the site static lineup sheets and static valve alignment checklists is to provide a method to align and monitor site process valves while in the static mode. These valve positions avert the misdirection of fluids while simultaneously allowing thermal relief for surface piping.

Also, the static alignment checklists, Appendix C, can be used for fluid movements by marking the new valve position within the static position column. This will clearly show the change from the static positon to the fluid movement position.

1.2 **Scope.** The site lineup and static lineup sheets show the main process equipment used for fluid movement. They cover the crude oil system, including the metering skid, large storage tanks, and dock area.

The lineup sheets do not show support systems such as the oily water collection system or the fire water system. Generally, manually operated valves, pump check valves and equipment support piping such as drains and vents under 4 inches are not shown.

The static valve alignment checklists give information on all valves shown in the site static lineup sheets, but in table format.

1.3 Reference Documents.

Piping & Instrumentation Diagrams, St. James Site. (SJ-M-103-018 through SJ-M-103-036).

2. PRECAUTIONS AND LIMITATIONS.

The site lineup sheets are to be used for general reference and planning purposes only. The sheets do not contain the detail which the P&ID drawings have.

If additional valves are necessary to safely align specific areas while in the static mode, they must be individually added at that time to the checklist.

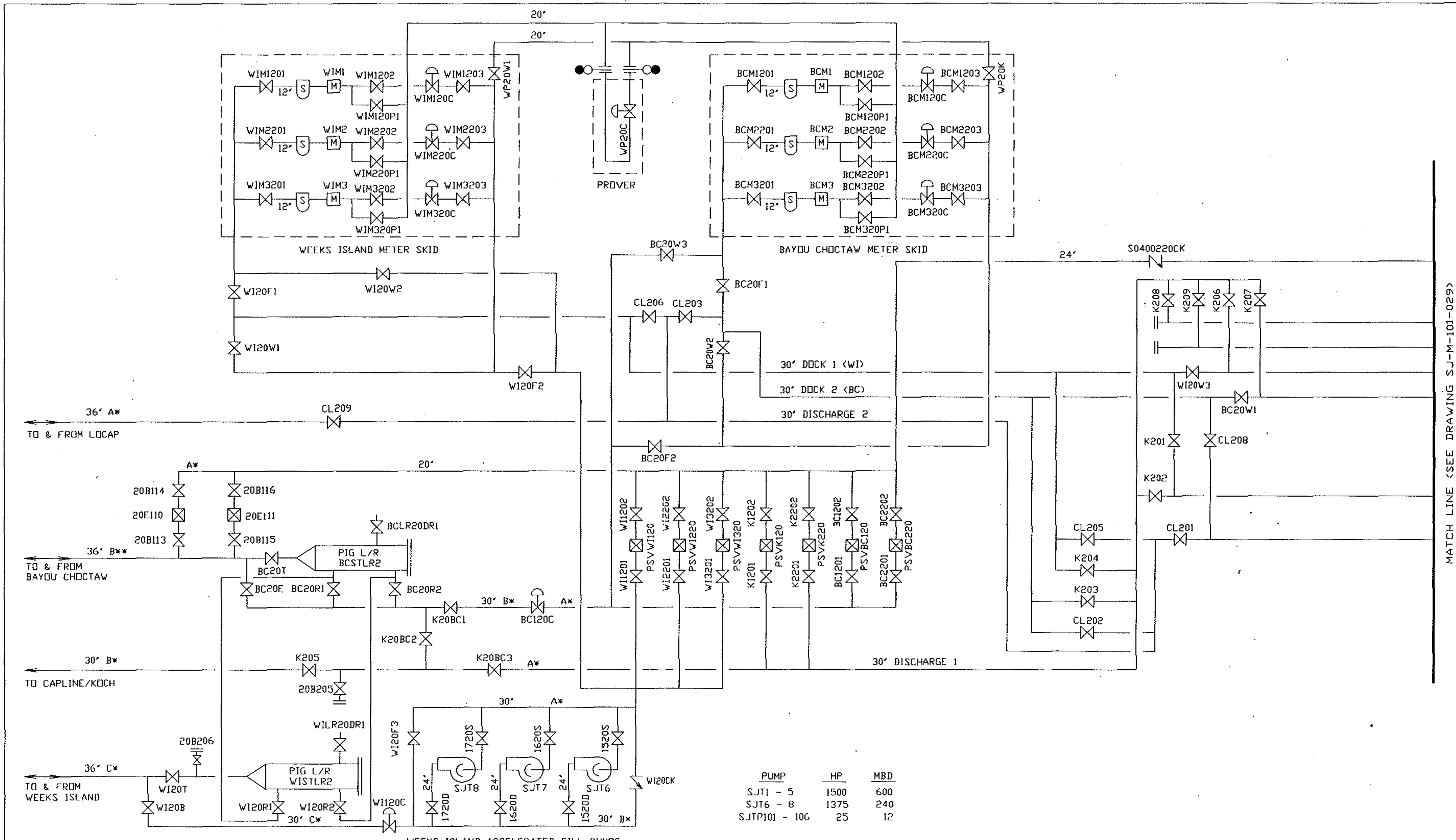
3. PREREQUISITE ACTIONS.

The St. James P&ID drawings should be readily available when using these schematics.

4. RECORDS.

When the site lineup sheets and/or static valve alignment checklists have been marked up for planning a specific fluid movement, the originals shall be kept with the originals of the fluid movement procedures package.

APPENDIX A
LINEUP SHEETS
(Sheet 1 of 2)



PUMP	HP	MBD
SJT1 - 5	1500	600
SJT6 - 8	1375	240
SJTP101 - 106	25	12

NOTE:

ALL PIPING RATED AS CLASS A* (275 PSIG) UNLESS OTHERWISE SHOWN AS CLASS B* (740 PSIG) OR CLASS C* (990 PSIG)

B** DERATED TO 300 PSIG

NO.	CHANGE DESCRIPTION	DRAWN BY	CHECKED BY	R/D APPROVAL	BOE APPROVAL	DATE
3	REVISED PER PAN 70577, ECN 100	JMH	SAB			10/1/96
2	REVISED PER ECN 999.DOC	ESP	SAB	GAG	JC	3/24/95
1	DWG. MADE INTO 2 SHTS. ADDED MTR SKID VALVES	ESP	JFS	GAG	JCK	6/29/94
0	RELEASED FOR OPS MANUAL	ESP	RDM	REG	JCK	8/10/92

SITE OPERATIONS MANUAL

CRUDE OIL
LINEUP SHEET

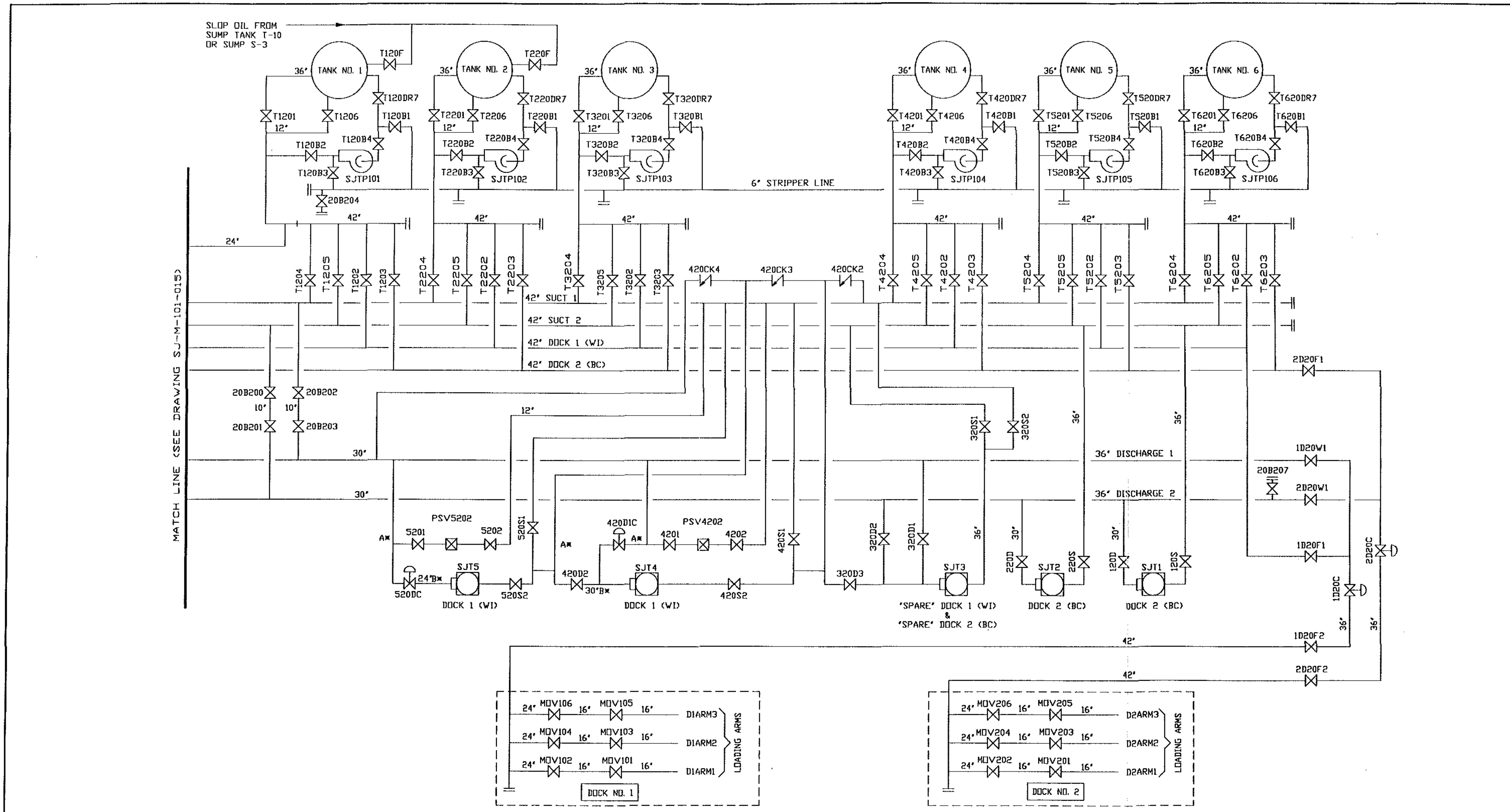
ST. JAMES TERMINAL
ST. JAMES PARISH, LOUISIANA

OFFICE OF ENGINEERING AND CONSTRUCTION

STRATEGIC PETROLEUM RESERVE

DISCIPLINE: PROCESS
SCALE: NONE
DRAWING NUMBER: SJ-M-101-015
SHEET 1 OF 1
REV 3

7100017



NOTE:

ALL PIPING RATED AS CLASS A* (275 PSIG) UNLESS OTHERWISE SHOWN AS CLASS B* (740 PSIG) OR CLASS C* (990 PSIG)

B** DERATED TO 300 PSIG

NOTES

NO.	CHANGE DESCRIPTION	DRAWN BY	CHECKED BY	M/O APPROVAL	D.O.E. APPROVAL	DATE
2	REVISED PER ECN 999.DOC	ESP	SAB	GAG	JC	3/24/95
1	DWG. MADE INTO 2 SHTS, ADDED MTR SKID VALVES	ESP	JFS	GAG	JCK	6/29/94
0	RELEASED FOR OPS MANUAL	ESP	RDM	REG	JCK	8/10/92

SITE OPERATIONS MANUAL

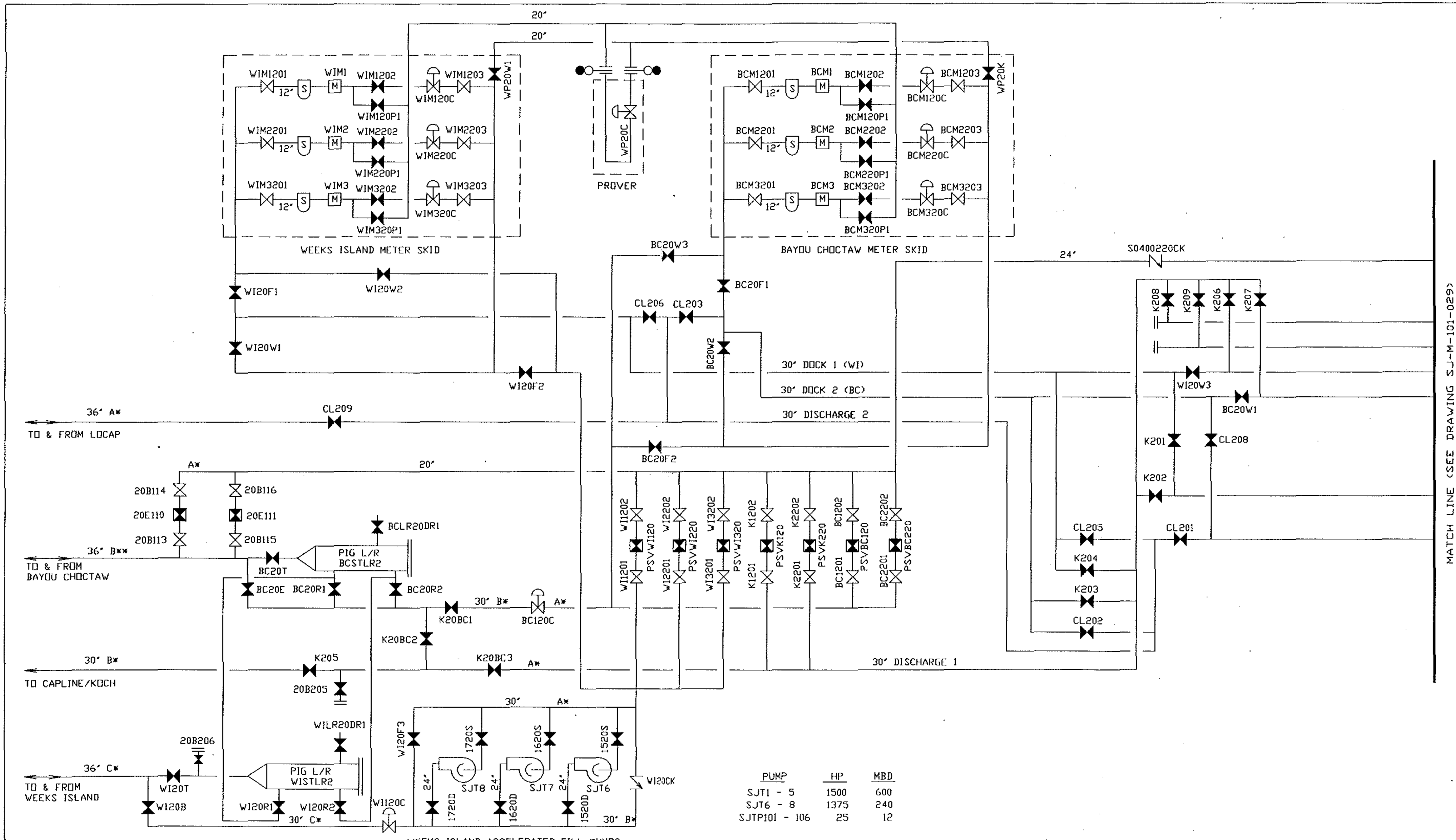
CRUDE OIL LINEUP SHEET

ST. JAMES TERMINAL
ST. JAMES PARISH, LOUISIANA

OFFICE OF ENGINEERING AND CONSTRUCTION

STRATEGIC PETROLEUM RESERVE

PROJECT NUMBER
TASK NUMBER: 10038
DISCIPLINE: PROCESS
SCALE: NONE
DRAWING NUMBER: SJ-M-101-029
SHEET 1 OF 1



PUMP	HP	MBD
SJT1 - 5	1500	600
SJT6 - 8	1375	240
SJTP101 - 106	25	12

NOTE:
ALL PIPING RATED AS CLASS A* (275 PSIG) UNLESS OTHERWISE SHOWN AS CLASS B* (740 PSIG) OR CLASS C* (990 PSIG)
B** DERATED TO 300 PSIG
SURGE RELIEF VALVE (CLOSE)
CLOSE
OPEN

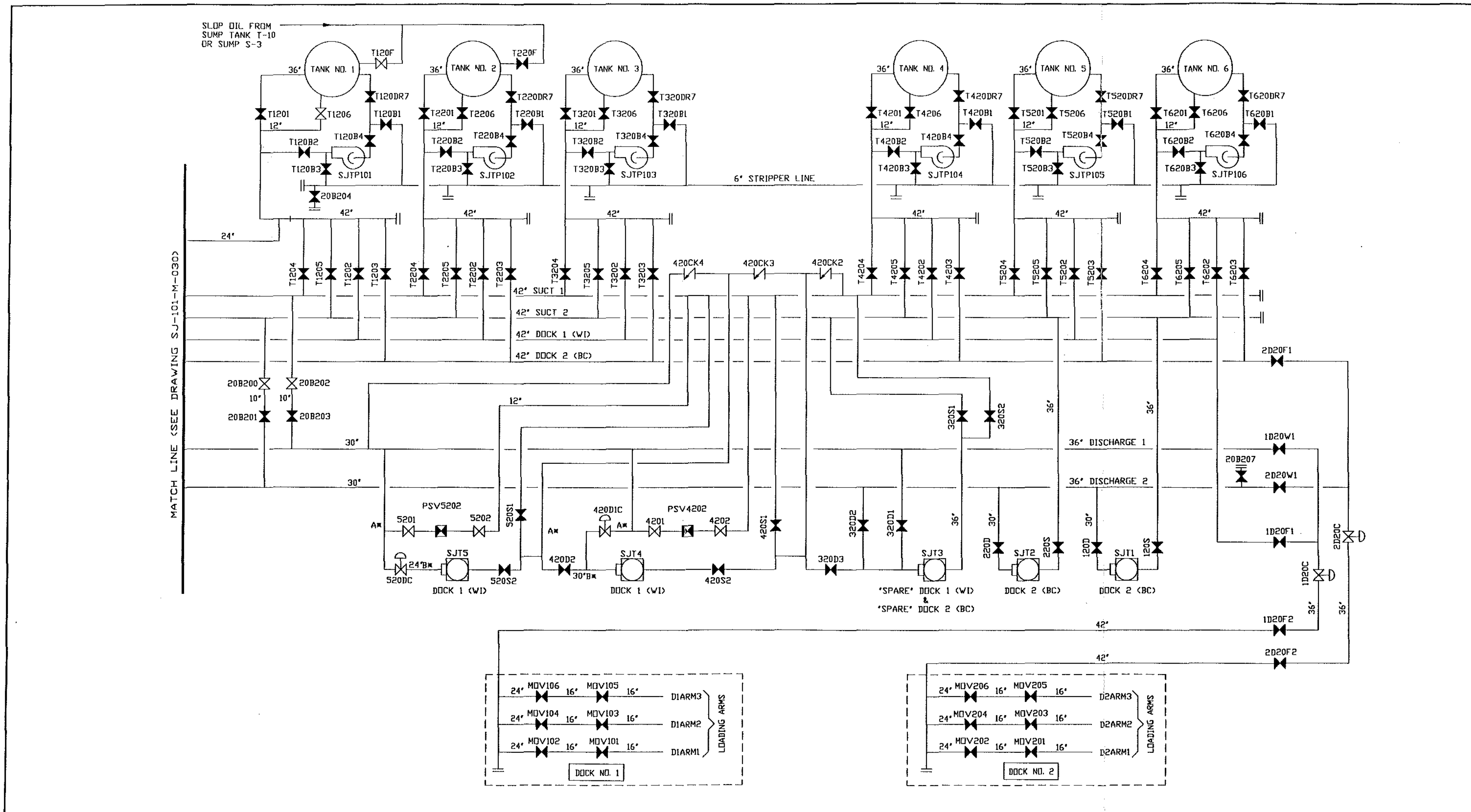
NO.	CHANGE DESCRIPTION	DRAWN BY	CHECKED BY	M/O APPROVAL	ENG. APPROVAL	DATE
3	REVISED PER PAN 70577, ECN 100	JMH	SAB			10/1/96
2	REVISED PER ECN 999.DOC	ESP	SAB	GAG	JC	3/24/95
1	DWG. MADE INTO 2 SHTS. ADDED MTR SKID VALVES	ESP	JFS	GAG	JCK	6/29/94
0	RELEASED FOR OPS MANUAL	ESP	RDM	REG	JCK	8/10/92

SITE OPERATIONS MANUAL
CRUDE OIL
STATIC LINEUP SHEET
ST. JAMES TERMINAL
ST. JAMES PARISH, LOUISIANA

OFFICE OF ENGINEERING AND CONSTRUCTION
STRATEGIC PETROLEUM RESERVE

DISCIPLINE: PROCESS
SCALE: NONE
DRAWING NUMBER: SJ-M-101-030
SHEET 1 of 1
REV. 3

71010032



NOTE:

ALL PIPING RATED AS CLASS A* (275 PSIG) UNLESS OTHERWISE SHOWN AS CLASS B* (740 PSIG) OR CLASS C* (990 PSIG)

B** DERATED TO 300 PSIG

SURGE RELIEF VALVE (CLOSE)

CLOSE

OPEN

NOTES

NO.	CHANGE DESCRIPTION	DRAWN BY	CHECKED BY	M/O APPROVAL	D.O.E. APPROVAL	DATE
2	REVISED PER WR-92-155	ESP	SAB	GAG	JC	3/24/95
1	DWG. MADE INTO 2 SHTS, ADDED MTR SKID VALVES	ESP	JFS	GAG	JCK	6/29/94
0	RELEASED FOR OPS MANUAL	ESP	RDM	REG	JCK	8/10/92

SITE OPERATIONS MANUAL

CRUDE OIL
STATIC LINEUP SHEET

ST. JAMES TERMINAL
ST. JAMES PARISH, LOUISIANA

OFFICE OF ENGINEERING
AND CONSTRUCTION

STRATEGIC
PETROLEUM
RESERVE

PROJECT NUMBER
TASK NUMBER: 10038
DISCIPLINE: PROCESS
SCALE: NONE
DRAWING NUMBER: SJ-M-101-031
SHEET 1 OF 1

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 1 of 13)

MOVEMENT:______________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
BCLR20DR1	BC L/R DRAIN	X				
BCM120C	BCM1 CONTROL	O				
BCM120P1	BCM1 PROVER INLET	X				
BCM1201	BCM1 INLET	O				
BCM1202	BCM1 OUTLET	X				
BCM1203	BCM1 ISOLATION	O				
BCM220C	BCM2 CONTROL	O				
BCM220P1	BCM2 PROVER INLET	X				
BCM2201	BCM2 INLET	O				
BCM2202	BCM2 OUTLET	X				
BCM2203	BCM2 ISOLATION	O				
BCM320C	BCM3 CONTROL	O				
BCM320P1	BCM3 PROVER INLET	X				
BCM3201	BCM3 INLET	O				
BCM3202	BCM3 OUTLET	X				
BCM3203	BCM3 ISOLATION	O				
BC120C	BC CONTROL	O				
BC1201	INLET TO PSVBC120	O				
BC1202	OUTLET FROM PSVBC120	O				
BC20E	BC STATION	X				
BC20F1	DOCK 2 HEADER/BCM INLET	X				
BC20F2	BCM OUTLET TO BC/LOCAP	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 2)

MOVEMENT:______________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
BC20R1	BC L/R FILL	X				
BC20R2	BC L/R LAUNCHER	X				
BC20T	BC L/R MAINLINE	X				
BC20W1	ISOLATE DOCK 2/BC HEADER	X				
BC20W2	BCM OUTLET TO BC/LOCAP/DOCK 2 HEADER	X				
BC20W3	BCM INLET FROM PIPELINE	X				
BC2201	INLET TO PSVBC220	O				
BC2202	OUTLET FROM PSVBC220	O				
CL201	ISOLATE DISCHARGE HEADER 2/LOCAP	X				
CL202	JUMPOVER DISCHARGE HEADER 2 TO DOCK 2/BC HEADER	X				
CL203	LOCAP HEADER/BC HEADER ISOLATION	X				
CL205	JUMPOVER DISCHARGE HEADER 2 TO DOCK 1/ WI HEADER	X				
CL206	DOCK 1/WI HEADER/ LOCAP ISOLATION	X				
CL208	JUMPOVER DISCHARGE HEADER 2 TO DOCK 2/ BC HEADER	X				
CL209	LOCAP TERMINAL ISOLATION	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 3)

MOVEMENT:________________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
K1201	INLET TO PSVK120	O				
K1202	OUTLET FROM PSVK120	O				
K20BC1	BC HEADER BLOCK	X				
K20BC2	BC/KOCH ISOLATION	X				
K20BC3	KOCH HEADER BLOCK	X				
K201	JUMPOVER DISCHARGE HEADER 1 TO DOCK 1/ WI HEADER	X				
K202	ISOLATE DISCHARGE HEADER 1/KOCH	X				
K203	JUMPOVER DISCHARGE HEADER 1 TO DOCK 2/ BC HEADER	X				
K204	JUMPOVER DISCHARGE HEADER 1 TO DOCK 1/ WI HEADER	X				
K205	KOCH/CAPLINE TERMINAL ISOLATION	X				
K206	DOCK 1/ WI HEADER JUMPOVER TO DISCHARGE HEADER 1	X				
K207	DISCHARGE HEADER 1 JUMPOVER TO DOCK 2 HEADER	X				
K208	SUCTION HEADER 1 JUMPOVER TO DISCHARGE HEADER 1	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 4)

MOVEMENT:______________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
K209	SUCTION HEADER 2 JUMPOVER TO DISCHARGE HEADER 1	X				
K2201	INLET TO PSVK220	O				
K2202	OUTLET FROM PSVK220	O				
MOV101	DOCK 1 ARM 1 BALL	X				
MOV102	DOCK 1 ARM 1 GATE	X				
MOV103	DOCK 1 ARM 2 BALL	X				
MOV104	DOCK 1 ARM 2 GATE	X				
MOV105	DOCK 1 ARM 3 BALL	X				
MOV106	DOCK 1 ARM 3 GATE	X				
MOV201	DOCK 2 ARM 1 BALL	X				
MOV202	DOCK 2 ARM 1 GATE	X				
MOV203	DOCK 2 ARM 2 BALL	X				
MOV204	DOCK 2 ARM 2 GATE	X				
MOV205	DOCK 2 ARM 3 BALL	X				
MOV206	DOCK 2 ARM 3 GATE	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 5)

MOVEMENT:______________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
PSVBC220	BC SURGE RELIEF	X				
PSVBC120	BC SURGE RELIEF	X				
PSVK220	KOCH SURGE RELIEF	X				
PSVK120	KOCH SURGE RELIEF	X				
PSVWI320	WI SURGE RELIEF	X				
PSVWI220	WI SURGE RELIEF	X				
PSVWI120	WI SURGE RELIEF	X				
PSV4202	DOCK 1 SURGE RELIEF	X				
PSV5202	DOCK 1 SURGE RELIEF	X				
T120B1	STRIPPER MAIN HEADER TO/ FROM STRIPPER SUCTION HEADER	X				
T120B2	DISCHARGE TO TANK MANIFOLD	X				
T120B3	DISCHARGE TO STRIPPER HEADER	X				
T120B4	STRIPPER PUMP SUCTION	X				
T120DR7	TANK STRIPPER	X				
T120F	ENTRAINED FLUIDS DISCHARGE INTO TANK 1	O				
T1201	TANK 1 SKIN	X				
T1202	DOCK 1/WI HEADER	X				
T1203	DOCK 2/BC HEADER	X				
T1204	SUCTION HEADER 1	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 6)

MOVEMENT:______________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
T1205	SUCTION HEADER 2	X				
T1206	TANK 1 SUMP	O				
T220B1	STRIPPER MAIN HEADER TO/FROM STRIPPER SUCTION HEADER	X				
T220B2	DISCHARGE TO TANK MANIFOLD	X				
T220B3	DISCHARGE TO STRIPPER HEADER	X				
T220B4	STRIPPER PUMP SUCTION	X				
T220DR7	TANK STRIPPER	X				
T220F	ENTRAINED FLUIDS DISCHARGE INTO TANK	X				
T2201	TANK 2 SKIN	X				
T2202	DOCK 1/ WI HEADER	X				
T2203	DOCK 2/BC HEADER	X				
T2204	SUCTION HEADER 1	X				
T2205	SUCTION HEADER 2	X				
T2206	TANK 2 SUMP	X				
T320B1	STRIPPER MAIN HEADER TO/FROM STRIPPER SUCTION HEADER	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 7)

MOVEMENT:________________________ DATE:_______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
T320B2	DISCHARGE TO TANK MANIFOLD	X				
T320B3	DISCHARGE TO STRIPPER HEADER	X				
T320B4	STRIPPER PUMP SUCTION	X				
T320DR7	TANK STRIPPER	X				
T3201	TANK 3 SKIN	X				
T3202	DOCK 1/WI HEADER	X				
T3203	DOCK 2/BC HEADER	X				
T3204	SUCTION HEADER 1	X				
T3205	SUCTION HEADER 2	X				
T3206	TANK 3 SUMP	X				
T420B1	STRIPPER MAIN HEADER TO/FROM STRIPPER SUCTION HEADER	X				
T420B2	DISCHARGE TO TANK MANIFOLD	X				
T420B3	DISCHARE TO STRIPPER HEADER	X				
T420B4	STRIPPER PUMP SUCTION	X				
T420DR7	TANK STRIPPER	X				
T4201	TANK 4 SKIN	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 8)

MOVEMENT:________________________ DATE:________________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
T4202	DOCK 1/WI HEADER	X				
T4203	DOCK 2/BC HEADER	X				
T4204	SUCTION HEADER 1	X				
T4205	SUCTION HEADER 2	X				
T4206	TANK 4 SUMP	X				
T520B1	STRIPPER MAIN HEADER TO/FROM STRIPPER SUCTION HEADER	X				
T520B2	DISCHARGE TO TANK MANIFOLD	X				
T520B3	DISCHARGE TO STRIPPER HEADER	X				
T520B4	STRIPPER PUMP SUCTION	X				
T520DR7	TANK STRIPPER	X				
T5201	TANK 5 SKIN	X				
T5202	DOCK 1/WI HEADER	X				
T5203	DOCK 2/BC HEADER	X				
T5204	SUCTION HEADER 1	X				
T5205	SUCTION HEADER 2	X				
T5206	TANK 5 SUMP	X				
T620B1	STRIPPER MAIN HEADER TO/FROM STRIPPER SUCTION HEADER	X				
T620B2	DISCHARGE TO TANK MANIFOLD	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 9)

MOVEMENT:______________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
T620B3	DISCHARGE TO STRIPPER HEADER	X				
T620B4	STRIPPER PUMP SUCTION	X				
T620DR7	TANK STRIPPER	X				
T6201	TANK 6 SKIN	X				
T6202	DOCK 1/WI HEADER	X				
T6203	DOCK 2/BC HEADER	X				
T6204	SUCTION HEADER 1	X				
T6205	SUCTION HEADER 2	X				
T6206	TANK 6 SUMP	X				
WILR20DR1	WI L/R DRAIN	X				
WIM120C	WIM1 CONTROL	O				
WIM120P1	WIM1 PROVER INLET	X				
WIM1201	WIM1 INLET	O				
WIM1202	WIM1 OUTLET	X				
WIM1203	WIM1 ISOLATION	O				
WIM220C	WIM2 CONTROL	O				
WIM220P1	WIM2 PROVER INLET	X				
WIM2201	WIM2 INLET	O				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 10)

MOVEMENT:________________________ DATE:________________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
WIM2202	WIM2 OUTLET	X				
WIM2203	WIM2 ISOLATION	O				
WIM320C	WIM3 CONTROL	O				
WIM320P1	WIM3 PROVER INLET	X				
WIM3201	WIM3 INLET	O				
WIM3202	WIM3 OUTLET	X				
WIM3203	WIM3 ISOLATION	O				
WI120C	WI CONTROL	O				
WI1201	INLET TO PSVWI120	O				
WI1202	OUTLET FROM PSVWI120	O				
WI120B	WI STATION	X				
WI20F1	DOCK 1 HEADER/WIM INLET	X				
WI20F2	WIM OUTLET TO WI PIPELINE	X				
WI20F3	WI HEADER BLOCK	X				
WI20R1	WI L/R FILL	X				
WI20R2	WI L/R LAUNCHER	X				
WI20T	WI L/R MAINLINE	X				
WI20W1	WIM OUTLET TO LOCAP/DOCK 1	X				
WI20W2	WIM INLET FROM PIPELINE	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 11)

MOVEMENT:______________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
WI20W3	DOCK 1/WI HEADER JUMPOVER TO DISCHARGE HEADER 1	X				
WI2201	INLET TO PSVWI220	O				
WI2202	OUTLET FROM PSVWI220	O				
WI3201	INLET TO PSVWI220	O				
WI3202	OUTLET FROM PSVWI220	O				
WP20C	PROVER CONTROL	O				
WP20K	PROVER OUTLET TO BCM SKID	X				
WP20W1	PROVER OUTLET TO WIM SKID	X				
1D20C	DOCK 1 CONTROL	O				
1D20F1	DOCK 1/TANK MANIFOLD	X				
1D20F2	DOCK 1 ISOLATION	X				
1D20W1	DOCK 1/BOOSTER PUMP MANIFOLD	X				
120D	SJT1 DISCHARGE	X				
120S	SJT1 SUCTION	X				
1520D	SJT6 DISCHARGE	X				
1520S	SJT6 SUCTION	X				
1620D	SJT7 DISCHARGE	X				
1620S	SJT7 SUCTION	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 12)

MOVEMENT:______________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
1720D	SJT8 DISCHARGE	X				
1720S	SJT8 SUCTION	X				
2D20C	DOCK 2 CONTROL	O				
2D20F1	DOCK 2/ TANK MANIFOLD	X				
2D20F2	DOCK 2 ISOLATION	X				
2D20W1	DOCK 2/ BOOSTER PUMP MANIFOLD	X				
20B113	INLET TO PSV20E110	O				
20B114	OUTLET FROM PSV20E110	O				
20B115	INLET TO PSV20E111	O				
20B116	OUTLET FROM PSV20E111	O				
20B200	BC 10" BY-PASS/ SUCTION HEADER 2	O				
20B201	BC 10" BY-PASS/ BC DISCHARGE HEADER	X				
20B202	WI 10" BY-PASS/ SUCTION HEADER 1	O				
20B203	WI 10" BY-PASS/ WI DISCHARGE HEADER	X				
20B204	STRIPPER HEADER CLEAN OUT/FILL	X				
20B205	CAPLINE INHIBITOR INJECTION	X				
20B206	4" VENT/DRAIN	X				
20B207	4" DRAIN	X				
20E110	BC SURGE RELIEF	X				
20E111	BC SURGE RELIEF	X				
220D	SJT2 DISCHARGE	X				

APPENDIX C
CRUDE OIL
STATIC VALVE ALIGNMENT CHECKLIST
(Sheet 13)

MOVEMENT:______________________ DATE:______________________

Valve No	Description	Static Pos	Open	Close	Remarks	Verify Inital
220S	SJT2 SUCTION	X				
320D1	SJT3 DISCHARGE HEADER 1	X				
320D2	SJT3 DISCHARGE HEADER 2	X				
320D3	SJT3 SERIES TO SJT4/5	X				
320S1	SJT3 SUCTION HEADER 2	X				
320S2	SJT3 SUCTION HEADER 1	X				
420D1C	SJT4 CONTROL DISCHARGE HEADER 1	O				
420D2	SJT4 DISCHARGE HEADER 1/ SERIES TO SJT5	X				
420S1	SJT4 SUCTION HEADER 1	X				
420S2	SJT4 SUCTION	X				
4201	INLET TO PSV420	O				
4202	OUTLET FROM PSV420	O				
520DC	SJT5 CONTROL DISCHARGE HEADER 1	O				
520S1	SJT5 SUCTION HEADER 1	X				
520S2	SJT5 SUCTION	X				
5201	INLET TO PSV520	O				
5202	OUTLET FROM PSV520	O				

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

METER SKIDS AND PROVER

NORMAL OPERATING PROCEDURE

ST. JAMES SITE

METER SKIDS AND PROVER

List of Effective Work Package Pages

Page No.	Chg. No.	Page No.	Chg. No.	Page No.	Chg. No.
1 thru 19	0	20(Blank)	0		

Record of Applicable Technical Directives

None

TABLE OF CONTENTS

1. **INTRODUCTION.**

The meter proving and flow measurement system provides the St. James Terminal with an integrated measurement system capable of accurately determining the transfer of crude oil into and out of the site. The metering system consists of two identical independent metering skids with three parallel, 12 inch, turbine meter runs each; an above ground, 24 inch, unidirectional meter prover for providing in-place turbine meter flow calibrations; local and remote instrumentation; and a control room panel for station monitoring and operation. The system is designed for manual operation and can be controlled and operated from the control room.

Parallel turbine meter runs may be used for transfer to and from Bayou Choctaw, Weeks Island, CAPLINE, and LOCAP. There is a separate installation of three parallel meter runs for Bayou Choctaw measurement and three parallel meter runs for Weeks Island measurement. These two skids can be used for CAPLINE and LOCAP. Common to both installations is a unidirectional meter prover used to prove any of the six meters in two skids. The systems are independent of each other and fully automatic. They are controlled and operated from the control room.

The meter station is designed for unidirectional flow and consists of two identical independent metering skids. The meter skids consist of an inlet and outlet manifold and three parallel meter runs each. The normal design flow rate of each meter skid is 34,200 barrels per hour (BPH) normal and 42,800 BPH maximum with two meter runs in operation. The remaining meter of each skid is held in reserve as a spare.

A "U" shaped unidirectional meter prover is provided to periodically calibrate the turbine meter. The purpose of the meter prover is to provide a fixed calibrated volume against which the turbine meter can be calibrated. The prover is made from 24 inch pipe.

The meter skids and prover loop are controlled at the control room from the Daniel Systems, Inc. control panel, the personal computer, and the CRT/DCS. The instrumentation contained within this panel monitors variables such as pressure, temperature, specific gravity, and flow rate. The metering system is monitored by the annunciator panel and graphics panel.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the metering systems under normal conditions. Operation under abnormal conditions, such as during total impairment to the control system, is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Fluid metering.

B. Meter proving.

1.3 **Applicability.** This procedure applies under normal operating conditions when the control system is operational. Under these conditions there is only one authorized operating mode, REMOTE.

1.4 **Reference Documents.**

A. Publication No. D506-02103-07, St. James Crude Oil Metering Procedures.

B. Piping and Instrumentation Diagram, Weeks Island Meter Station, drawing no. SJ-M-103-020.

C. Piping and Instrumentation Diagram, Bayou Choctaw and Weeks Island Meter Prover, drawing no. SJ-M-103-021.

D. Piping and Instrumentation Diagram, Bayou Choctaw Meter Station, drawing no. SJ-M-103-022.

E. Work package 006 00, Crude Oil Automatic Sampling Units, Weeks Island and Bayou Choctaw Meter Skids and work package 007 00, Crude Oil Automatic Sampling Units, Docks 1 and 2.

2. PRECAUTIONS AND LIMITATIONS.

The following precautions and limitations apply to the operation of the meter skid and prover systems in the REMOTE operating mode.

A. The minimum and maximum operating and safety parameters in the operating and safety envelope (Appendix A) shall be observed at all times.

B. All pressure safety valves shall be properly in place and operational.

C. Valve alignment is in accordance with the valve line-up sheet for the particular fluid movement procedure.

3. **PREREQUISITE ACTIONS.**

The following actions shall be taken prior to operating the meter or meter prover system. These actions apply to operation in the REMOTE operating mode.

3.1 **Special Tools and Equipment.**

A. Crude oil hydrometer.

B. Thermometer.

3.2 **Field Preparation.** The following steps shall be performed before starting the metering skids systems or meter prover:

[1] Verify visually that all vent and drain valves are closed.

[2] Verify that the appropriate sections of the automatic sampling systems are prepared in accordance with work packages 006 00 or 007 00.

[3] Place hydraulic control valves and prover control hydraulic power units next to the meter skids into operation by turning the local switches to the ON position.

[4] Obtain representative oil samples (not involving automatic samplers) from system piping. Samples are to be taken in small containers.

[5] Using a thermometer and hydrometer, observe and record temperature and API gravity of samples.

[6] Verify that the surge relief valves are set correctly and change setting, if required, (normally between 200 and 235 psi).

4. **METERING AND PROVING PRE-FLOW COMPUTER VERIFICATION.**

After selecting the meters to be used in a fluid movement, perform the following pre-flow steps on the Daniel control panel and the personal computer.

4.1 **Daniel Control Panel for Pre-flow Verification.** Perform the following steps for pre-flow verification (DANCHECK form) with Daniel computer.

[1] Complete sections of the fluid movement procedure to transfer oil to metering skid (not allowing flow through meter).

[2] Using the keyboard on Daniel flow computer, perform the following steps to access or change the reading for temperature, pressure, and density (SG). (Refer to Appendix B, Sheet 3, Item 1.)

[a] Depress the EXIT key on front panel of metering skid flow computer until time and date message (indicates start of main menu) appears.

[b] Depress the ENTER key to gain access to the main menu.

[c] The first item of the main menu, INPUT CHANNELS, will appear on the front panel display.

[d] Depress the ENTER key to gain access to the INPUT CHANNELS sub-menu. This is confirmed by the appearance of ANALOG INPUTS on the display.

[e] Depress the ENTER key a second time to gain access to specific valves, such as TTI.

[f] Scroll down (or up) by pressing the arrow key, comparing temperature, pressure, and density values with those obtained in the field.

[g] To change a value shown on the screen, press the # button and toggle to the MANUAL mode. (Switch from LIVE mode.)

[h] Verify that the computer has accepted this command by observing that the # symbol on the screen moved over one space to the right.

[i] View or change both LO and HI limits, utilizing steps **[f]**, **[g]**, and **[h]**.

[j] Press the EXIT button to go back into the MANUAL mode (again obtain confirmation that the # symbol moves to the left).

[k] Repeat steps **[a]** through **[j]** until temperature, pressure, and density comparisons or changes are complete.

[l] To print a report, such as current alarms, perform the following steps:

1. Verify that the printer switch is on.

2. Verify WI or BC switch is set.

3. Enter Daniel computer menu, following steps **[a]** through **[c]**, down to Alarms.

4. Enter CALCULATION instruction.

5. Enter REPORT instruction.

6. Enter CURRENT instruction.

4.2 **Personal Computer Pre-flow Verification.** Perform the following steps for pre-flow verification with personal computers.

[1] Use arrow keys to move cursor to SYSTEM MENU and press the ENTER key.

[2] Key in **F7** from system menu.

[3] Key in **F1** from Operator Entries menu (NUMERIC entries).

[4] Key in **F1** or **F2** from System Selection Menu (Bayou Choctaw or Weeks Island).

[5] Move cursor with arrow keys to name desired, as example, BATCHVOL and observe numeric value.

[6] To download new data (for future use), type in new value and press **F1** key.

[7] Press the EXIT key (returns to System Menu) after observation or changes are completed.

5. **CRUDE OIL METERING/PROVING PROCESS.**

After a specific operational oil movement has been authorized, observe the procedures below for metering (Section 5.1) and proving (Section 5.2).

5.1 **Crude Oil Metering Procedures.** Perform the following steps to provide metering for an oil movement.

[1] Determine how many and which specific meters will be used, after an estimation of the total flow is given by the operations manager or his designee.

NOTE
The flow through any one of the turbine meters should not exceed 17,138 BPH.

[2] Select the proper valve alignment checklist and prepare a flow schematic.

[3] Prepare the metering skid and automatic samplers.

[4] Notify other sites that St. James Terminal is in standby to transfer.

[5] Set up the status screen on the CRT.

[6] Turn on the personal computer.

[7] Verify that the screen on the Daniel flow computers (at keyboard) is displaying valves. (Refer to Appendix B, Sheet 3, Item 1.)

[8] Perform the pre-flow check (DANCHECK) on the Daniel flow computer and personal computer. (Refer to Section 4.)

[9] Turn on the printer assigned to the Daniel computer and print CURRENT reports and label the report START METER READING.

[10] Fill out 3 meter tickets and insert each into the meter ticket printer slots on the meter panel. (Refer to Appendix B, Sheet 3, Item 6.)

[11] Press the START PRINT button on the meter panel.

[12] Perform valve alignment by an approved fluid movement procedure and initiate the oil movement including checking for leaks in the field piping and starting booster pumps.

[13] Perform the following steps to make certain all two-way block and bleed valves are properly bled and drained after the metering skid is pressurized.

[a] Open the seal cavity bleed line to the atmosphere with the bleed valve.

[b] Drain the cavity between the seals with the drain valve seal.

NOTE

If oil continues to drain from the cavity for over ten minutes, maintenance should be performed on the valve to determine of one or both of the seals are leaking.

[14] Adjust the flow rate using the flow controller on the Daniel meter panel. The steps below give a summary for this procedure. (Refer to Appendix B, Sheet 3, Item 2.)

[a] Using top right up-down buttons, set to REMOTE.

[b] Using top right up-down buttons, set to MANUAL.

[c] Using bottom right left-right buttons, open or close the control valve. Monitor valve position by reviewing movement of arrow to left of screen.

NOTE
Zero percent is open position and 100% is valve closed position.

[15] Adjust the automatic sampler to the proper configuration.

NOTE
The red light above the keyboard on the Daniel flow computer will alarm (glow red) when the sampler container needs to be emptied. (Refer to Appendix B, Sheet 3, Item 3.)

[16] Monitor and record flow rates on an hourly basis by viewing flow data on the Daniel computer. (Refer to Section 4.1.)

[17] While monitoring flow rates, view unacknowledged alarms (glow yellow) on the Daniel computer. View these alarms by following the steps shown below.

[a] Press EXIT to get date and time.

[b] Press down key to INPUT CHANNELS.

[c] Press down key to OUTPUT CHANNELS.

[d] Press down key and select proper skid (Bayou Choctaw or Weeks Island).

[e] Press down key to ALARMS.

[f] Press down key to UNLOCKED (unacknowledged alarms).

[g] Press down key to either HIGH or LOW LIMIT and clear alarms.

[18] After flow stabilization has been obtained, indicated by a constant value for differential pressure, calculate new (+or- 4%) Hi-Lo flow rate limits (variance). Download the revised data using the steps shown below.

[a] Key in function values shown in steps [1] through [4] in Section 4.2.

[b] Move cursor with arrow keys to RUN-FRMX and enter calculated the flow limits of GSFR.

[c] Move cursor to Hi RUN-FRMN and enter calculated Lo flow limits of GSFR.

[d] After three runs are entered, press **F1** to download to the Daniel flow computer.

[19] After the flow rate variance has been entered into the Daniel computer (from the personal computer), calculate new total (+or- 10%) Hi-Lo flow rate limits (window deviation). Download the revised data into the Daniel Computer using the steps shown below.

[a] As shown in step **[13]**, sub-steps **[a]** through **[d]**, press down GASR 1 and enter values.

[b] Press down to GSFR 2 and enter values.

[c] Press down to GSFR 3 and enter values.

[20] After the flow rates from step **[15]** have been downloaded, calculate the Lo-Hi limits of TT 1, 2, 3, PT 1, 2, 3, and SG (specific gravity) and enter these values in the Daniel computer (at the Daniel keyboard).

[21] If the shift supervisor relays that meter switching is necessary, follow procedure outlined in the oil movement procedure (MRSWITCH form).

[22] If the shift supervisor is given a request to perform a meter proving procedure, follow the steps given in Section 5.3.

[23] After the fluid movement procedure is complete, align the valves for the static mode.

[24] After valves have been returned to static mode, collect the automatic sampler sample.

[25] Perform the final meter reading checklist by performing the following steps.

[a] Turn the printer on and print CURRENT reports from the Daniel computer.

[b] Press the finish button on the ticket printer and remove the three tickets.

[c] At the personal computer, perform the following steps:

1. Set the BATCH selection to STOP.

2. Press **F1** to download the BATCH data in the Daniel computer.

3. Enter requested information in BATCH SETUP.

4. Press **F1** to download the BATCH SETUP.

5. Print the data under METER TICKET.

5.2 **Crude Oil Meter Proving Procedures.** Perform the following steps to provide meter proving for oil movement.

[1] Perform the meter to prover valves switching procedure by an approved fluid movement procedure (PRSWIN form).

[2] Verify that proper minimum back pressure, from 13 to 33 psig, is maintained on the meters by checking the CRT screen.

[3] Verify that the prover LOCAL/REMOTE switch is in REMOTE.

[4] Verify that the prover hydraulic pump is on by observing a glowing green light and a glowing amber light above the Daniel computer keyboard. (Refer to Appendix B, Sheet 3, Items 4 and 5.)

[5] Verify that the meter program has been started on the personal computer and that the printers are on.

[6] Follow the steps below to input prover commands into the personal computer.

[a] Key in **F7** from the System Menu.

[b] Key in **F2** from Operator Entries.

[c] Key in **F1 or F2** from System Selection Menu.

[d] Move cursor with arrow keys to PROVE _ (1,2,3).

[e] Download to the Daniel computer by pushing the **F1** key.

[f] Move cursor with arrow key to TRIAL.

[g] Verify that display shows five proves within tolerances after making a maximum of ten runs (pulses).

[7] Unless proving is aborted, monitor prover run information on the personal computer screen.

[8] Verify that a meter factor report is printed.

[9] Repeat steps **[16]** through **[19]** from Section 5.1, to check for flow, temperature, pressure, or gravity deviations.

[10] Perform the prover to meter valve switching procedure by an approved fluid movement procedure (PRVSWOUT form).

APPENDIX A

OPERATING AND SAFETY ENVELOPE
METER SKID AND PROVER

CAUTION

The crude oil meter skid and meter prover shall be operated within the following parameters at all times.

		SAFETY ENVELOPE			
			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
Meter flow rate	BPH	a	2500	17100	21400 b
Strainer diff. pressure	psig	a	1	20 b	a

a These parameters have no defined limits.
b These parameters cause an alarm at the Daniel and DCS control panels.

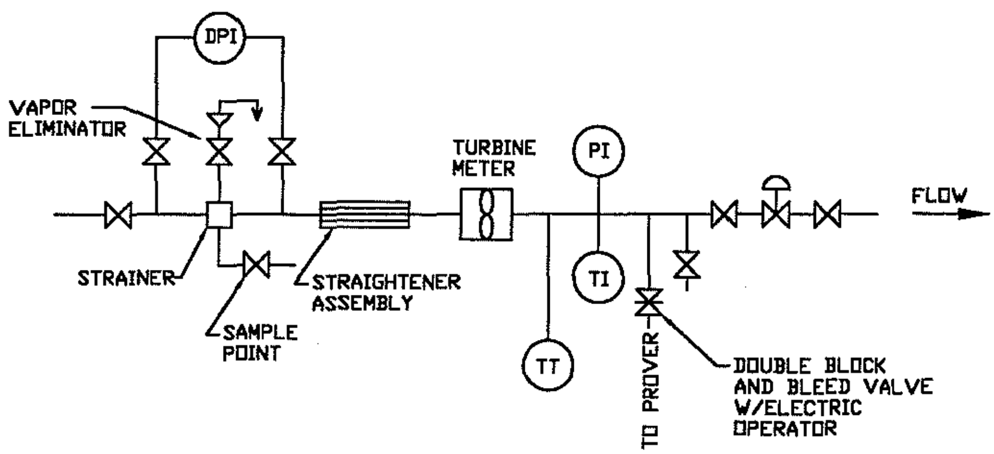
Support Equipment List.

Uni-directional prover.

APPENDIX B

SCHEMATIC DIAGRAM
METER SKID AND PROVER

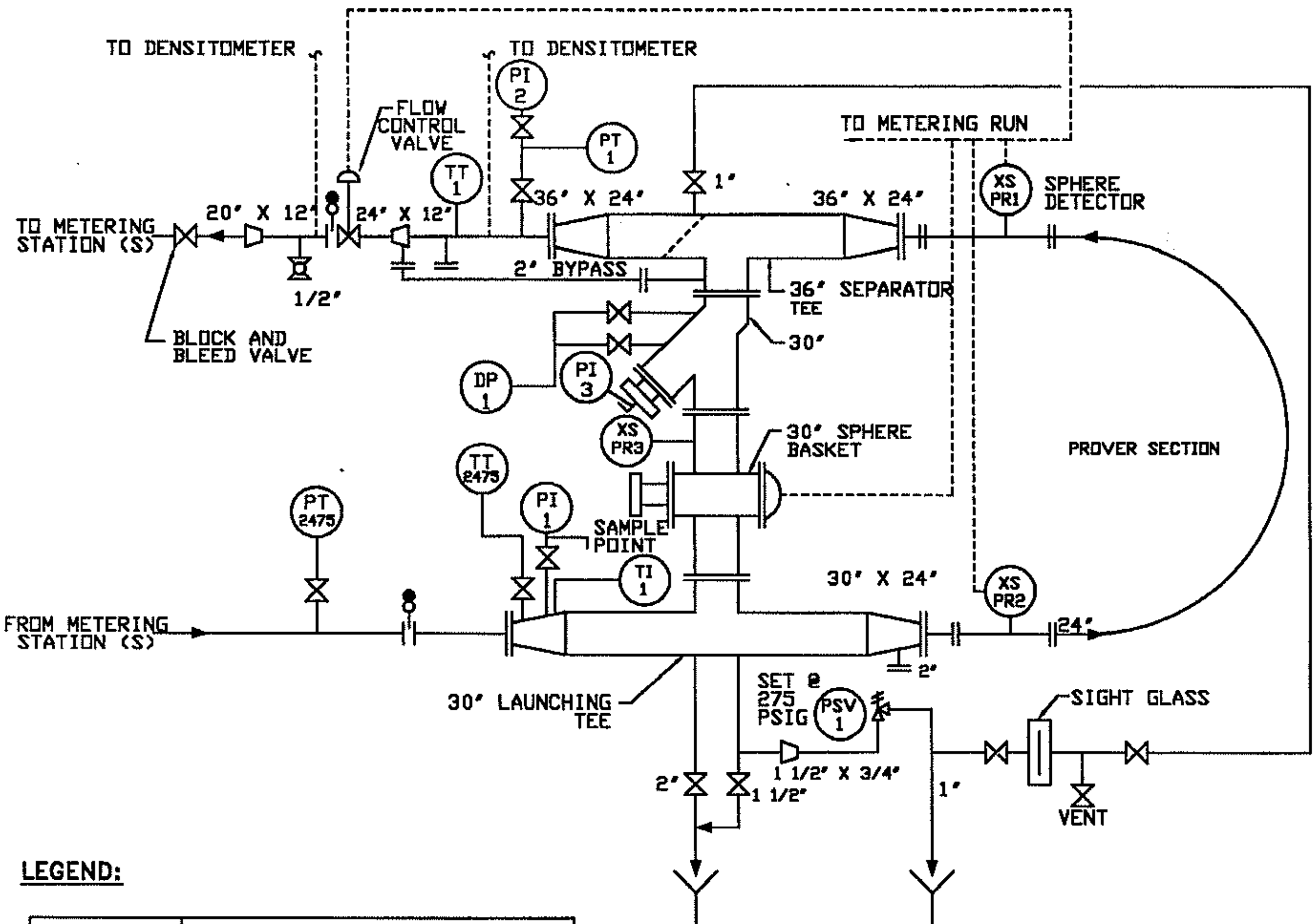
METERING RUN LAYOUT
(Sheet 1 of 5)



LEGEND:

ITEM	DESCRIPTION
DPI	DIFFERENTIAL PRESSURE INDICATOR
PI	PRESSURE INDICATOR
TI	TEMPERATURE INDICATOR
TT	TEMPERATURE TRANSMITTER

APPENDIX B
SCHEMATIC DIAGRAM
METER SKID AND PROVER
METER PROVER LAYOUT
(Sheet 2)



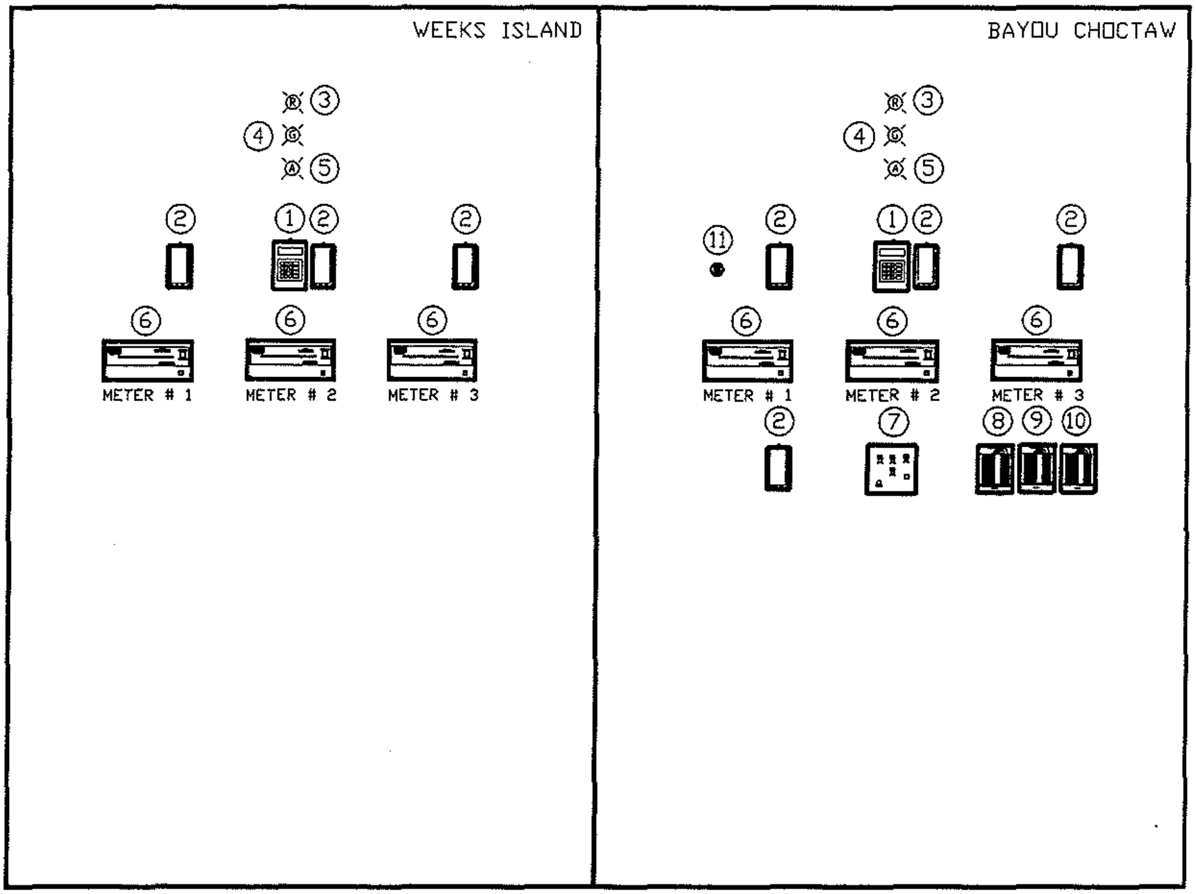
LEGEND:

ITEM	DESCRIPTION
DP-1	DIFFERENTIAL PRESSURE SWITCH
PI-1,2,3	PRESSURE INDICATOR
PSV-1	PRESSURE SAFETY VALVE
PT-1,2475	PRESSURE TRANSMITTER
TI-1	TEMPERATURE INDICATOR
TT-1,2475	TEMPERATURE TRANSMITTER
XS-PR1,2,3	SPHERE DETECTOR SWITCH

APPENDIX B

SCHEMATIC DIAGRAM
METER SKID AND PROVER

CONTROL ROOM METER PANEL
(Sheet 3)

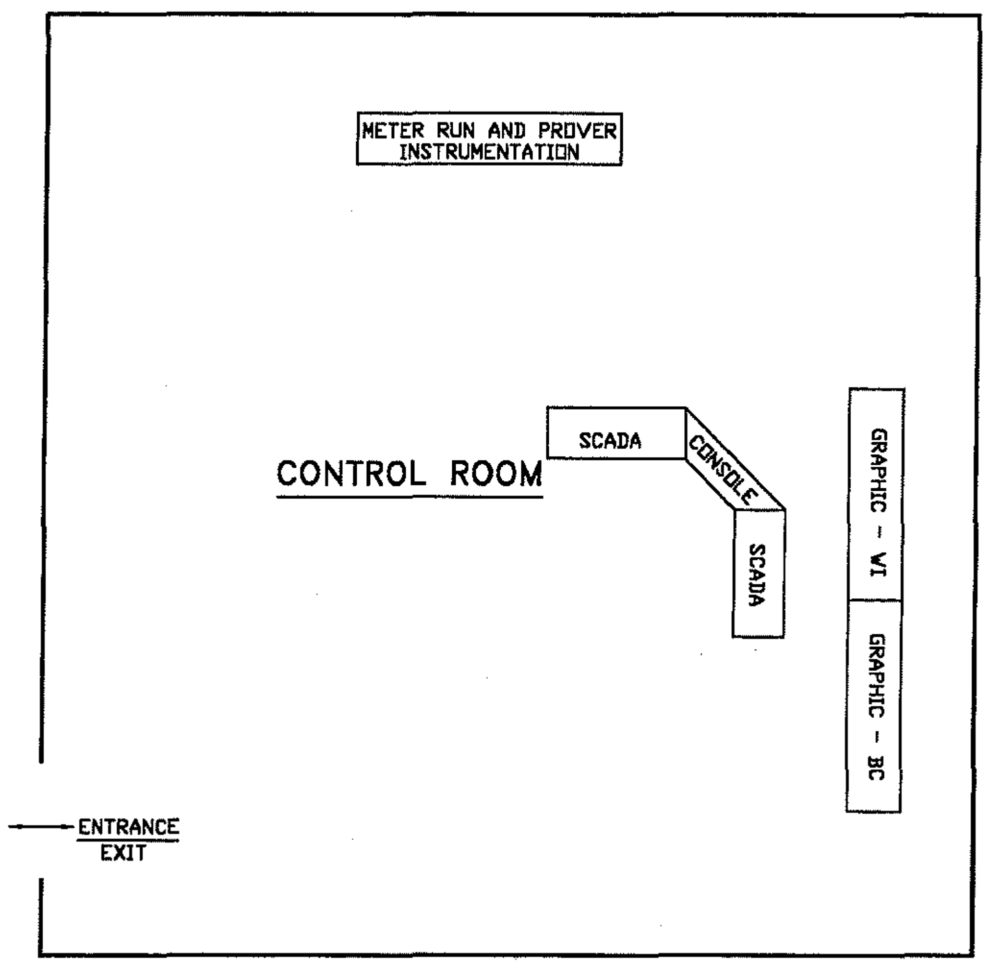


ITEM	DESCRIPTION
1	DANIEL FLOW COMPUTER
2	FLOW CONTROLLER
3	RED LIGHT: SAMPLE CONTAINER FULL
4	GREEN LIGHT: BATCH NEAR DONE
5	AMBER LIGHT: PROVING REQUIRED
6	TICKET PRINTER
7	PROVER CONTROL PANEL
8	SPECIFIC GRAVITY RECORDER
9	PRESSURE RECORDER
10	TEMPERATURE RECORDER
11	PROVER SELECTOR SWITCH

APPENDIX B

SCHEMATIC DIAGRAM
METER SKID AND PROVER

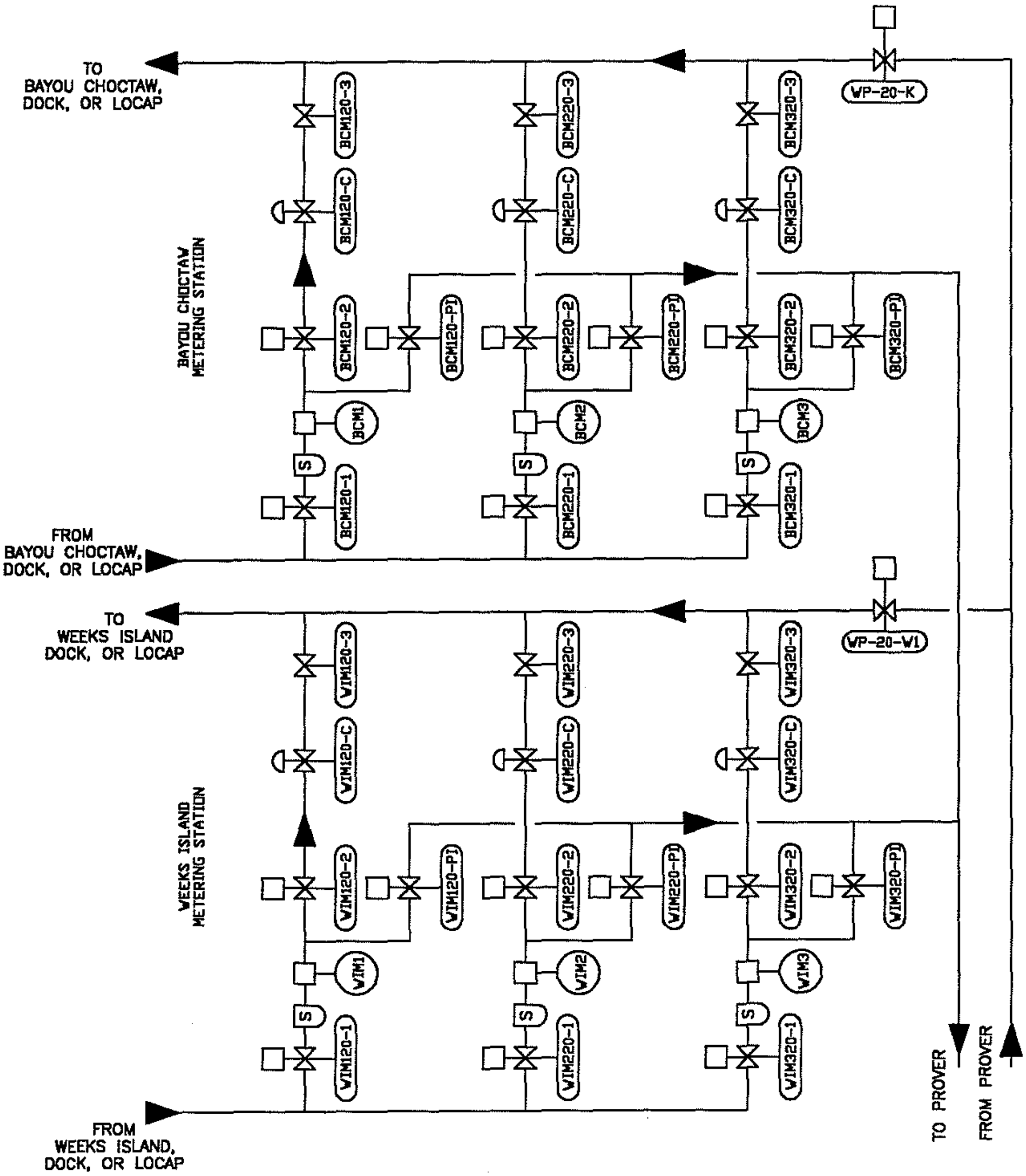
CONTROL ROOM EQUIPMENT LAYOUT
(Sheet 4)



APPENDIX B

SCHEMATIC DIAGRAM
METER SKID AND PROVER

METER STATION VALVE LAYOUTS
(Sheet 5)



APPENDIX C

TECHNICAL DATA
METER SKID AND PROVER

Metering Equipment:

Manufacturer:	Flow TECHNOLOGY
Meter size:	12 inch
Flow rate:	
Normal Maximum Linear Range:	17,100 BPH
Extended Range:	21,400 BPH
Meter Linearity:	+/-0.25%
Meter Repeatability:	+/-0.02%
Temperature Range:	-40°F to 100°F
Pressure Range:	0 to 7200 psig
Reid Vapor Pressure:	1.0 to 13.0 psig
Crude Oil Specific Gravity:	0.802 to 0.876
Viscosity Range:	233 SSU @ 40°F to 77 SSU @ 100°F

Meter Prover:

Manufacturer:	System Fabricators, Inc.
Size:	24" uni-directional

Meter Strainer:

Manufacturer:	Aiken
Size:	16-inch

Meter Tubes:

Manufacturer:	Flow Technology
Size:	12-inch diameter

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CRUDE OIL AUTOMATIC SAMPLING UNITS WEEKS ISLAND AND BAYOU CHOCTAW METER SKIDS

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CRUDE OIL AUTOMATIC SAMPLING UNITS WEEKS ISLAND AND BAYOU CHOCTAW METER SKIDS

List of Effective Work Package Pages

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1 thru 12	0				

Record of Applicable Technical Directives

None

TABLE OF CONTENTS

1. INTRODUCTION.

This procedure describes the normal operation of the crude oil automatic sampling units, ASU-3 and ASU-4.

Sampling units, ASU-3 and ASU-4, are identical. ASU-3 is used to sample crude oil entering the Weeks Island meter station. ASU-4 is used to sample crude oil entering the Bayou Choctaw meter station. Both sampling units are located adjacent to the meter skids. Each sampling unit is designed to take samples throughout the fluid movement procedure.

A typical sampler unit consists of the following:

A. Circulating pump with adjustable controls.

B. Electric solenoid valve.

C. Sample volume regulator.

D. Sample container.

E. Pressure regulator.

The table in Appendix A describes the system's operating parameters. Appendix B shows a schematic diagram of a typical sampler unit and the sampler valve position table. Appendix C contains technical information about the pump.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the crude oil sampling units under normal operating conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Prerequisite actions for crude oil automatic sampling unit (ASU) operations.

B. Operating procedures for automatic sampler units.

C. Sampler calibration.

D. Extracting an oil sample.

E. Sampler system purge.

F. Post sampling operation activities.

1.3 **Applicability.** This procedure provides instructions for the safe operation of the crude oil sampling units under normal conditions. There is only one operating mode, AUTOMATIC.

1.4 **Reference Documents.**

A. Piping and Instrumentation Diagram, Weeks Island Meter Station, drawing no. SJ-M-103-020.

B. Piping and Instrumentation Diagram, Bayou Choctaw Meter Prover Station, drawing no. SJ-M-103-022.

2. **PRECAUTIONS AND LIMITATIONS.**

The following precautions and limitations apply to the operation of the automatic crude oil sampling units.

A. The minimum and maximum operating envelope parameters in Appendix A shall be observed at all times.

B. Safety devices, including the pump coupling guards and pump PSVs, shall be in place and operational.

3. **PREREQUISITE ACTIONS FOR CRUDE OIL AUTOMATIC SAMPLING UNIT (ASU) OPERATIONS.**

The following actions shall be taken prior to operating the automatic crude oil sampling units.

3.1 **Special Tools and Equipment.**

A. Five gallon sample container.

B. Oil absorbent cloths.

C. 10cc graduated cylinders.

3.2 **Field Preparation.** The following steps shall be performed before starting the automatic sampling units:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present.

NOTE
If the line to the sample tank is not purged, oil from the previously sampled movement will contaminate the sample of the current movement.

[2] Verify that the sample tank has been cleaned by removing lid and visually inspecting.

[3] Verify that all valves and switches are in the standby position. (Refer to Appendix D.)

4. OPERATING PROCEDURES FOR AUTOMATIC SAMPLER UNITS.

The following steps describe the operation of the automatic sampling unit.

4.1 **Sampler Calibration.** Perform the following steps to calibrate the automatic sampling unit:

[1] Open sample probe valve. (Refer to sketch in Appendix B.)

[2] Verify that valves "A" and "B" are in position 1.

[3] Set pressure regulator to the required pressure (as given by site supervisor) by turning the set screw clockwise to increase pressure or counterclockwise to decrease pressure (as indicated by local pressure gauge.).

[4] Place a graduated cylinder at the end of the test line.

[5] Set valve "A" and "B" to position 2.

[6] Check the volume in the cylinder to ensure the desired bite size 0.4cc sample is obtained.

NOTE
The volume check is made by observing the volume obtained by two bites and divide the total by two.

[7] Compare the bite quantity desired (as given by the site supervisor) to the bite quantity obtained in step **[6]**. If obtained sample is too much, turn the round knob on the sampler regulator clockwise to get the necessary bite quality.

[8] After the sample check is complete, set valves "A" and "B" to position 1.

4.2 **Extracting an Oil Sample.** Perform the following steps to extract an oil sample.

[1] Verify that valves "C" and "D" are in position 1.

[2] Energize circulating pump for a minimum of 5 minutes by placing the local switch in the ON position.

[3] Place the sample container at the discharge end of the sample drain line.

[4] Set valves "C" and "D" to position 2 and fill the sample containers.

[5] After sample has been collected, set valves "C" and "D" to position 1.

[6] Deenergize the pump by placing the local switch in the OFF position.

4.3 **Sampler System Purge.** Perform the following steps to purge the automatic sampling system after use.

[1] Close sample probe ON/OFF valve.

[2] Remove the sample container cover and pour in 1/2 gallon of cleaning solvent.

[3] Replace cover on sample container and energize circulating pump by placing the local switch in the ON position.

[4] Recirculate the solvent for approximately 10 minutes.

[5] Open valve "E" and set valve "C" to position 2.

[6] Deenergize the circulation pump after it begins to cavitate by placing the local switch in the OFF position.

[7] Remove the sample container cover and check for cleanliness. If necessary, repeat steps [2] through [6].

[8] Clean sight glass by performing the following steps.

[a] Remove the sight glass from the mounting brackets.

[b] Shove a cloth, saturated with a cleaning solvent, through the center of the glass.

[c] Replace the sight glass into the mounting brackets.

5. **POST SAMPLING OPERATION ACTIVITIES.**

When the crude oil automatic sampling units are no longer needed for the fluid movement, set all valves and selector switches associated with the systems as shown in Appendix D.

APPENDIX A

OPERATING PARAMETERS
CRUDE OIL AUTOMATIC SAMPLING UNITS
WEEKS ISLAND AND BAYOU CHOCTAW METER SKIDS

			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
Regulator discharge pressure[a]	psig	-	10	50	-

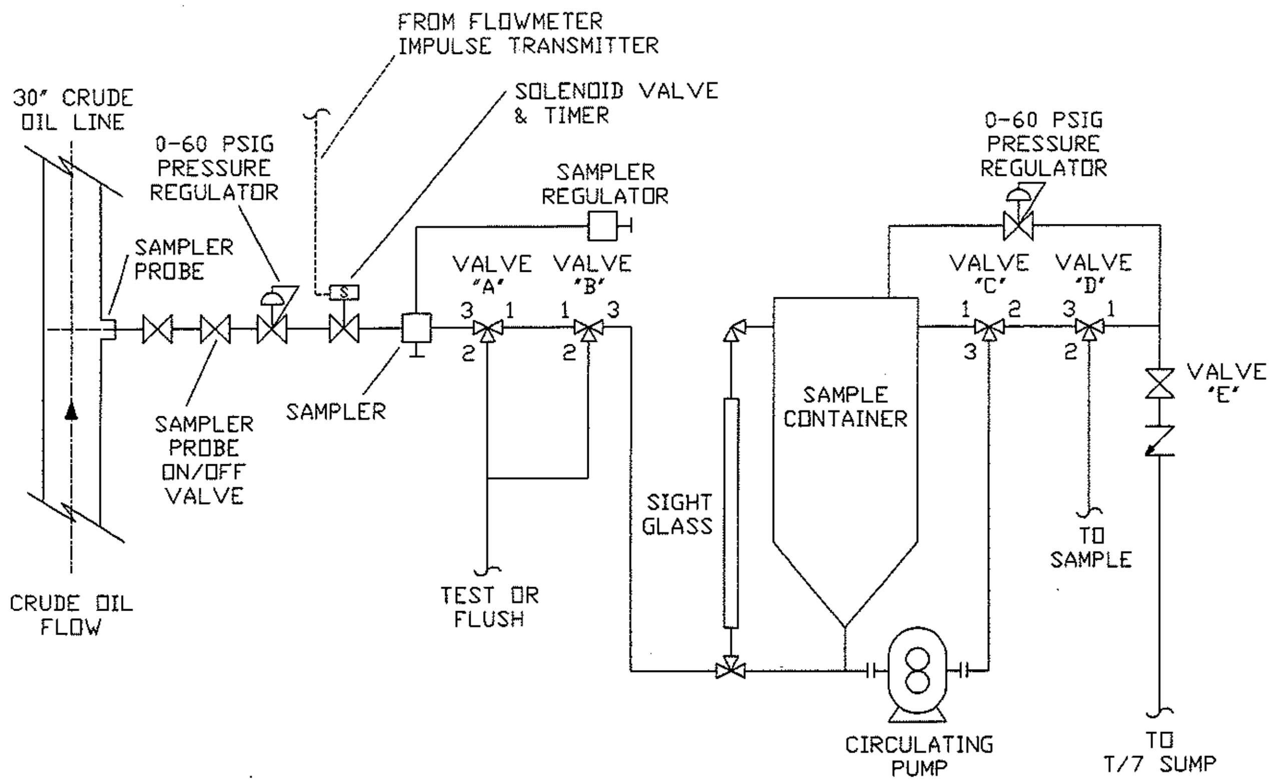
a These values must be monitored and corrected by an operator.

Support Equipment:

A. Daniel 2500 flow computer.

APPENDIX B

SCHEMATIC DIAGRAM
CRUDE OIL AUTOMATIC SAMPLING UNITS
WEEKS ISLAND AND BAYOU CHOCTAW METER SKIDS



VALVE POSITION TABLE

VALVE 'A'	VALVE 'B'	VALVE 'C'	VALVE 'D'
POSITION 1	POSITION 1	POSITION 1	POSITION 1
3 1 2	1 3 2	1 2 3	3 1 2
POSITION 2	POSITION 2	POSITION 2	POSITION 2
3 1 2	1 3 2	1 2 3	3 1 2

APPENDIX C

TECHNICAL DATA
CRUDE OIL AUTOMATIC SAMPLING UNITS
WEEKS ISLAND AND BAYOU CHOCTAW METER SKIDS

Sample Container:

Manufacturer:	McFarland
Capacity:	5 gallons

Recirculating Pump Motor:

RPM:	1725
Horsepower:	1/4
Voltage (volts):	110

APPENDIX D

STANDBY VALVE POSITIONS
CRUDE OIL AUTOMATIC SAMPLING UNITS
WEEKS ISLAND AND BAYOU CHOCTAW METER SKIDS

	ITEM	POSITION
1.	Sampling probe valves	Closed
2.	Valves "A", "B", "C", and "D"	Position 1
3.	Valve "E"	Closed
4.	Circulation pump power switch	OFF

APPENDIX E

PUMP START/STOP CAPABILITIES
CRUDE OIL AUTOMATIC SAMPLING UNITS
WEEKS ISLAND AND BAYOU CHOCTAW METER SKIDS

PUMP NO.	LOCAL CONTROL		PUMP MCC	
	START HS	STOP HS	NO.	BREAKER SWITCH
CIRC (2)	ON	OFF	MCC-LP4	XXX

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CRUDE OIL AUTOMATIC SAMPLING UNITS DOCKS 1 AND 2

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CRUDE OIL AUTOMATIC SAMPLING UNITS DOCKS 1 AND 2

List of Effective Work Package Pages

Page No.	Chg. No.	Page No.	Chg. No.	Page No.	Chg. No.
1 thru 12	0				

Record of Applicable Technical Directives

None

WARNING

Crude oil is a flammable liquid. The vapors given off by crude oil are far more susceptible to ignition than the crude oil liquid. "Gassy" crude oil with a vapor pressure of >14.7 psia has a significantly increased vapor flash risk (and, therefore, ignition risk) during depressurization. Crude oil contains petroleum hydrocarbons which may cause eye, skin, and lung irritation. Crude oil may contain significant quantities of hydrogen sulfide which is irritating to the eyes, skin, and lungs at low concentrations. At higher hydrogen sulfide concentrations, loss of ability to smell, respiratory paralysis or death may occur. Crude oil also contains benzene, a known carcinogen.

TABLE OF CONTENTS

1. INTRODUCTION.

This procedure describes the normal operation of the crude oil sampling units, ASU-1 and ASU-2.

Sampling units, ASU-1 and ASU-2, are identical. ASU-1 is located on Dock No. 1 and ASU-2 is located on Dock No. 2. ASU-1 and 2 are used to sample crude oil entering the site's 42" header to the dock. Each sampling unit is designed to take samples throughout the fluid movement procedure.

The sampler consists of the following:

A. Circulating pump.

B. Sample volume regulator (3).

C. Sample container.

D. Sampler pump (3).

E. Pressure regulator (3).

The table in Appendix A describes the system's operating parameters. Appendix B shows a schematic diagram of a typical sampler unit and the sampler valve position table. Appendix C contains technical information about the pump.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the crude oil sampling systems under normal operating conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Prerequisite actions for crude oil automatic sampling unit (ASU) operations.

B. Operating procedures for automatic sampler units.

C. Sampler calibration.

D. Extracting an oil sample.

E. Sampler system purge.

F. Post sampling operation activities.

1.3 **Applicability.** This procedure provides instructions for the safe operation of the crude oil sampling systems under normal conditions. There is only one operating mode, AUTOMATIC.

1.4 **Reference Documents.**

A. Piping and Instrumentation Diagram, Crude Oil Loading/Unloading Dock No. 1, drawing no. SJ-M-103-026.

B. Piping and Instrumentation Diagram, Crude Oil Loading/Unloading Dock No. 2, drawing no. SJ-M-103-027.

2. **PRECAUTIONS AND LIMITATIONS.**

The following precautions and limitations apply to the operation of the crude oil automatic sampling units.

A. The minimum and maximum operating envelope parameters in Appendix A shall be observed at all times.

B. Safety devices, including the pump coupling guards and pump PSVs, shall be observed at all times.

3. **PREREQUISITE ACTIONS FOR CRUDE OIL AUTOMATIC SAMPLING UNIT (ASU) OPERATIONS.**

The following actions shall be taken prior to operating the crude oil automatic sampling units.

3.1 **Special Tools and Equipment.**

A. Five gallon sample container.

B. Oil absorbent cloths.

C. Graduated cylinder (10 cc)..

3.2 **Field Preparation.** The following steps shall be performed before starting the automatic sampling units:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present.

NOTE

If the line to the sample tank is not purged, oil from the previously sampled movement will contaminate the sample of the current movement.

[2] Verify that the sample tank has been cleaned by removing the lid and visually inspecting.

[3] Verify that all valves and switches are in the standby position. (Refer to Appendices D and E.)

4. **OPERATING PROCEDURE FOR AUTOMATIC SAMPLER UNITS.**

The following steps describe the operation of the automatic sampling units.

4.1 **Sampler Calibration.** Perform the following steps to calibrate the automatic sampling unit:

[1] Close valve "E". (Refer to Appendix B.)

[2] Verify that valve "D" is in position 1.

[3] Verify that valves "A", "B", and "C" are open.

[4] Energize sampler by placing the local switch to the ON position.

[5] Set pressure regulator to 20 psig by observing reading on pressure indicator. Pressure can be increased by turning the set screw clockwise and decreased by turning the set screw counterclockwise.

[6] Place a graduated cylinder at the discharge end of the test line.

[7] Close valve "C" on other sampler units not being calibrated.

[8] Set valve "D" to position 2.

[9] Check the volume in the cylinder to ensure the desired bit size is obtained.

NOTE 1
The desired bite size (in cc) is obtained by dividing 113,550 by the amount of oil received (in barrels).

NOTE 2
The volume check is made by observing the volume obtained by two bites and dividing the total by two.

[10] Compare the bite quantity desired to the bite quantity obtained in step **[9]**. If obtained sample is too much, turn the round knob on the sampler regulator clockwise to get the necessary bite quantity.

[11] After sample check is complete, set valve "D" to position 1 and open valve "E".

4.2 **Extracting an Oil Sample.** Perform the following steps to extract oil sample.

[1] Verify that valves "G" and "H" are in position 1.

[2] Energize circulating pump with the local switch and let the liquid circulate for a minimum of five minutes.

[3] Place the sample container at the discharge end of the sample drain line.

[4] Set valves "G" and "H" to position 2 and fill the sample container.

[5] Set valves "G" and "H" to position 1.

4.3 **Sampler System Purge.** Perform the following steps to purge the automatic sampling system after use.

[1] Deenergize sampler pump(s) by placing the local switch in the OFF position.

[2] Remove the sample container cover and pour in 1/2 gallons of cleaning solvent.

[3] Replace cover on sample container and energize circulating pump.

[4] Recirculate the solvent for approximately ten minutes.

[5] Open valve "J".

[6] Set valve "G" to position 2.

[7] Deenergize the circulating pump by placing the local switch in the OFF position.

[8] Remove the sample container cover and check for cleanliness. If necessary, repeat steps [2] through [7].

[9] Clean the sight glass by performing the following steps.

[a] Remove the sight glass from the mounting brackets.

[b] Shove a cloth, saturated with a cleaning solvent, through the center of the glass.

[c] Replace the sight glass into the mounting brackets.

5. POST SAMPLING OPERATION ACTIVITIES.

When the crude oil automatic sampling systems are no longer needed for the fluid movement, set all valves and selector switches associated with the systems as shown in Appendix D.

APPENDIX A

OPERATING PARAMETERS
CRUDE OIL AUTOMATIC SAMPLING UNITS
DOCKS NO. 1 AND NO. 2

			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
Sampling pump Pump discharge pressure[a]	psig	-	15	40	-

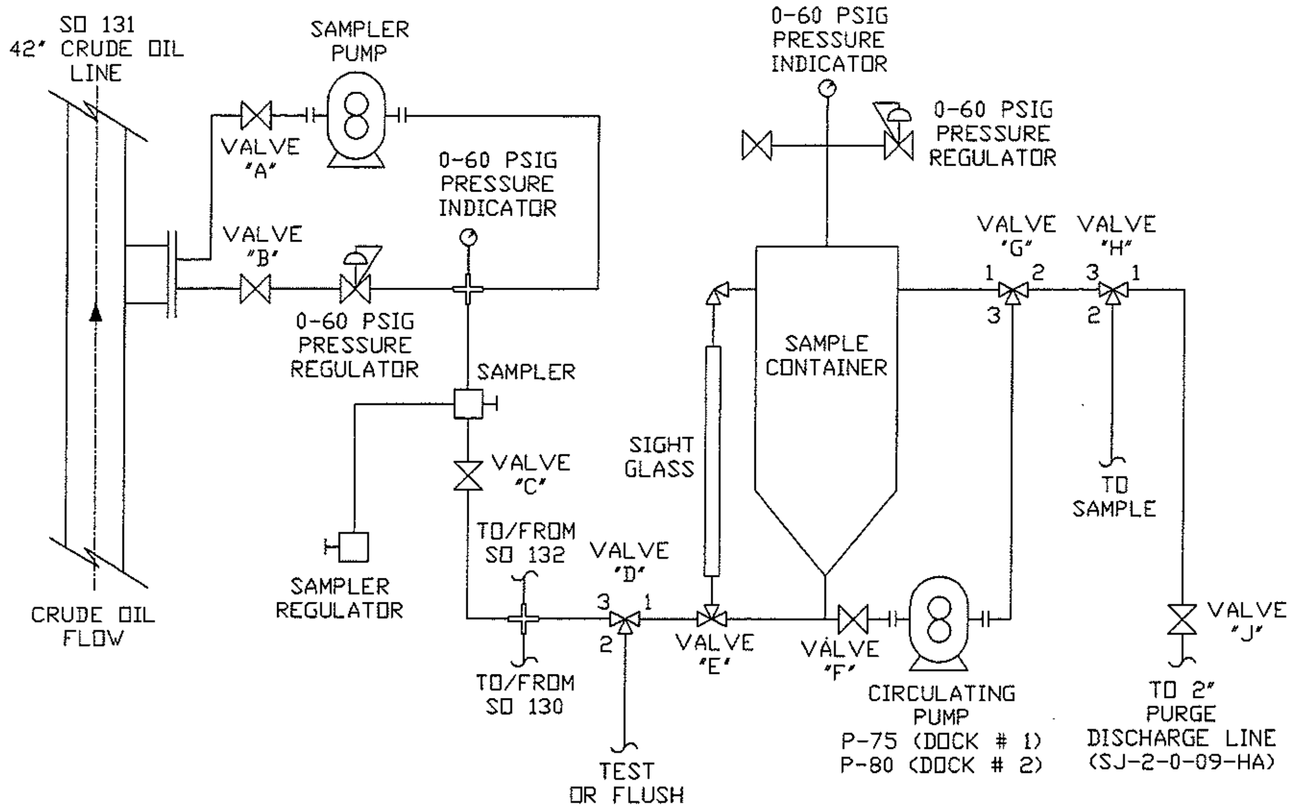
a These values must be monitored, corrected, and recorded by an operator.

Support Equipment:

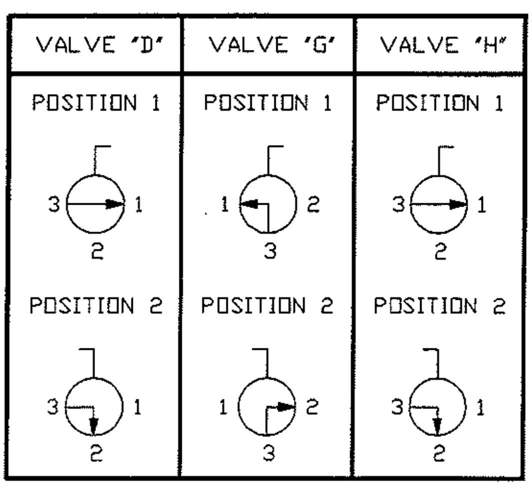
None required.

APPENDIX B

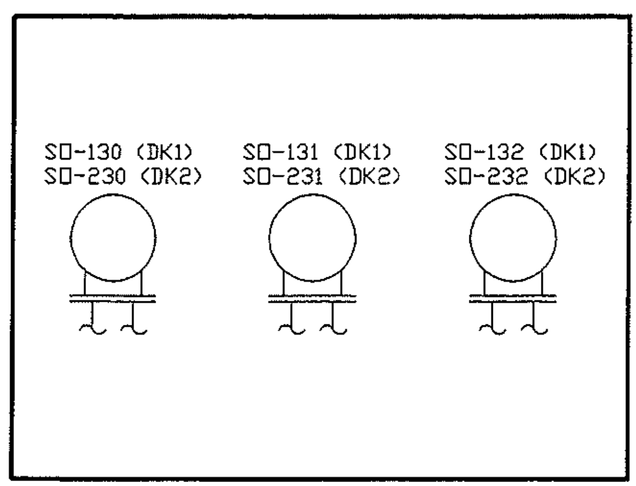
SCHEMATIC DIAGRAM
CRUDE OIL AUTOMATIC SAMPLING UNITS
DOCKS NO. 1 AND NO. 2



VALVE POSITION TABLE



SAMPLER SYSTEMS LAYOUT



APPENDIX C

TECHNICAL DATA
CRUDE OIL AUTOMATIC SAMPLING UNITS
DOCKS NO. 1 AND NO. 2

Sample Container:

Manufacturer:	McFarland
Capacity:	10 gallons

Recirculating Pump Motor:

RPM:	1725
Horsepower:	1/4
Voltage (volts):	110

Sampler Pump Motor:

RPM:	1725
HP:	1/2
Voltage (volts)	110

APPENDIX D

STANDBY VALVE POSITIONS
CRUDE OIL AUTOMATIC SAMPLING UNITS
DOCKS NO. 1 AND NO. 2

	ITEM	POSITION
1.	Valve "A" and "B", "C", "E", and "F"	Open
2.	Valve "J"	Closed
3.	Valves "D", "G", and "H"	Position 1
4.	Sampler and circulating pump switches	OFF

APPENDIX E

PUMP START/STOP CAPABILITIES
CRUDE OIL AUTOMATIC SAMPLING UNITS
DOCKS NO. 1 AND NO. 2

PUMP NO.	LOCAL CONTROL		PUMP MCC	
	START HS	STOP HS	NO.	BREAKER SWITCH
SAMP1 (2)	ON	OFF	MCC-LP4	XXX
SAMP2 (2)	ON	OFF	MCC-LP4	XXX
SAMP3 (2)	ON	OFF	MCC-LP4	XXX
CIRC (2)	ON	OFF	MCC-LP4	XXX

LEGEND:

Item	Description
Local Control:	Control at the pump.
HS	Hand Switch

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CRUDE OIL BOOSTER PUMPS SJT-1, -2, -3, -4, AND -5

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CRUDE OIL BOOSTER PUMPS SJT-1, -2, -3, -4, AND -5

List of Effective Work Package Pages

Page Number	Revision Number	Page Number	Revision Number
1 thru 40	1		

Record of Applicable Technical Directives

None

WARNING

Crude oil is a flammable liquid. The vapors given off by crude oil are far more susceptible to ignition than the crude oil liquid. "Gassy" crude oil with a vapor pressure of >14.7 psia has a significantly increased vapor flash risk (and, therefore, ignition risk) during depressurization. Crude oil contains petroleum hydrocarbons which may cause eye, skin, and lung irritation. Crude oil may contain significant quantities of hydrogen sulfide which is irritating to the eyes, skin, and lungs at low concentrations. At higher hydrogen sulfide concentrations, loss of ability to smell, respiratory paralysis or death may occur. Crude oil also contains benzene, a known carcinogen.

TABLE OF CONTENTS

1. INTRODUCTION.

This procedure describes the normal operation of the five crude oil booster pumps, SJT-1, -2, -3, -4, and -5.

The crude oil booster pumps take suction from the storage tanks T-1, -2, -3, -4, -5, and -6. The crude oil booster pumps SJT-1 and -2 operate in parallel and are normally used for sending oil to the Bayou Choctaw site, CAPLINE, or to Dock 2. Crude oil booster pumps SJT-4 and -5 may operate in series or in parallel and are normally used for sending oil to the Weeks Island site, LOCAP or to Dock 1. Crude oil booster pump SJT-3 is a common spare to crude oil booster pumps SJT-1 and SJT-2 or either the parallel or series combination of crude oil booster pumps SJT-4 and SJT-5. Any of the pumps can be used to transfer crude oil to LOCAP or CAPLINE.

The crude oil booster pumps are three stage vertical turbine can pumps which operate at 1180 RPM and are driven by 1500 horsepower motors. The design flow rate is 575 MBD (6,750 GPM) at 285 feet differential head. This design differential head is 103 psi on lowest specific gravity crude oil and 113 psi on highest specific gravity crude oil.

The table in Appendix A describes the crude oil booster pump operating and safety envelope. Appendix B shows typical schematic diagrams and equipment layout of the pumps. Appendix C contains technical information on the pumps, including a pump curve.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the crude oil booster pumps under normal conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Prerequisite actions for preparing a crude oil booster pump for operation.

B. Starting, monitoring, and stopping the crude oil booster pumps in the REMOTE operating mode.

C. Starting, monitoring, and stopping the crude oil booster pumps in the LOCAL with DCS monitoring mode.

D. Emergency stopping procedures for the crude oil booster pumps.

E. Post crude oil booster pump operations procedures.

1.3 **Applicability.** This procedure applies under normal operating conditions when the distributed control system (DCS) is operational. Under these conditions, there are two authorized operating modes:

A. REMOTE (Section 4).

B. LOCAL with DCS Monitoring (Section 5). LOCAL with DCS Monitoring is not recommended and requires the approval of the site manager or the site manager's designee.

1.4. **Reference Documents.**

A. Piping and Instrumentation Diagram, Crude Oil Booster Pumps SJT-1 through SJT-5, drawing no. SJ-M-103-024.

B. Work Packages 009 00, Crude Oil Storage Tanks, 019 00, Loading Arms, and 005 00, Meter Skids and Prover.

C. Peabody Floway Model FKH multi-stage, vertical turbine can pump Operating and Maintenance Manual.

2. **PRECAUTIONS AND LIMITATIONS.**

The following precautions and limitations apply to the operation of the crude oil booster pumps in both the REMOTE and the LOCAL with DCS Monitoring operating modes:

A. DCS instrumentation associated with the crude oil booster pumps to be used in the fluid movement shall have current calibration stickers. The loss of one or more safety device alarms requires the authorization of a work around. Refer to Operating Procedure ASR4330.5, Interim Repair/Mitigation Procedure.

B. All local instrumentation relating to the crude oil booster pumps to be operated shall have current calibration stickers.

C. The minimum and maximum safety envelope parameters in Appendix A shall be observed at all times.

D. Safety devices, including the pump coupling guards, shall be in place and operational.

E. All personnel within the designated envelope around the crude oil booster pump area shall wear OSHA approved hearing protection during pump operation.

F. Valve alignment shall be in accordance with the valve line-up sheet for the particular fluid movement procedure.

G. The pump and motor shafts shall have been aligned according to the St. James Maintenance Procedure CM-401. If the pump/motor shafts are not properly aligned, damage to the pump and/or motor can occur.

3. PREREQUISITE ACTIONS FOR PREPARING THE CRUDE OIL BOOSTER PUMPS FOR OPERATION.

The following actions shall be taken prior to operating the crude oil booster pumps. These actions apply to operation in both REMOTE and LOCAL with DCS Monitoring modes.

3.1 Special Tools and Equipment.

A. Pint size sample bottle.

B. Oil absorbent cloths.

3.2 Field Preparations.

The following steps shall be performed before starting the crude oil booster pumps:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present, piping is properly configured with vent and drain valves closed, and motor grounding straps are in place.

[2] Verify that the support equipment shown in Appendix A, Sheet 2 is fully functional and available for service, prior to starting the pumps.

[3] Verify that the piping system from the suction source to the crude oil booster pump has been vented of air before starting the first crude oil booster pump.

[4] Verify that all valves and switches are in the standby position, as shown in Appendix D.

[5] Verify that the local (non-DCS) instrumentation at the pumps to be operated have current calibration stickers. Refer to Appendix B, Sheet 1 for specific tag numbers (ELNs).

[a] Suction pressure.

[b] Discharge pressure.

[6] Verify that the DCS monitored devices for the pumps to be operated have current calibration stickers. Refer to Appendix B, Sheet 1 for specific tag numbers (ELNs).

[a] Motor vibration high.

[b] Top motor bearing temperature.

[c] Bottom motor bearing temperature.

[d] Motor winding temperature.

[e] Seal leak detector.

[f] Flow switch low.

[g] Suction pressure low.

[h] Discharge pressure high.

[7] Verify that the oil quality for the motor bearings have been checked per ORC-41A. If oil quality cannot be verified, either from ORC-41A or from running of the pumps within the last 48 hours, drain sufficient oil from the bearing sumps into the bottle to verify that the oil is visibly water free.

[8] Verify that the oil levels for the motor bearings have been checked per ORC-41A or that they are within their operational levels by checking that the bulls eye level indicator is over half full of oil and is maintaining a proper level in the bearing sumps.

[9] Verify that the pump motor has been meggered or previously run within the required time period of starting the pump.

[10] Verify that the pump/motor shafts have been properly aligned.

3.3 **Approvals and Notifications.** All pump operations shall be in accordance with an approved fluid movement procedure.

4. STARTING, MONITORING, AND STOPPING THE CRUDE OIL BOOSTER PUMPS IN THE REMOTE OPERATING MODE.

In the REMOTE operating mode, the crude oil booster pumps are selected, started, and stopped by the control room operator remotely through the DCS system.

NOTE
Correct operation and sequencing require that both the control room operator and the field operator(s) communicate and coordinate efforts.

The DCS and electrical safety devices monitor process variables and pump conditions required to maintain the safety envelope. All DCS control functions and motor electrical protection will shut down the pump without first alerting the control room with a precursor alarm. The operator shall take corrective action, stop the pump and, if necessary, start another pump. (Refer to Appendix A.)

The following subsections provide step-by-step instructions for operating the crude oil booster pumps in the REMOTE operating mode. This is the preferred operating mode for the pumps.

4.1 Pump Start Procedure - REMOTE Mode. Perform the following steps to start the crude oil booster pumps from the control room in the REMOTE operating mode.

4.1.1 Parallel Pump Operation - REMOTE Mode.

NOTE
Parallel operation means that two or more crude oil booster pumps discharge into a common header.

[1] At the MCC motor starter for the crude oil booster pump(s) to be used in the fluid movement:

[a] Place the motor HOA (MANUAL/OFF/AUTO) switch(es) to the AUTO position by inserting and turning the key. The MCCs associated with the pumps and MOVs are shown in Appendix E, Sheet 2.

[b] Push the RESET button. The RESET button is shown in Appendix C, Sheet 3. The MCCs associated with the pumps are shown in Appendix E.

[c] Verify that all personnel are clear of the 5KV MCC area.

[2] Initiate OPEN commands to the pump suction MOVs from the control room console by selecting the MOV, pressing the COMMAND button, and then the OPEN button.

[3] Verify that the suction MOVs start to open.

NOTE

A partially open suction MOV will prevent the pump from start-up and cause an alarm after the DCS time interval.

[4] Verify that the suction MOVs are fully open.

CAUTION

A minimum suction pressure of 0 psig is recommended to maintain a margin of safety above the low suction pressure alarm and shutdown set point of -4" Hg gauge. Lower suction pressures must be avoided to prevent pump damage due to vibration and cavitation.

[5] The field operator shall notify the control room operator when the suction pressure indicator on the crude oil booster pump reaches 0 or greater psig.

[6] Remove the lockout and place the local STOP/NEUTRAL/START switch in the NEUTRAL position.

[7] Initiate the 5KV MCC warning light.

CAUTION

A pump must not start against a blocked valve.

[8] If SJT-4 or SJT-5 are operated through their control valves 420D1C or 520DC, verify that the discharge valves are in their set positions (open) given in the fluid movement procedure.

WARNING

Once the START command is initiated, pumps SJT-1, -2, -3, and -4 discharging through 420D2 will start when all permissives are satisfied. This is <u>not</u> an immediate process. SJT-4 operating through 420D1C or SJT-5, will start immediately.

NOTE

The motor will not start when the pump STOP/NEUTRAL/START switch is in the STOP and locked out position. NEUTRAL position is the REMOTE position and allows a START command from a remote signal, in this case, the DCS.

[9] Initiate a pump START command for the crude oil booster pump from the control room console by selecting the pump, pressing the COMMAND button, and then the START button.

[10] If the pump has a discharge block valve (SJT-1, -2, -3, and -4, when discharging through 420D1C), verify that the following events occur after the crude oil booster pump START command is given:

[a] The pump discharge MOV begins to open.

[b] The pump motor starts after the pump discharge MOV travel has begun.

NOTE

The discharge MOV should open no more than one-quarter of the way before the pump starts.

[c] The pump discharge MOV reaches the fully open position. If the discharge MOV does not reach the fully open position in the DCS time interval, the DCS will cause an alarm.

NOTE 1

After an aborted cold motor pump start, wait 15 minutes before attempting a restart to allow the motor windings to cool down. The wait period for a third start is 45 minutes, fourth and each succeeding start; two hours, with a maximum of six starts per day. Wait 15 minutes after a hot start (motor ran in excess of 20 minutes). Wait 45 minutes for a second hot start and two hours for each succeeding start with no more than six starts per day. There is a time delay lockout (TDLO) relay in the MCC for each pump which will prevent a restart for 15 minutes. Following site procedures, this can be reset to 0 in an emergency, after a first aborted start, or after the first hot start. Operations may perform the first restart. The electrical group must perform the succeeding starts.

NOTE 2

If a second pump is to be started, the control valve listed in the fluid movement procedure should be adjusted (pinched) to account for the new flow.

[11] After the pump comes up to speed and the pump pressures have stabilized, verify that the suction pressure is greater than 0 psig.

NOTE

The normal range pump differential pressure is between 80 psi and 138 psi. This is the discharge pressure minus the suction pressure.

[12] To bring additional crude oil booster pumps on line repeat steps **[1]** through **[11]**.

[13] Turn off the 5KV MCC warning light.

4.1.2 Series Pump Operation - REMOTE Mode.

NOTE

Series operation means that a crude oil booster pump will discharge into the suction of another crude oil booster pump.

[1] At the MCC motor starter compartment for the crude oil booster pump(s) to be used in the fluid movement:

[a] Place the motor HOA switch(es) to the AUTO position by inserting and turning the key. The MCCs associated with the pumps and MOVs are shown in Appendix E, Sheet 2.

[b] Push the RESET button.

[c] Verify that all personnel are clear of the MCC area.

[2] Initiate OPEN commands to the pumps suction MOV(s) to be used in the fluid movement procedure from the control room console by selecting the MOV, pressing the COMMAND button, and then the OPEN button. (Refer to Appendix C, Sheet 4 for the MOV(s).)

[3] Verify that the suction MOV(s) start to open.

NOTE

A partially open suction MOV will prevent the pump from start-up and cause an alarm after the DCS time interval.

[4] Verify that the suction MOVs are fully open.

CAUTION

A minimum suction pressure of 0 psig is recommended to maintain a margin of safety above the low suction pressure alarm and shutdown set point of -4" HG gauge. Lower suction pressures must be avoided to prevent pump damage due to vibration and cavitation.

[5] The field operator shall notify the control room operator when the suction pressure indicator on the crude oil booster pump is greater than 0 psig.

[6] Start the control valve hydraulic power unit located at the control valve.

[7] Set the discharge control valve (-D1C) pressure or position for the last in series pump, SJT-4 or SJT-5. The position should be set from the analog controller in the control room. The opening value should be given in the fluid movement procedure or use 25% open if no value is given.

[a] If operation of the valve is through the analog controller in the control room, set the switches in LOCAL and MANUAL and adjust to the set point position.

[b] If operation is through the field panel controller, set the selector switch in the MANUAL POS, and adjust the set point position.

NOTE
If the valve is set in MANUAL (either at the analog controller LOCAL or the field panel MANUAL POS), it will go to the set open position and maintain that position. The valve selector switch and position set point are on the analog control valve panel in the control room and the field panel. (Refer to Appendix C, Sheet 4.)

[8] Verify that the control valve reaches the set position.

[9] Remove the lockouts and place the local STOP/NEUTRAL/START switches in the NEUTRAL position.

NOTE
The motor will not start when the pump STOP/NEUTRAL/START switch is in the STOP and locked out position. NEUTRAL position is the REMOTE position and allows a START command from a remote signal, in this case, the DCS.

[10] Initiate the 5KV MCC warning light.

[11] Initiate a pump START command for the first pump in the series (SJT-3 or SJT-4) from the control room console by selecting the pump, pressing the COMMAND button, and then the START button.

[12] Verify that the following events occur after the crude oil booster pump START command is given:

[a] For the first pump in series only, the pump discharge MOV begins to open.

[b] The pump motor starts after the pump discharge MOV travel has begun.

NOTE
The discharge MOV should open no more than one-quarter of the way before the pump starts.

[c] For the first pump in series only, the discharge valve is 320D3 or 420D2. The valve must reach the full open position. If it does not reach the full open position in the DCS time interval, the DCS will cause an alarm.

NOTE
After an aborted cold motor pump start, wait 15 minutes before attempting a restart to allow the motor windings to cool down. The wait period for a third start is 45 minutes, fourth and each succeeding start; two hours, with a maximum of six starts per day. Wait 15 minutes after a hot start (motor ran in excess of 20 minutes). Wait 45 minutes for a second hot start and two hours for each succeeding start with no more than six starts per day. There is a time delay lockout (TDLO) relay in the MCC for each pump which will prevent a restart for 15 minutes. Following site procedures, this can be reset to 0 in an emergency, after a first aborted start, or after the first hot start. Operations may perform the first restart. The electrical group must perform the succeeding starts.

[13] After the pump comes up to speed and the pump pressure has stabilized, verify that:

[a] The suction pressure on the first pump in this series is greater than 0 psig.

[b] The pump differential pressure is between 80 psi and 150 psi. This is the discharge pressure minus the suction pressure. The normal operating range is 80 psi to 138 psi.

[c] The first crude oil booster pump is within its normal operating discharge pressure. The discharge pressure will depend on the feed tank head pressure.

[14] To bring the other crude oil booster pump (SJT-4 or SJT-5) on line, initiate the pump start from the control room console by selecting the pump, pressing the COMMAND button, and then the START button.

[15] After the pump comes up to speed and the pump pressures have stabilized, verify that:

WARNING

Discharge pressure shall not exceed pump MAWP (Maximum Allowable Working Pressure) in the pump maufacturer's data or pipe MAOP (Maximum Allowable Operating Pressure) as listed in PD60, NDT Location/Data, Publication No. ASE6400.42.

[a] The discharge pressure from the last pump in the series is within the pressure limits established for the approved fluid movement procedure.

[b] The pump differential pressure is between 80 psi and 150 psi. This is the discharge pressure minus the suction pressure. The normal operating range is 80 psi to 138 psi.

[16] Adjust the control valve by either:

[a] Placing the MANUAL switch to AUTOMATIC position with the input pressure from the fluid movement procedure.

OR

[b] Adjusting the set position in MANUAL to obtain the discharge pressure to that identified in the fluid movement procedure.

[17] Turn off the 5KV MCC warning light.

4.2 **Performance Monitoring - REMOTE Mode.** For either parallel or series operation, the control room operator and field operator shall perform the following operations.

[1] Record the following as required by the operations shift supervisor:

[a] Motor outboard bearing temperature in the MCC RTU 1A cabinet.

[b] Motor inboard bearing temperature in the MCC RTU 1A cabinet.

[c] Motor amperage at the MCC feeding the pump.

[d] Pump suction pressure gauge reading at the pump.

[e] Pump discharge pressure gauge reading at the pump.

[f] Motor vibration on control room strip chart recorder.

[g] Motor winding temperature at the MCC feeding the pump.

[2] If an alarm for any pump or support equipment is received, verify the alarm, notify the shift supervisor, and take corrective actions as required.

4.3 **Pump Stop Procedure - REMOTE Mode.** For either parallel or series operations, perform the following steps to stop the crude oil booster pumps from the control room in the REMOTE operating mode.

[1] Verify that the switchgear area is cleared of personnel and initiate the 5KV MCC warning light.

[2] Initiate a pump STOP command from the control room console by selecting the pump, pushing the COMMAND button, and then pushing the STOP button.

[3] Verify the pump motor stops.

[4] If the discharge valve is a -D1, -D2, or -D3 MOV, verify the discharge MOV begins to close.

[5] Verify that the suction MOV begins to close.

[6] Verify the pump suction and discharge MOVs are fully closed. If a suction or discharge MOV does not reach the fully closed position in the DCS time interval, the DCS will cause an alarm.

NOTE
The flow rate may need to be adjusted before shutting down any pumps to be sure that the flow rate will still be in the operating envelope after the pump is shut down.

[7] To shut down the remaining pumps, repeat steps **[2]** through **[6]** until all of the crude oil booster pumps have been stopped.

[8] Place the local STOP/NEUTRAL/START selector switch in the STOP position and lock the lockout.

[9] If the pumps were in series operation, open the control valve (100%) from the control room analog controller panel.

[10] If this was the last pump run from MCC-A or MCC-B, turn off the 5KV MCC warning light.

5. STARTING, MONITORING, AND STOPPING THE CRUDE OIL BOOSTER PUMPS IN THE LOCAL WITH DCS MONITORING MODE.

The site manager or the site manager's designee shall approve all operations in the LOCAL with DCS Monitoring mode. This mode should only be used when the DCS system or the DCS monitoring instruments associated with the crude oil booster pumps are not fully operational.

The following subsections provide step-by-step instructions for operating in the LOCAL with DCS Monitoring mode. The crude oil booster pumps shall be started and stopped from the local STOP/NEUTRAL/START pushbutton station next to the pump. Extreme caution shall be exercised while operating in this mode. The field operator shall be stationed at the crude oil booster pumps at all times while operating in this mode to respond to safety alarms being monitored in the control room. The field operator shall maintain communications with the control room at all times. This mode is the alternate mode for use when REMOTE operation is not possible.

WARNING

Operation in the LOCAL with DCS Monitoring mode provides only electrical and motor winding overtemperature shutdowns. The field operators shall use extreme caution to ensure operation within the safety envelopes. The field operators shall be stationed at the pump pad and maintain communication with the control room operator in this mode.

5.1 **Pump Start Procedure - LOCAL with DCS Monitoring Mode.** Perform the following steps to start the crude oil booster pumps manually in the LOCAL with DCS Monitoring operating mode.

5.1.1 **Parallel Pump Operation - LOCAL with DCS Monitoring Mode.**

NOTE

Parallel operation means that two or more crude oil booster pumps discharge into a common header.

[1] At the MCC motor starter for the crude oil booster pump(s) to be used in the fluid movement:

[a] Place the motor HOA switch(es) to the MANUAL position by inserting and turning the key. The MCCs associated with the pumps and the MOVs are shown in Appendix E.

[b] Push the RESET pushbutton.

[c] Verify that the MCC room is cleared of any personnel.

[2] Verify that the area around the pump is clear of any hazards.

[3] Open the crude oil booster pump suction MOVs.

[a] Initiate the OPEN commands from the control room console by selecting the MOVs, pushing the COMMAND button, and then pushing the OPEN button.

[b] If a valve did not open from the control room, at the suction MOV, place the MOV selector switch to the LOCAL position and initiate the OPEN command.

NOTE

Failure of the suction MOVs to fully open will not prevent pump start in the LOCAL with DCS Monitoring mode. This is different from a DCS start; the safety envelope interlocks are overridden. The DCS will give an alarm after the DCS time interval if the MOV is not yet fully open.

[4] Verify, at the pump and the control room console, that the suction MOVs are fully open.

CAUTION

A minimum suction pressure of 0 psig is recommended to maintain a margin of safety above the low suction pressure alarm and shutdown set point of -4" Hg gauge. Lower suction pressures must be avoided to prevent pump damage due to vibration and cavitation.

[5] Verify that the suction pressure on the crude oil booster pump indicates a pressure greater than 0 psig.

[6] Remove the lockout from the STOP/NEUTRAL/START selector switch.

[7] Initiate the 5KV MCC warning light.

[8] Open the discharge MOV as follows:

[a] Initiate the OPEN command from the control room console by selecting the MOV, pushing the COMMAND button, and then pushing the OPEN button.

[b] If the valve did not open from the control room, at the discharge MOV, at the direction of the control room operator, place the MOV selector switch to the LOCAL position and initiate the OPEN command.

[c] Verify that the discharge MOV starts opening.

WARNING 1

Once a START command is initiated, the pump will start immediately. This is different from a DCS start, there is no time delay.

WARNING 2

If the pump must be stopped in the LOCAL with DCS Monitoring mode, the lockout shall be installed immediately to prevent the pump from restarting without warning.

CAUTION

If a local instrument indicates a shutdown condition, the field operator shall push the STOP pushbutton.

[9] When the discharge MOV is between 15% and 25% open (three to four inches on the stem), push the START button on the local STOP/NEUTRAL/START pushbutton station.

[10] After the START button is pushed, verify both at the pump and control room:

[a] That the pump motor starts.

[b] That the pump discharge MOV reaches the fully open position. If the discharge MOV does not reach the fully open position in the DCS time interval, the DCS will cause an alarm.

NOTE

After an aborted cold motor pump start, wait 15 minutes before attempting a restart to allow the motor windings to cool down. The wait period for a third start is 45 minutes, fourth and each succeeding start; two hours, with a maximum of six starts per day. Wait 15 minutes after a hot start (motor ran in excess of 20 minutes). Wait 45 minutes for a second hot start and two hours for each succeeding start with no more than six starts per day. There is a time delay lockout (TDLO) relay in the MCC for each pump which will prevent a restart for 15 minutes. Following site procedures, this can be reset to 0 in an emergency, after a first aborted start, or after the first hot start. Operations may perform the first restart. The electrical group must perform the succeeding starts.

[11] After the pump comes up to speed and the pump pressures have stabilized, verify that:

[a] There is still more than 0 psig at the suction pressure indicator.

[b] The pump differential pressure is between 80 psi and 150 psi. This is the discharge pressure minus the suction pressure. The normal operating range is 80 psi to 138 psi.

[c] The crude oil booster pump is within its normal operating discharge pressure. The discharge pressure will depend on the tank head pressure.

[12] To bring additional crude oil booster pumps on line repeat steps **[5]** through **[11]**.

[13] Turn off the 5KV MCC warning lights.

5.1.2 Series Pump Operation - LOCAL with DCS Monitoring Mode.

NOTE

Series operation means that a crude oil booster pump will discharge into the suction of another crude oil booster pump.

[1] At the MCC motor starter compartment for the crude oil booster pump(s) to be used in the fluid movement:

[a] Place the motor HOA switch(es) to the MANUAL position by inserting and turning the key. The MCCs associated with the pumps and the MOVs are shown in Appendix E.

[b] Push the RESET pushbutton.

[c] Verify that the MCC area is clear of personnel.

[2] Verify that the area around the pump is clear of any hazards.

[3] Open the crude oil booster pumps' suction MOVs (-S2).

[a] Initiate the OPEN commands from the control room console by selecting the MOVs, pushing the COMMAND button, and then pushing the OPEN button.

[b] If the DCS did not open a suction MOV, at the suction MOV, place the suction MOV selector switch to the LOCAL position and initiate the OPEN command.

NOTE

Failure of the suction MOV to fully open will not prevent pump start in the LOCAL with DCS Monitoring mode. This is different from a DCS start, the safety envelope interlocks are overridden. The DCS will give an alarm after the DCS time interval if the MOV is not yet fully open.

[4] Verify, at the pumps and the control room console, that the suction MOVs are fully open.

CAUTION

A minimum suction pressure of 0 psig is recommended to maintain a margin of safety above the low suction pressure alarm and shutdown set point of -4" Hg gauge. Lower suction pressures must be avoided to prevent pump damage due to vibration and cavitation.

[5] Verify that the suction pressure on the crude oil booster pump indicates a pressure greater than 0 psig.

[6] Set the discharge control valve position for the last in series pump, SJT-4 or SJT-5. The pressure should be set from the fluid movement procedure or approximately 25% open position if no value is given. If the valve is set

in AUTOMATIC, it will adjust itself to maintain the set discharge pressure. If the valve is set in MANUAL, it will go to the set open position and maintain that position. The valve selector switch and position set point are given on the control valve panel in the control room.

[7] Remove the lockouts from the local STOP/NEUTRAL/START selector switches.

[8] Initiate the 5KV MCC warning light.

[9] Open the discharge MOV as follows:

[a] Initiate the OPEN command from the control room console by selecting the MOV, pushing the COMMAND button, and then pushing the OPEN button.

[b] If the DCS did not open the discharge MOV, at the discharge MOV of the pump, at the direction of the control room operator, place the MOV selector switch to the LOCAL position and initiate the OPEN command.

[c] Verify that the discharge MOV starts opening.

WARNING 1

Once a START command is initiated, the pump will start immediately. This is different from a DCS start, there is no time delay.

WARNING 2

If the pump must be stopped in the LOCAL with DCS Monitoring mode, the lockout shall be inserted immediately to prevent the pump from restarting without warning.

CAUTION

If a DCS monitored device or a local instrument indicates a shutdown condition, the field operator shall push the STOP pushbutton.

[10] When the discharge MOV is between 15% and 25% open (three to four inches on the stem), push the START button of the local STOP/NEUTRAL/START pushbutton station.

[11] After the START button is pushed, verify both at the pump and control room:

[a] That the pump motor starts.

[b] That the pump discharge MOV reaches the fully open position. If the discharge MOV does not reach the fully open position in the DCS time interval, the DCS will cause an alarm.

NOTE

After an aborted cold motor pump start, wait 15 minutes before attempting a restart to allow the motor windings to cool down. The wait period for a third start is 45 minutes, fourth and each succeeding start; two hours, with a maximum of six starts per day. Wait fifteen minutes after a hot start (motor run in excess of 20 minutes). Wait 45 minutes for a second hot start and two hours for each succeeding start with no more than six starts per day. There is a time delay lockout (TDLO) relay in the MCC for each pump which will prevent a restart for fifteen minutes. Following site procedure, this can be reset to 0 in an emergency or after a first aborted start, or after the first hot start. Operations may perform the first restart. The electrical group must perform the succeeding starts.

[12] After the pump comes up to speed and the pump pressure has stabilized, verify that:

[a] There is still more than 0 psig at the suction pressure indicator.

[b] The differential pressure is between 80 psi and 150 psi. This is the discharge pressure minus the suction pressure. The normal operating range is 80 psi to 138 psi.

[c] The pump is within its normal operating discharge pressure. The discharge pressure will depend on the tank head pressure.

[13] To bring the other crude oil booster pump (SJT-4 or SJT-5) on line, initiate the pump start from the control room console by selecting the pump, pressing the COMMAND button, and then the START button.

WARNING

The discharge pressure shall not exceed the pump MAWP or pipe MAOP established in the fluid movement procedure.

[14] After the pump comes up to speed and the pump pressures have stabilized, verify that:

[a] The discharge pressure from the last pump in the series is within the pressure limits established in the approved fluid movement procedure.

[b] The differential pressures are between 80 psi and 150 psi. This is the discharge pressure minus the suction pressure. The normal operating range is 80 psi to 138 psi.

[15] Adjust the control valve by either:

[a] Placing the MANUAL switch to AUTOMATIC position with the input pressure from the fluid movement pressure.

OR

[b] Adjusting the set position in MANUAL to obtain the discharge pressure identified in the fluid movement procedure.

[16] Turn off the 5KV MCC warning light.

5.2 **Performance Monitoring - LOCAL with DCS Monitoring Mode.** For either parallel or series operation, the control room operator and field operator shall perform the following operations.

[1] Record the following as required by the operations shift supervisor:

[a] Motor outboard bearing temperature in the MCC RTU 1A cabinet.

[b] Motor inboard bearing temperature in the MCC RTU 1A cabinet.

[c] Motor amperage at the MCC feeding the pump.

[d] Pump suction pressure gauge reading at the pump.

[e] Pump discharge pressure gauge reading at the pump.

[f] Motor vibration on control room strip chart recorder.

[g] Motor winding temperature at the MCC feeding the pump.

[2] If an alarm for any pump or support equipment is received, verify the alarm, notify the shift supervisor, and take corrective actions as required.

5.3 **Pump Stop Procedure - LOCAL with DCS Monitoring Mode.** For either parallel or series operation, perform the following steps to stop the crude oil booster pumps manually in the LOCAL with DCS Monitoring operating mode.

[1] Verify that the switchgear room is clear of personnel and initiate the switchgear warning light.

WARNING

If the pump must be stopped in the LOCAL with DCS Monitoring mode, the lockout shall be inserted immediately to prevent the pump from restarting without warning.

[2] At the selected pump, push the STOP pushbutton of the STOP/NEUTRAL/START selector switch and immediately insert the lockout.

[3] Verify that the pump motors stop.

[4] Initiate the CLOSE command for the discharge MOV from the control room console by selecting the MOV, pushing the COMMAND button, and then pushing the CLOSE button.

[5] If the DCS did not close the discharge MOV, at the discharge MOV of the pump(s) and at the direction of the control room operator, place the selector switch in LOCAL position and initiate the CLOSE command.

[6] If the discharge valve is a -DX MOV, verify that the discharge MOV begins to close.

[7] Initiate the CLOSE command for the suction MOV from the control room console by selecting the MOV, pushing the COMMAND button, and then the CLOSE button.

[8] If the DCS did not close the suction MOV, at the MOV of the pump(s) and at the direction of the control room operator, place the selector switch in LOCAL position and initiate the CLOSE command.

[9] Verify that the suction valve begins to close.

[10] To shut down the remaining pumps repeat steps **[2]** through **[9]** until all of the crude oil booster pumps have been stopped.

[11] If the pumps were in series operation, open the control valve 100% from the control room control analog controller panel.

[12] Turn off the 5KV MCC warning light.

6. EMERGENCY STOPPING PROCEDURES FOR THE CRUDE OIL BOOSTER PUMPS.

The following subsections address emergency stopping of the pump from either the REMOTE (DCS) or LOCAL with DCS Monitoring mode. If the pump has not stopped from DCS commands, begin with step **[1]**. If the pump has not stopped in the LOCAL with DCS Monitoring mode, begin with step **[2]**.

WARNING

If the pump must be stopped using the local STOP of the STOP/NEUTRAL/START pushbutton, the lockout shall be inserted immediately to prevent the pump from restarting without warning.

[1] Press the local STOP button at the STOP/NEUTRAL/START selector switch at the motor and immediately insert the lockout. If this fails to stop the motor, then the motor shall be stopped from the motor starter in the motor control center (MCC) according to the following steps:

[2] The field operator shall notify the control room operator that an emergency stop is necessary.

[3] The control room operator shall notify the operations shift supervisor of the emergency stop requirement.

[4] The operations shift supervisor or the operations shift supervisor's designee shall contact the electrician who will perform the shutdown in this MCC.

[5] After the electrician has performed the stop procedure in the MCC, verify that the following events occur both at the pump and at the control room console:

[a] Pump motor stops.

[b] The suction and discharge MOVs are fully closed. If any one of them did not close, close from the DCS and then, if necessary, place the suction or discharge MOVs in LOCAL position and initiate CLOSE commands.

7. POST CRUDE OIL BOOSTER PUMP OPERATION PROCEDURE.

When the crude oil booster pumps are no longer needed for the fluid movement, set all valves and selector switches associated with the pumps as shown in Appendix D and verify the following items in the MCC.

[1] The red RUN light is off.

[2] The green OFF light is illuminated.

[3] The blue HEATER light is illuminated.

APPENDIX A
OPERATING AND SAFETY ENVELOPE
CRUDE OIL BOOSTER PUMPS
(Sheet 1 of 2)

WARNING

In some serial pumping configurations, the discharge pressure can exceed the maximum allowable working pressure (MAWP) of the pump or maximum allowable operating pressure (MAOP) of the piping. Refer to the manufacturer's data for the MAWP. For the MAOP of the piping, refer to the fluid movement procedure.

CAUTION

The crude oil booster pumps shall be operated within the following safety envelope at all times. Failure to do so could result in damage to the equipment.

		SAFETY ENVELOPE			
			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
Motor vibration	in/s	h	h	h	1.5[a]
Motor winding temperature	^{o}C	AMB	h	140[b]	140[e]
Motor bottom bearing temp.	^{o}F	AMB	h	180[b]	190[a]
Motor top bearing temp	^{o}F	AMB	h	180[b]	190[a]
Pump differential pressure[c]	psi	63	80	138	150
Pump suction pressure	in Hg	-4[a,f]	0	d	d
Pump discharge pressure, parallel	psig	h	h	135	160
Pump discharge pressure series	psig	h	h	250[b,g]	250[d]
Flow switch low	MBD	30[a]	290	690	

a These are shutdown levels. In REMOTE mode, the DCS will automatically cause a shutdown.
b These are alarm points in the DCS.
c This must be monitored by an operator.
d This will depend on the series arrangement and specific gravity of pumped fluid.
e This is a hard-wired shut down (not through DCS).
f There is a 45 second alarm period before shutdown.
g There is a 7 second alarm period before shutdown.
h These values have no defined limits.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
CRUDE OIL BOOSTER PUMPS
(Sheet 2)

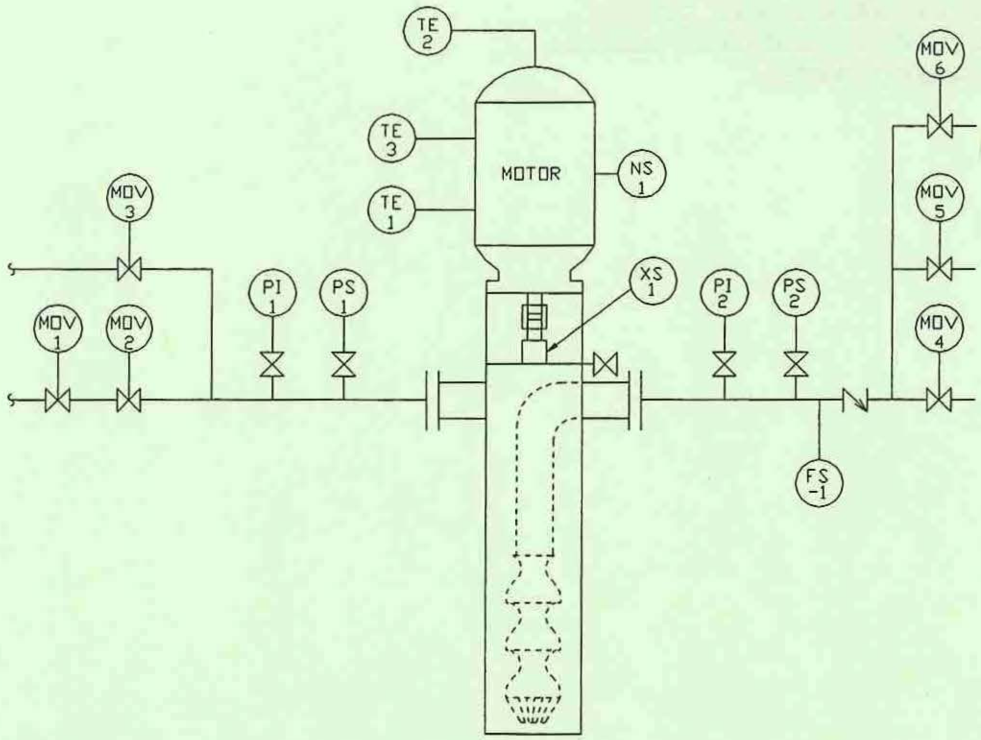
Support Equipment:

The following list of support equipment shall be operational if required for the fluid movement before the crude oil booster pumps are started.

A. Crude oil storage tanks.
B. Meter skids and prover.
C. Automatic sampler units.
D. Loading arms.

APPENDIX B

SCHEMATIC DIAGRAM
CRUDE OIL BOOSTER PUMPS
(Sheet 1 of 3)

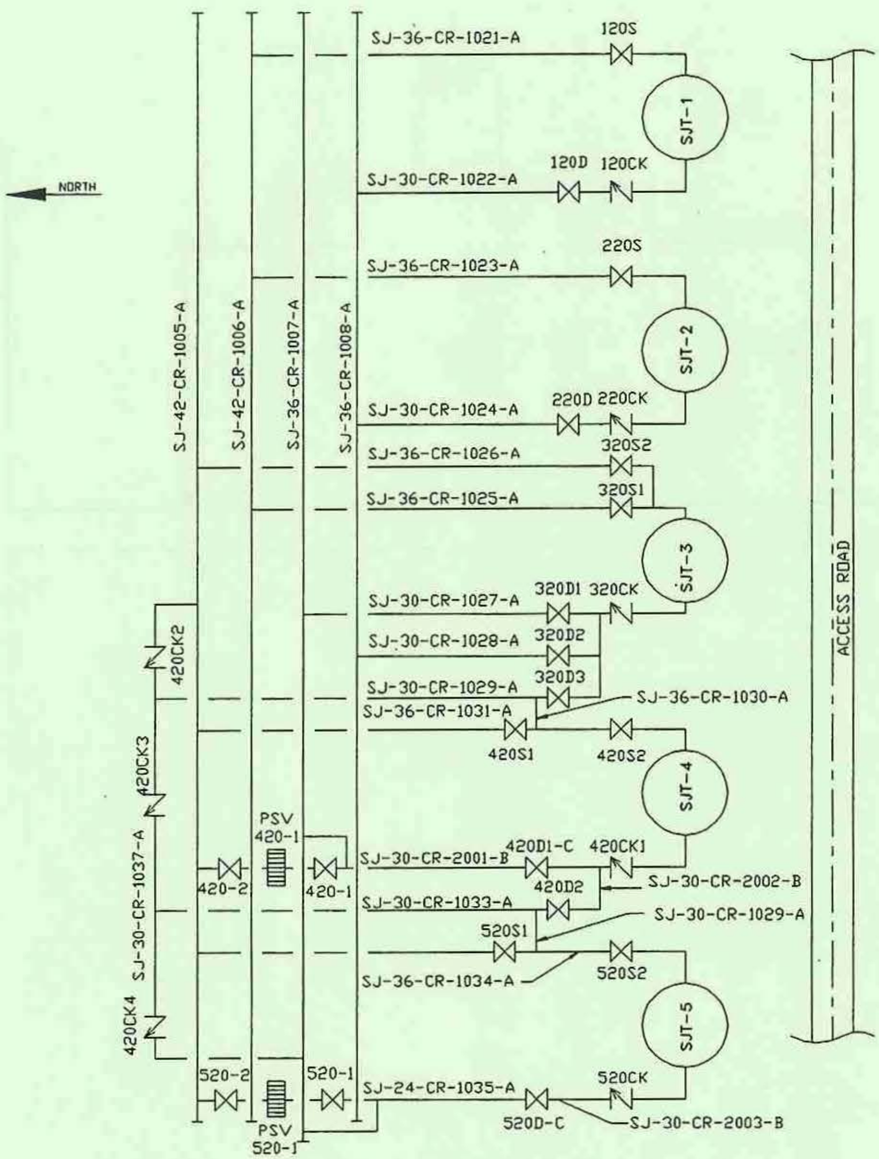


ITEM	DESCRIPTION	PUMP SJT-1	PUMP SJT-2	PUMP SJT-3	PUMP SJT-4	PUMP SJT-5
MOV-1	SUCTION VALVE	120S	220S	320S1	420S1	520S1
MOV-2	SUCTION VALVE	NA	NA	NA	420S2	520S2
MOV-3	SUCTION VALVE	NA	NA	320S2	NA	NA
MOV-4	DISCHARGE VALVE	120D	220D	320D1	420D1C	520DC
MOV-5	DISCHARGE VALVE	NA	NA	320D2	420D2	NA
MOV-6	DISCHARGE VALVE	NA	NA	320D3	NA	NA
PI-1	SUCTION PRESSURE INDICATOR	SJT-1-PI-1	SJT-2-PI-1	SJT-3-PI-1	SJT-4-PI-1	SJT-5-PI-1
PI-2	DISCHARGE PRESSURE INDICATOR	SJT-1-PI-2	SJT-2-PI-2	SJT-3-PI-2	SJT-4-PI-2	SJT-5-PI-2
PS-1	SUCTION PRESSURE LOW	SJT-1-PS-1	SJT-2-PS-1	SJT-3-PS-1	SJT-4-PS-1	SJT-5-PS-1
PS-2	DISCHARGE PRESSURE HIGH	SJT-1-PS-2	SJT-2-PS-2	SJT-3-PS-2	SJT-4-PS-2	SJT-5-PS-2
TE-1	LOWER BEARING TEMPERATURE	SJT-1-TE-1	SJT-2-TE-1	SJT-3-TE-1	SJT-4-TE-1	SJT-5-TE-1
TE-2	UPPER BEARING TEMPERATURE	SJT-1-TE-2	SJT-2-TE-2	SJT-3-TE-2	SJT-4-TE-2	SJT-5-TE-2
TE-3	MOTOR WINDING TEMPERATURE	SJT-1-TA-1	SJT-2-TA-1	SJT-3-TA-1	SJT-4-TA-1	SJT-5-TA-1
NS-1	VIBRATION SWITCH HIGH	SJT-1-NS-1	SJT-2-NS-1	SJT-3-NS-1	SJT-4-NS-1	SJT-5-NS-1
XS-1	SEAL LEAKAGE	SJT-1-XS-1	SJT-2-XS-1	SJT-3-XS-1	SJT-4-XS-1	SJT-5-XS-1
FS-1	LOW FLOW SWITCH	SJT-1-FS-1	SJT-2-FS-1	SJT-3-FS-1	SJT-4-FS-1	SJT-5-FS-1

APPENDIX B

SCHEMATIC DIAGRAM
CRUDE OIL BOOSTER PUMPS

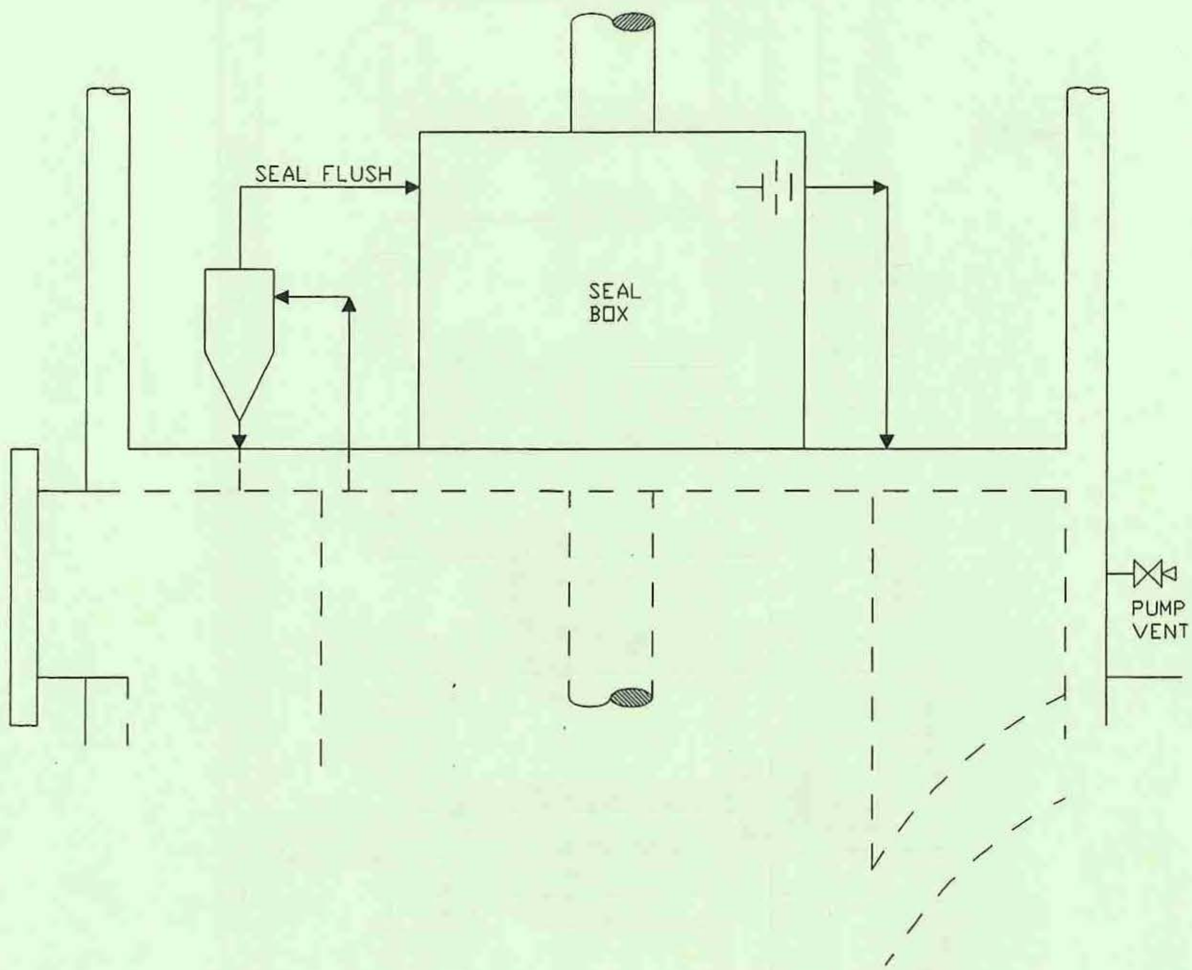
EQUIPMENT LAYOUT
(Sheet 2)



APPENDIX B

SCHEMATIC DIAGRAM
CRUDE OIL BOOSTER PUMPS

SEAL FLUSH
(Sheet 3)



APPENDIX C

TECHNICAL DATA
CRUDE OIL BOOSTER PUMPS
(Sheet 1 of 5)

Pump:

Manufacturer:	Peabody, Floway
Model:	28 FKH, 3 stage, vertical turbine
Capacity:	17,500 GPM
Total Dynamic Head:	285 feet
RPM:	1180
NPSH Required:	6 feet
NPSH Available:	8 feet
BHP Rated:	1371
Efficiency:	81.3%
Weight:	20,160 lbs.
Pump Performance Curve:	78-2931-1
Pump Outline DWG:	78-2931-2

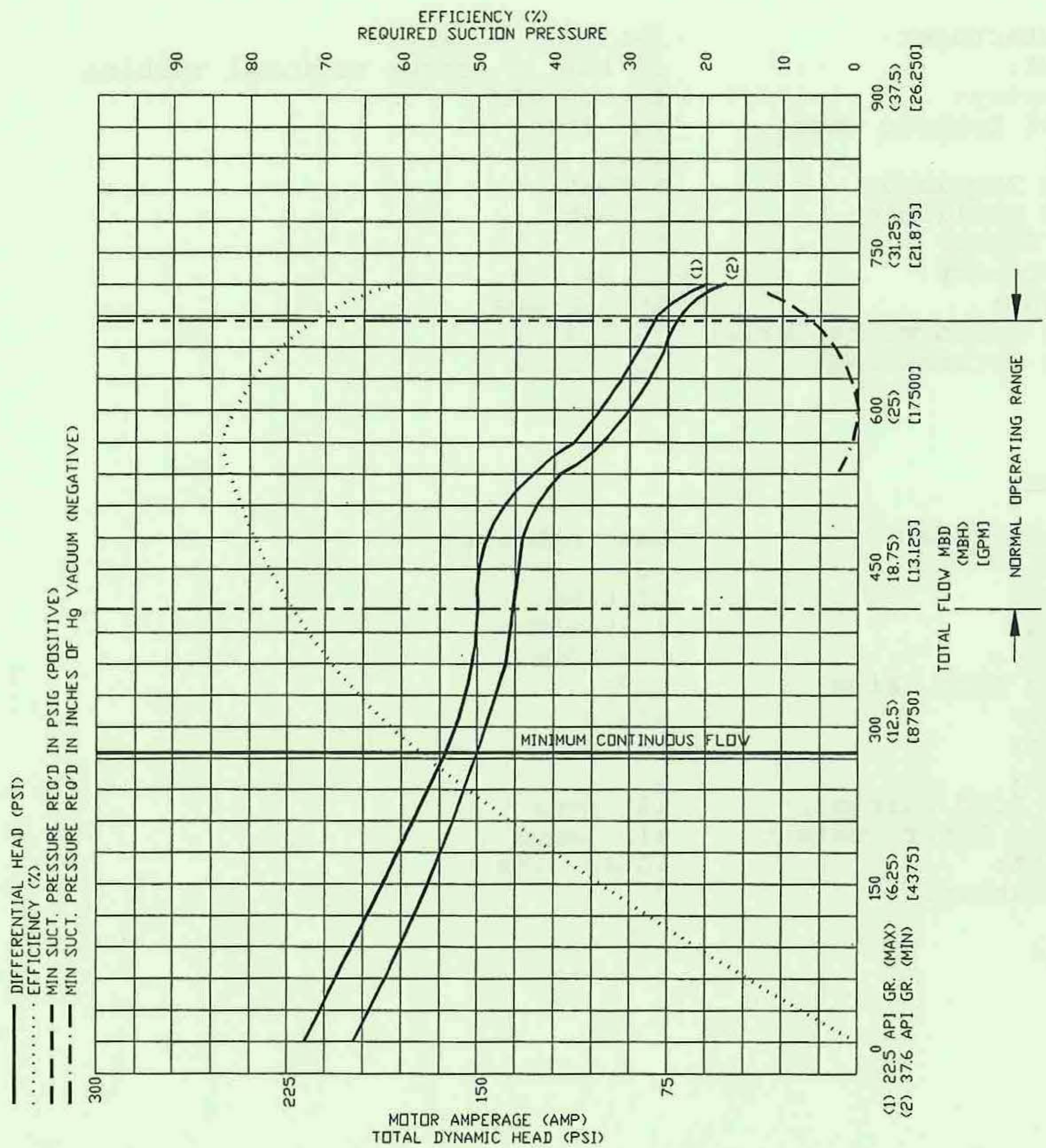
Motor:

Manufacturer:	Westinghouse
Model:	VSS
Rated:	1500 HP
Speed:	1189 RPM
Frame:	L 6810P42
Rated Temp. Rise:	70°C
Volts:	4160
Hertz:	60
Phase:	3
Full Load Current:	181 Amps
Locked Rotor Current:	1126 Amps
Weight:	10,400 lbs.
Insulation:	F

APPENDIX C

TECHNICAL DATA
CRUDE OIL BOOSTER PUMPS

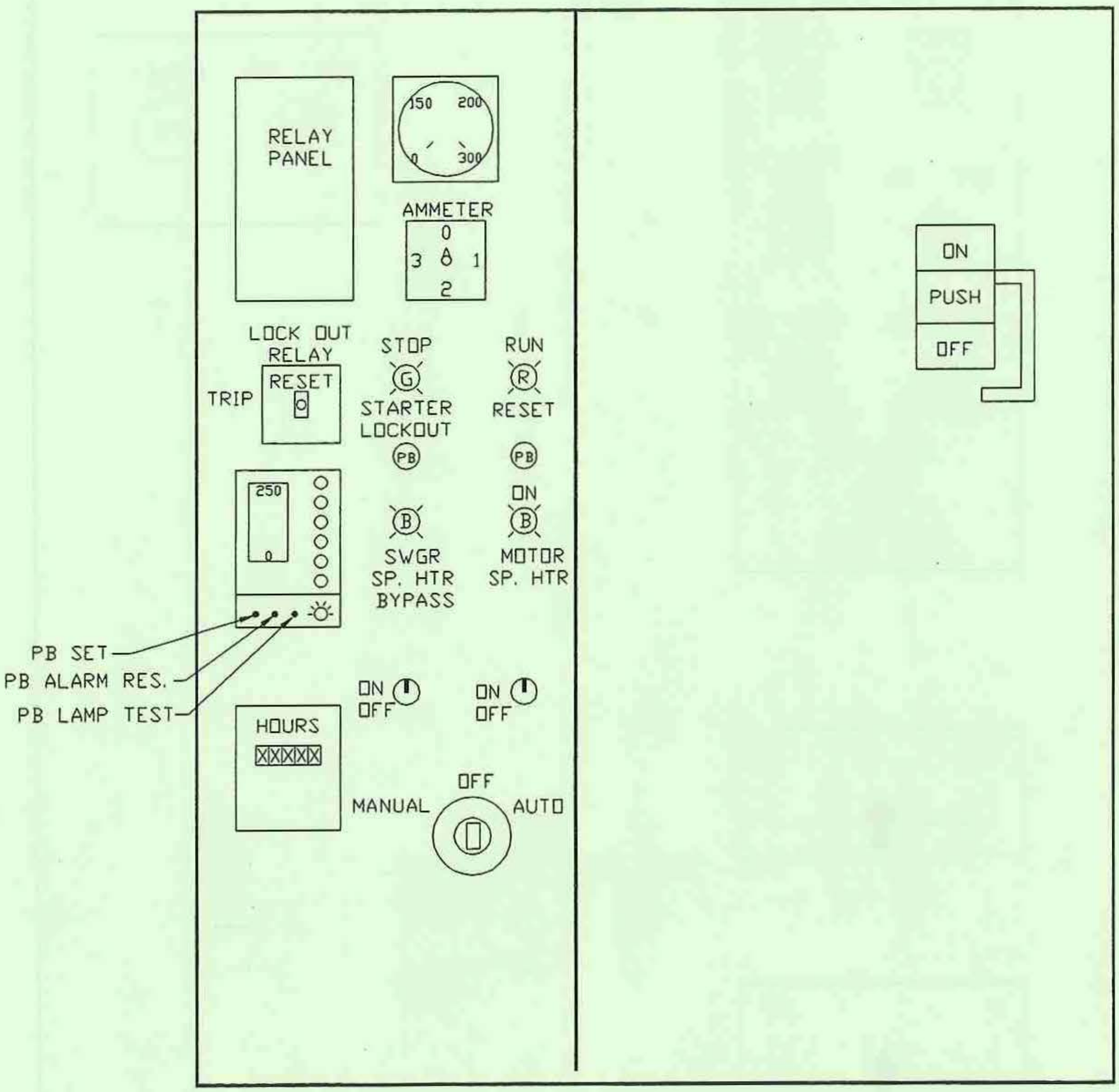
TYPICAL PUMP CURVE
(Sheet 2)



APPENDIX C

TECHNICAL DATA
CRUDE OIL BOOSTER PUMPS

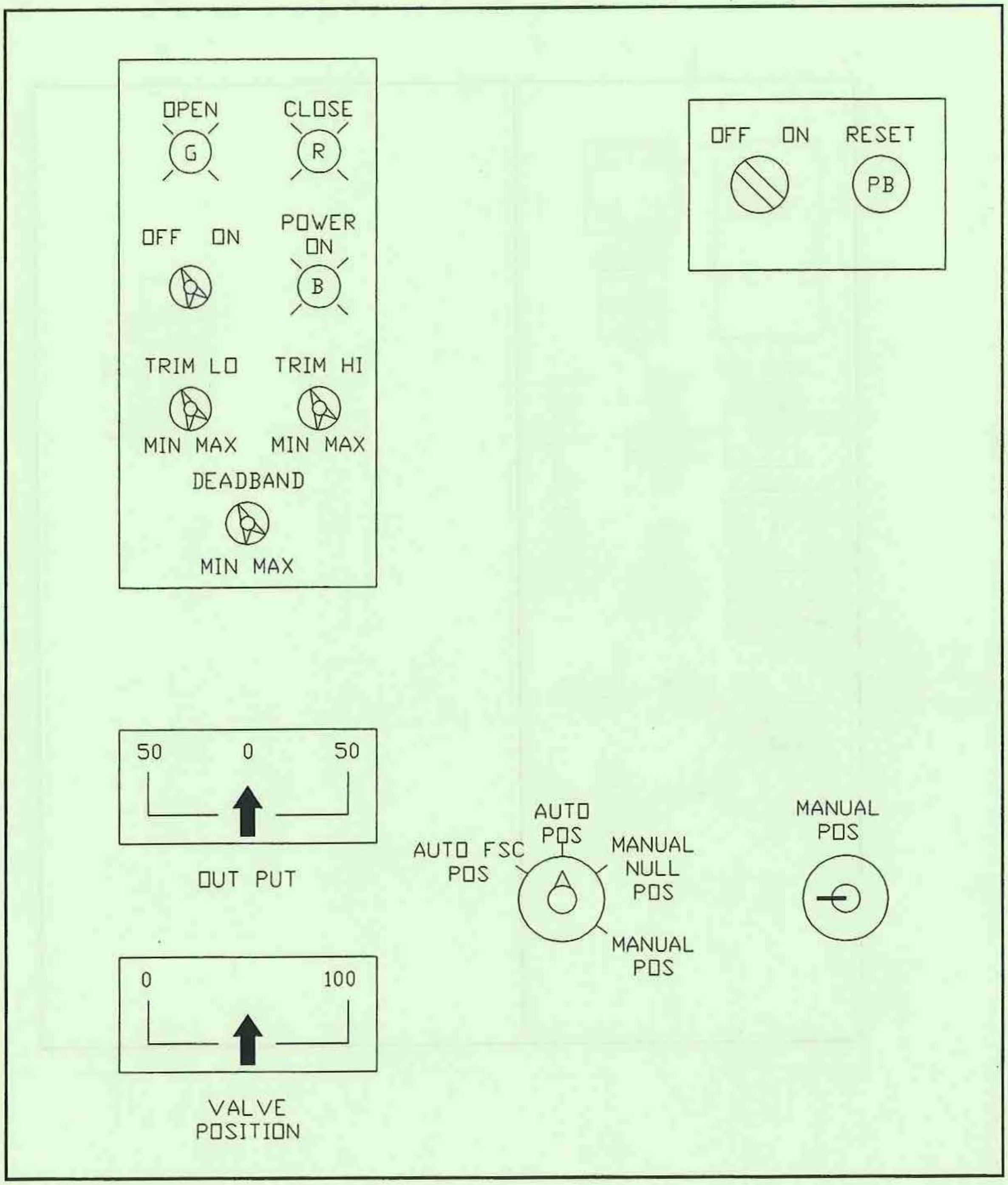
TYPICAL MCC PANEL
(Sheet 3)



APPENDIX C

TECHNICAL DATA
CRUDE OIL BOOSTER PUMPS

LOCAL ANALOG PANEL
(Sheet 4)



APPENDIX C

TECHNICAL DATA
CRUDE OIL BOOSTER PUMPS

PUMP OPERATING MODES
(Sheet 5)

Mode	Pump Configuration	Discharge Valve	Suction Valve	Suction Valve
Mode 1	SJT-1	120-D	120-S	---
Mode 2	SJT-2	220-D	220-S	---
Mode 3	SJT-3 P/W 1 or 2	320-D2	320-S1	---
Mode 4	SJT-3 P/W 4 or 5	320-D1	320-S2	---
Mode 5	SJT-3 Series	320-D3	320-S2	---
Mode 6	SJT-4 Parallel	420-D1C	420-S1	420-S
Mode 7	SJT-4 S/W 3	420-D1C	420-S2	---
Mode 8	SJT-4 S/W 5	420-D2	420-S1	420-S2
Mode 9	SJT-5 Parallel	520-D-C	520-S1	520-S2
Mode 10	SJT-5 Series	520-D-C	520-S2	---

APPENDIX D

STANDBY VALVE AND SWITCH POSITIONS
CRUDE OIL BOOSTER PUMPS

ITEM	POSITION
1. MCC HOA Selector Switch	OFF[1]
2. Local STOP/NEUTRAL/START switch	Lockout in STOP
3. Suction MOV selector switches	REMOTE
4. Suction MOVs	Closed
5. Suction MOVs MCC starter	ON
6. Discharge MOV selector switches	REMOTE
7. Discharge MOVs Control Valves	Closed Open 100%
8. Discharge MOVs MCC starter	ON
9. Vent and drain valves	Closed
10. Pressure gauge/switch block valves	Open

1 Motor MCC starter will not reset until HOA out of OFF position.

APPENDIX E

PUMP START/STOP CAPABILITIES
CRUDE OIL BOOSTER PUMPS
(Sheet 1 of 2)

PUMP NO.	LOCAL CONTROL		DCS CONTROL		MCC CONTROL		
	MCC-HOA IN M		MCC-HOA IN A				
	START PB	STOP PB	START HOA	STOP HOA	START HOA[1]	STOP PB	STOP HOA
SJT-1	Y	Y	Y[2]	Y[2]	N	Y[3]	O
SJT-2	Y	Y	Y[2]	Y[2]	N	Y[3]	O
SJT-3	Y	Y	Y[2]	Y[2]	N	Y[3]	O
SJT-4	Y	Y	Y[2]	Y[2]	N	Y[3]	O
SJT-5	Y	Y	Y[2]	Y[2]	N	Y[3]	O

1 Must remove lockout at local STOP/NEUTRAL/START pushbutton station.
2 Function button on DCS keyboard.
3 Push MCC starter LOCK OUT pushbutton.

LEGEND:

<u>Item</u>	<u>Description</u>
Local Control:	Control at the pump
DCS Control:	Pump control from the Distributed Control System (DCS) control panel at the main control room.
MCC Control:	Pump control at the pump's MCC panel.
PB:	Pushbutton.
HOA:	Manual-Off-Automatic selector switch.

Y - Indicates that a pushbutton operation is possible.
N - Indicates that a pushbutton operation is not possible.
H - Indicates Manual (LOCAL) position on the Manual-Off-Automatic Switch.
O - Off Position on the Manual-Off-Automatic Switch.
A - Indicates Auto (DCS) position on the Manual-Off-Automatic Switch.

APPENDIX E

PUMP START/STOP CAPABILITIES
CRUDE OIL BOOSTER PUMPS

MCC LOCATIONS
(Sheet 2)

PUMP NO.	PUMP MCC NO.	MOV NO.	MOV MCC NO.
SJT-1	MCC-A1	120-S 120-D	MCC-5RA MCC-5FA
SJT-2	MCC-B8	220-S 220-D	MCC-5RB MCC-5FB
SJT-3	MCC-A2	320-S1 320-S2 320-D3	MCC-5RC MCC-5RD MCC-5FC
SJT-4	MCC-A3	420-S1 420-S2 420-D1-C 420-D2	MCC-10RA MCC-10RB MCC-12FCC MCC-10FC
SJT-5	MCC-B7	520-S1 520-S2 520-D-C	MCC-10RC MCC-10RD MCC-12FD

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CRUDE OIL STORAGE TANKS T-1, -2,. -3, -4, -5, AND -6

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CRUDE OIL STORAGE TANKS T-1, -2, -3, -4, -5, AND -6

List of Effective Work Package Pages

Page Number	Revision Number	Page Number	Revision Number
1 thru 28	1		

Record of Applicable Technical Directives

None

WARNING

Crude oil is a flammable liquid. The vapors given off by crude oil are far more susceptible to ignition than the crude oil liquid. "Gassy" crude oil with a vapor pressure of >14.7 psia has a significantly increased vapor flash risk (and, therefore, ignition risk) during depressurization. Crude oil contains petroleum hydrocarbons which may cause eye, skin, and lung irritation. Crude oil may contain significant quantities of hydrogen sulfide which is irritating to the eyes, skin, and lungs at low concentrations. At higher hydrogen sulfide concentrations, loss of ability to smell, respiratory paralysis or death may occur. Crude oil also contains benzene, a known carcinogen.

TABLE OF CONTENTS

1. INTRODUCTION.

The St. James Terminal crude oil tanks T-1 through T-6 are open top, floating roof tanks, built to the API-620 specification. The six tanks have a total nominal capacity of two million barrels. Four tanks (T-1, -2, -5, and -6) are 400,000 barrel tanks. These tanks are 300 feet in diameter with a nominal design liquid level of 33 feet. Tanks T-3 and T-4 are 200,000 barrel tanks. These tanks are 212 feet in diameter with a nominal design liquid level of 33 feet. Tanks T-1, T-2, and T-3 are enclosed in one primary dike, with secondary dikes subdividing each tank. The primary dike is designed to hold the full contents of any one tank. Tanks T-4, T-5, and T-6 have a similar diking system. (Refer to Appendix B, Sheet 2.) All tanks have a six-inch rainwater roof drain with EMSCO flexible joints to allow drain pipe movement. The run-off drains to the dike drain sump.

The floating roofs have a vapor seal and a wiper seal. The roofs have adjustable stand-off legs that prevent the roof from settling onto the bottom. The minimum height is 3' 4-3/8" and the maximum height is 6' 5-1/4". Each roof has five 8 inch air vents to expel air during filling of empty tanks or stripping. Each roof has an 8 inch vertical pipe for gauging. The roof is accessible from the side wall with a self leveling stairway. The roofs are equipped with a Varec level gauge and a transmitter for local and remote tankage readings. There is an independent separate high-high level switch set at 32' that activates an alarm. The high-high switch is on the UPS.

There are vari-angle mixers for blending oils and removing sediment accumulations from the tank bottoms installed on each tank. The sweep is automatic through 60 degrees during mixer operation and completes a sweep cycle every 10-1/2 hours of operation.

A chemical injection port is located on top of each of the tank strainers, T1STR1, T2STR1, T3STR1, T4STR1, T5STR1 and T6STR1. This allows for the addition of treatment chemicals into the tanks to prevent the growth of bacteria and thereby reduce the Microbial Influenced Corrosion which could cause failure of the tank bottoms and sumps.

The tanks provide holding capacity for oil transfer operations to or from Bayou Choctaw and Weeks Island, between the dock facilities, to or from the LOCAP system, and to the CAPLINE pipeline. The tanks are currently used for custody transfer between suppliers and purchasers of oil. The surge relief valves use tank T-1 for overflow. (Crude oil booster pumps SJT-4 and SJT-5 surge goes back to the suction line when pumping from T-2 through T-6.)

1.1 **Purpose.** This procedure provides instructions for the safe operation of the crude oil storage tanks under normal operation conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Receiving to a crude oil storage tank.

B. Shipping from a crude oil storage tank.

C. Gauging a crude oil storage tank.

D. Sampling a crude oil storage tank.

E. Stripping a crude oil storage tank.

F. Operating mixers.

1.3 **Applicability.** This procedure applies under normal operating conditions when the distributed control system (DCS) is operational.

1.4 **Reference Documents.**

A. Operating Procedure ASR4330.5, Interim Repair and Mitigation Authorization.

B. Piping and Instrumentation Diagrams, Crude Oil Storage Tanks T-1 through T-3, drawing no. SJ-M-103-023.

C. Piping and Instrumentation Diagrams, Crude Oil Storage Tanks T-4 through T-6, drawing no. SJ-M-103-025.

D. Strategic Petroleum Reserve, Safe Work Permits, Publication D-506-01933-09 and D-506-02556-09.

E. Strategic Petroleum Reserve Accident Prevention Volume 1, Publication ASI5480.22 (D506-02556-09).

F. Work Packages 008 00, Crude Oil Booster Pumps and 012 00, Stripping Pumps.

2. PRECAUTIONS AND LIMITATIONS.

The following precautions and limitations apply to the operation of the crude oil storage tanks and equipment in both the REMOTE and LOCAL with DCS Monitoring operating modes.

A. DCS instrumentation associated with the storage tanks to be used in the fluid movement shall have current calibration stickers. The loss of one or more safety device alarms requires the authorization of a work around. Refer to Operating Procedure ASR4330.5, Interim Repair/Mitigation Procedure.

B. All local instrumentation relating to the storage tanks to be used shall have current calibration stickers.

C. The maximum operating and safety parameters in Appendix A shall be observed at all times.

D. The mixer coupling guards shall be in place and operational.

E. Valve alignment shall be in accordance with the valve line-up sheet for the particular fluid movement procedure.

F. The support equipment shown in Appendix A, Sheet 2 required for the fluid movement procedure shall be fully functional and available for service.

G. Entry onto the floating roof is considered entry into a confined space and shall be done by a safe work permit per publications D506-01933-09 and D506-02556-09.

3. PREREQUISITE ACTIONS FOR PREPARING THE CRUDE OIL STORAGE TANKS FOR OPERATION.

This section identifies the preparatory actions to be completed by the user.

3.1 Special Tools and Equipment.

A. Innage gauge certified tape and bob.

B. Watercut paste (stored at each tank).

C. Sorbent.

D. Wood backed certified thermometer (stored at each tank).

E. Hand held radio.

F. H_2S meter.

G. Quart-sized sample bottle.

H. Sampling thief.

I. Gallon sized sample bottle.

3.2 **Field Preparations.** The following steps shall be performed before putting the crude oil storage tanks into service:

[1] Verify that the tank system is in general readiness. This shall include checking that no SPR Report of Repair tags are present, piping is properly configured, drain valves and personnel tank access ways are closed, and the grounding straps are in place. Consult the shift supervisor if SPR Report of Repair tags are present.

[2] Verify that the tank isolation MOVs (skin valves - "X" is particular tank number) TX201 have their breakers in their MCCs reset and the MOVs have been stroked in the last PM interval. (Refer to Appendix E.)

[3] Verify that the high-high (independent) level switches (LSHH-2026 through 2031 respectively) on the tank and their alarms are operational by performing a functional test as follows:

[a] Pull the chain that is connected to the high-high level switch until it clicks. The chain is located at the stair bottom on the northeast side at ground level.

[b] Verify that the alarm sounds in the control room.

[c] Release the chain.

NOTE

If the alarm does not function properly, a priority one work order shall be written. Operation can only continue with a waiver from the Operations Supervisor/Site Manager.

[4] Verify that all valves and switches are in the standby position, as shown in Appendix D.

[5] Verify that the DCS monitored devices for the storage tanks to be operated have current calibration stickers. Refer to Appendix B for specific tag numbers (ELNs).

1. Temperature.
2. Level.
3. Level switch high-high.

[6] Use the H_2S sniffer and verify that the roof area is safe to enter when entry onto the roof is required.

NOTE
Entry onto the roof requires a safe work permit and confined space entry permit.

3.3 **Approvals and Notifications.** All tank operations shall be in accordance with an approved fluid movement procedure.

4. CRUDE OIL STORAGE TANK RECEIPT PROCEDURE.

Oil for filling a tank may come from the docks, LOCAP, Weeks Island site, Bayou Choctaw site, or another tank. Receipt of crude oil into tanks requires tank gauging (Section 6), and tank sampling (Section 7). When the tanks are below the 8'-0" fill level, the roof is supported on legs and air from the roof vents fills the void. Between 8'-0" and 10'-0", the roof is partially supported by the legs and partially by the pontoons.

[1] Perform the crude oil storage tank opening procedure as follows:

[a] Verify that the receiving paperwork is complete.

[b] Gauge the tank(s). (See Section 6.)

[c] Verify that the oils are compatible or that the tank is empty.

[d] If the tank is over the 10'-0" level, start the mixers and run for a minimum of 10-1/2 hours.

[e] Shut down the mixers and immediately sample the tank(s). (See Section 7.)

[2] Open the tank MOV TX201 from the control room console by selecting the valve, pressing the COMMAND button, and then pressing the OPEN button.

[3] If the DCS did not open the tank MOV TX201, notify the shift supervisor. When directed, the field operator shall place the MOV selector switch to the LOCAL position and initiate the OPEN command.

[4] Verify from the control room and locally that the valve is opening.

[5] Verify that the MOV reaches the fully open position. If the MOV does not reach the fully open position in the DCS time interval, the DCS will cause an alarm.

[6] Receive at or below the rates shown in Appendix A, Sheet 1.

[7] Gauge the tank(s) at the interval shown in Appendix A, Sheet 1.

NOTE
Closing the tank may need to be coordinated with switching tanks if the tank to be closed is not the last tank in the fluid movement.

[8] Perform the crude oil storage tank closing procedure as follows:

[a] Close the tank MOV TX201 from the control room console by selecting the valve, pressing the COMMAND button, and then pressing the CLOSE button.

[b] If the DCS did not close the MOV, notify the shift supervisor. When directed, the field operator shall place the MOV selector switch to the LOCAL position and initiate the CLOSE command.

[c] Close all valves associated with the tank and check for leaks and abnormal conditions.

[d] Shut down the mixers and immediately sample the tanks.

NOTE
Ensure that the mixers have been run for a minimum of 10.5 hours, even if the actual movement of fluid does not require 10.5 hours.

[e] Allow the tank to settle for a minimum of two hours and then gauge the tank.

5. **CRUDE OIL STORAGE TANK SHIPMENT PROCEDURE.**

Crude oil from a tank may be sent to the docks, LOCAP, CAPLINE, Weeks Island site, Bayou Choctaw site, or another tank. Shipment from a tank requires tank gauging (Section 6), and tank sampling (Section 7). Normal low level for emptying is 10'-0". This is the shut down level for the mixers on level interlock and is the level that will not require reduced fill rates when refilling. At 8'-0" (7'-0" on T-3 and T-4) the roof will be fully supported by the legs. If the 10'-0" level is waived, the tanks may be brought down to the roof support levels. The mixers will stop at the 10'-0" level.

[1] Perform the crude oil storage tank opening procedure as follows:

[a] Verify that the shipment paperwork is complete.

[b] Gauge the tank. (See Section 6.)

[2] Open the tank MOV TX201 from the control room console by selecting the valve, pressing the COMMAND button and then the OPEN button.

[3] If the DCS did not open the MOV, notify the shift supervisor. When directed, the field operator shall place the MOV selector switch to the LOCAL position and initiate the OPEN command.

[4] Verify at the control room and locally that the valve is opening.

[5] Verify that the MOV reaches the fully open position. If the MOV does not reach the fully open position in the DCS time interval, the DCS will cause an alarm.

[6] Gauge the tank(s) at the intervals shown in Appendix A.

[7] When the tank reaches the 10'-0" level, verify that the mixers shut down on low level interlock.

[8] If shipment below the 10-0" level is required, use the stripping procedure. (See Section 8.)

[9] Perform the crude oil storage tank closing procedure as follows:

[a] Close the tank MOV TX201 from the control room console by selecting the valve, pressing the COMMAND button, and then pressing the CLOSE button.

[b] If the DCS did not close the MOV, notify the shift supervisor. When directed, the field operator shall place the MOV selector switch in the LOCAL position, and initiate the CLOSE command.

[c] Verify at the control room and locally that the valve is closing.

[d] Verify that the MOV reaches the fully closed position. If the MOV does not reach the fully closed position in the DCS time interval, the DCS will cause an alarm.

[e] Place all valves associated with the tanks in their standby position as shown in Appendix D and check for leaks and abnormal conditions.

[f] If the mixers did not shut down on low level, shut down the mixers and immediately sample the tanks. (See Section 7.)

NOTE

Ensure that the mixers have been run for a minimum of 10.5 hours even if the actual movement of fluid does not require 10.5 hours.

[g] Allow the tank(s) to settle for a minimum of two hours and then gauge the tank(s). (See Section 6.)

6. CRUDE OIL STORAGE TANK GAUGING PROCEDURES.

Hand tank gauging is performed at least once per week on each tank containing oil at St. James Terminal. An SPR inventory ticket shall be completed for each tank calculation (refer to Appendix C, Sheet 3). Weekly hand gauging, gauging as required by the receipt or shipment in Sections 4 or 5, and gauging required by the fluid movement shall be performed any time an oil movement is in progress.

WARNING

When working on top of a roof, entry is by safe work permit and shall utilize a fully functional H_2S meter at all times. Entry onto the roof is considered entering a confined space.

NOTE 1

Record all data in a field operator's log book. This book is kept in the control room and is checked in and out at the beginning and end of all gauging.

NOTE 2

Record all opening, operating, and closing data on a Calculation Sheet for Tanks (gauging ticket). (Refer Appendix C, Sheet 2.)

NOTE 3

Oil volumes can be calculated using strapping tables (use the current copy in the control room) and the Calculation Sheet for Tanks. (Refer to Appendix C, Sheet 2.)

[1] Turn on the H_2S monitor, if entry onto the roof is required. Normal gauging does not require entry onto the roof.

NOTE

Step **[2]** is required only for tank opening, closing, or static gauging.

[2] Close all valves on the tank to be gauged.

WARNING

Perform all gauging activities from the windward side of the tank hatch. This will minimize exposure of the operator to harmful vapors.

[3] Remove the vapor exclusion device.

[4] Apply water cut paste to the bottom 18" of the innage gauge tape and bob.

WARNING

Minimize static electricity buildup by placing the unmarked side of the tape against the metal rim when lowering the tape into the tank.

[5] Slowly lower the bob into the tank controlling the speed with the reel handle.

[a] Using the reference mark on the gauging hatch to determine the bob depth, stop the decent of the bob when it is 1'-0" from the datum plate for water cut and receipt rate measurements (ullage).

NOTE

This will compensate for any sediment that may have built up on the datum plate.

[b] Stop the decent of the bob when it just touches the datum plate for water cut and receiving measurements (innage). Do not allow the bob to lay over as this will cause an inaccurate gauge reading.

[6] Wait one minute and retrieve the bob. Record the oil, water, and reference level to the nearest 1/8 inch.

[7] With a clean rag, remove the water cut paste and oil from the gauge tape.

[8] Repeat steps [4] through [7] until at least two identical gaugings are recorded.

[9] Lower the wood backed thermometer into the tank. Use the following criteria to obtain temperatures.

[a] If the tank gauge reading is over 15'-0", obtain upper, middle, and lower third measurements.

[b] If the tank gauge reading is between 10'-0" and 15'-0", obtain upper and lower measurements.

[c] If the tank gauge reading is less than 10'-0", obtain a middle of oil height measurement.

[10] If the thermometer is a liquid bulb type, allow the thermometer five minutes to stabilize at the reading height. Digital thermometers will stabilize within 15 to 30 seconds.

[11] On tank heights that require two or three temperature readings, average the temperatures for the tank and record in the log book.

[12] Clean the thermometer and gauge with degreaser.

[13] Calculate the actual crude oil tank volume using the calculation sheet (refer to Appendix C, Sheet 2) form number SPRMO-F-6110.2-2A) and record on the SPR tank Inventory Ticket (refer to Appendix C, Sheet 3) form number SPRMO F6110-2-1.

7. **CRUDE OIL STORAGE TANK SAMPLING PROCEDURE.**

Tank sampling is accomplished using a thief sampler. The thief is a sample bottle with a stopper that is removable when the thief is in the tank. The "all level" sampling method is utilized. Tank sampling is usually performed before and after transfer of fluid into or out of a crude oil storage tank. Sampling is done through the tank gauging hatch.

WARNING

When working on top of a roof, entry is by safe work permit and shall utilize a fully functional H_2S meter at all times. Entry onto the roof is considered entering a confined space.

[1] Turn on the H_2S monitor if entry onto the roof is required. Normal sampling does not require entry onto the roof.

[2] Close all valves on the tank to be sampled.

[3] Stand to the upwind side of the opening.

[4] Remove the vapor exclusion device.

[5] Lower the clean sample thief with the stopper installed down to the level of the tank outlet.

[6] Pull out the stopper with a sharp jerk of the cord or chain.

[7] Immediately begin retrieving the thief at a rate that will allow the thief to fill to between one-half and five-sixths full as it is being retrieved.

NOTE

If the sample is not between one-half and five-sixths full, clean the thief, replace the stopper and repeat the sampling.

[8] Pour the sample into the sample container.

[9] Use a waterproof and oil-proof ink or a pencil with a lead hard enough to engrave the sample label. Include the following:

[a] Date and time.

[b] Name of person who took the sample.

[c] Tank number.

[d] Grade of material.

[e] Reference or identification number.

[f] Any other requirements or comments.

[10] After all samples have been obtained and labeled, prepare the crude oil sample custody form, and route the samples to the laboratory for processing.

[11] After all samples have been taken, clean and store the sampling equipment for future use.

[12] Complete the tank inventory ticket.

8. CRUDE OIL STORAGE TANK STRIPPING PROCEDURE.

The decision to strip a tank is made by the site management. A tank is stripped when it is to be emptied for maintenance or to prevent mixing different types of oil.

WARNING

At 8'-0" level the roof will be standing on its legs. Air will aspirate into the space through the roof vents. This air space may contain explosive vapors.

[1] Open the crude oil storage tank as follows:

[a] Gauge the tank. (Refer to Section 6.)

[b] Verify that the oil from the tank to be stripped is compatible with the tank or oil that will be receiving the stripped fluid.

[c] Sample the tank. (Refer to Section 7.)

[2] If stripping to another tank, record and sample the receiving tank.

NOTE

Stripping can be partially completed using the crude oil booster pumps. Operation with the crude oil booster pumps can be continued until it shuts down on low suction pressure. Site practice of jumpering the low suction pressure switch is not covered here. It is not a normal operating condition and must be covered under an IRMA. Stripping can be done completely or just the last fluid stripped using the stripping pump. If stripping with only a stripping pump, skip to step **[12]**.

[3] Select and prepare a crude oil booster pump according to work package 008 00. (SJT-4 or SJT-5 have their own control valves.)

[4] Open the tank MOV TX201 to the half open position by placing the MOV selector switch to the LOCAL position and initiate the OPEN command.

[5] When the valve reaches the one-half open position, push the local STOP button on the MOV station.

[6] Because the MOV will not reach the fully open position in the DCS time interval, the DCS will cause an alarm. Acknowledge the alarm.

[7] Open the manual 12" drain valve (TX206) fully on the tank to be emptied.

NOTE

The other piping and valves shall be configured according to the fluid movement procedure.

[8] Set the control valve designated in the fluid movement procedure to the minimum flow position.

[9] Start the crude oil booster pump according to work package 008 00.

[10] Monitor the tank level. When the tank level reaches 3'-6"", close the tank MOV TX201 by placing the MOV selector switch in the LOCAL position and initiating the CLOSE command.

[11] When the crude oil booster pump shuts down on low suction pressure, close the 12" tank drain valve (TX206).

[12] Prepare the tank stripping pump according to work package 012 00.

[13] Start the tank stripping pump according to work package 012 00.

CAUTION

Running a pump while it is cavitating will cause damage to the pump.

[14] Monitor the stripping pump. If an operator hears a pump cavitating, the operator shall shut the pump down according to work package 012 00. If an operator is not there, it will shut down on low flow, but may operate cavitating in a mixed flow condition temporarily.

[15] Wait 30 minutes and repeat steps **[13]** and **[14]**.

[16] When the pump is shut down again on low flow, close the tank by placing all valves associated with the tank in their standby positions as shown in Appendix D and check for leaks and abnormal conditions.

9. CRUDE OIL STORAGE TANK MIXER PROCEDURE.

There are three mixers on the larger tanks, T-1, -2, -5, and -6. There are two mixers on the smaller tanks, T-3 and T-4. They are Jensen side mounted vari-angle 35" propeller type mixers. They sweep left 30° and right 30°, completing a full sweep every 10-1/2 hours. They are driven (by 75 HP on the large tanks and 50 HP on the small tanks) Westinghouse motors through reduction gears for a shaft speed of 425 RPM. The mixers require a minimum of 10'-0" fluid level to prevent damage to the floating roof and seal. An automatic shut down of the mixers occurs at this 10'-0" level.

Each mixer is equipped with a mechanical sweep actuator which shows a position on an indicator. For best mixing performance they all should start in the same position and run together.

The mixers may be started and/or stopped either locally or from the control room. On the DCS the START/STOP command is given from a status sheet on the CRT. Locally the START/STOP command is given by pressing the local START/STOP pushbutton.

9.1 Tank Mixer Start Procedure.

[1] On the selected tank(s), verify that the fluid level is 10'-0" or more and the low level alarms and interlocks are cleared.

[2] Set the alignment of all the mixers' actuators on the selected tank to the same position.

[3[Remove the stop pin from the STOP position at the local switch.

[4] Verify that the MCC starter switch is in the ON position. (Refer to Appendix E.)

[5] Start the mixers as follows:

[a] For starting in the control room, on the computer status sheet, select the number of the mixer to be started, push the COMMAND button, and then enter a START command.

[b] For starting locally, press the START button on the local START/STOP pushbutton station.

[c] Acknowledge the alarm and correct the status to show RUNNING.

[d] Repeat step(s) **[a]** and/or **[b]** and **[c]** until all of the mixers on the selected tank are started.

[6] Record the start time of the mixers.

9.2 Performance Monitoring. The field operator shall perform the following operations on his normal rounds and report any discrepancies to the shift supervisor.

[1] Observe for excessive vibration.

[2] Observe for unusual noises.

[3] Observe for leaks around:

[a] The shaft.

[b] The spherical swing joint.

[4] Observe for overheating:

[a] At the shaft seal.

[b] At the spherical swing joint.

[c] Of the motor.

[5] Check tank level on the Varec and verify that level is still greater than 10'-0".

9.3 Tank Mixer Stop Procedure.

[1] Stop the mixers as follows:

[a] For stopping the mixers from the control room, on the computer status sheet, select the number of the mixer to be stopped, push the COMMAND button, and then enter a STOP command.

[b] For stopping locally, press the STOP button on the LOCAL START/STOP pushbutton station.

[c] Acknowledge the alarm and change the status to show STOPPED.

[d] Repeat step(s) **[a]** and/or **[b]** and **[c]** until all of the mixers are stopped.

NOTE
The mixers will stop on low level interlock if the level goes below 10'-0".

[2] Record the stop time of the mixers.

[3] Place the stop pin in the STOP switch at the local switch.

[4] If the mixer shutdown on low level, insert the stop pin in the STOP position and place a CAUTION tag on the lockout hole of the stop pin.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
CRUDE OIL STORAGE TANKS

MAXIMUM ALLOWABLE RECEIPT RATES (BPH)
(Sheet 1 of 2)

TANK LEVEL	1	2	3	4	5	6
0' to 7'-0"	20,000	20,000	20,000	20,000	20,000	20,000
7'-0" to 8'-6"	10,000	10,000	10,000	10,000	10,000	10,000
8'-6" to 10'-0"	20,000	20,000	20,000	20,000	20,000	20,000
10'-0" to 29'-0"	(**a**) (**c**)	(below)	(below)	(below)	(below)	(**c**) (**b**)
10'-0" to 30'-0"	(above)	(**c**)	(**c**)	(**c**)	(**c**)	(above)

MAXIMUM ALLOWABLE TANK GAUGING INTERVAL

Receipt

Tank	Level	Interval
1	8'-0" to 27'-0"	1 hour
1	27'-0" to 29'-0" (Full)	6 minutes
2	8'-0" to 28'-0"	1 hour
2	28'-0" to 30'0" (Full)	6 minutes
3	8'-0" to 26'-0"	1 hour
3	26'-0" to 30'-0" (Full)	6 minutes
4	8'-0" to 26'-0"	1 hour
4	26'-0" to 30'-0" (Full)	6 minutes
5	8'-0" to 28'-0"	1 hour
5	28'-0" to 30'-0" (Full)	6 minutes
6	8'-0" to 27'-0"	1 hour
6	27'-0" to 29'-0" (Full)	6 minutes

Shipment

Tank	Level	Interval
1	29'-0" to 12'0"	1 hour
1	Less than 12'-0"	6 minutes
2	30'-0" to 12'-0"	1 hour
2	Less than 12'-0"	6 minutes
3	30'-0" to 12'-0"	1 hour
3	Less than 12'-0"	6 minutes
4	30'-0" to 12'-0"	1 hour
4	Less than 12'-0"	6 minutes
5	30'-0" to 12'-0"	1 hour
5	Less than 12'-0"	6 minutes
6	29'-0" to 12'0"	1 hour
6	Less than 12'-0"	6 minutes

a. One foot is maintained for surge relief in T-1.
b. T-6 full level of 29'-0" due to settlement differential.
c. Use rate in fluid movement procedure.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
CRUDE OIL STORAGE TANKS
(Sheet 2)

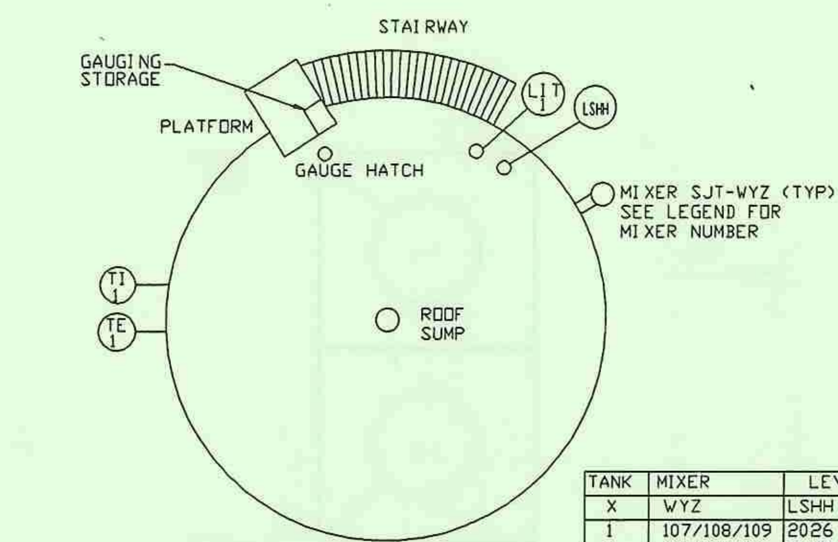
Support Equipment List

The following support equipment shall be operational if required for the fluid movement before the tanks are used in a fluid movement.

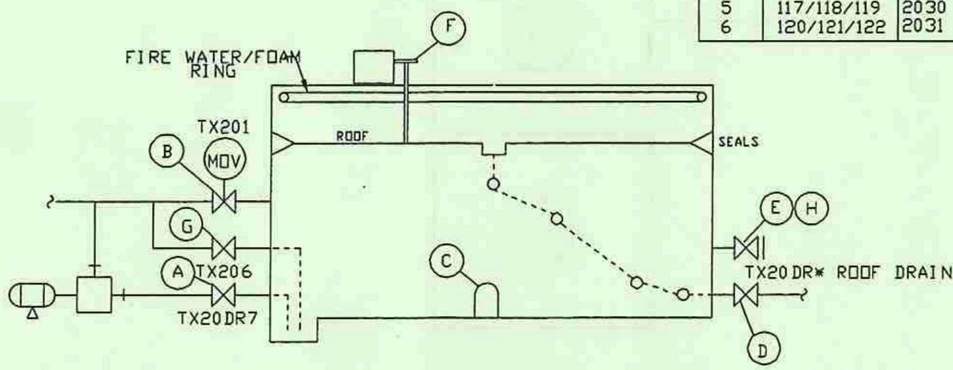
Oil Movement	Tank Gauging
a. Crude oil booster pumps b. Pig traps c. Surge relief valves	a. Gauge tape and bob b. Water cut paste c. Sorbent d. Wood back thermometer e. H2S meter f. Tank field book g. Radio (hand held)

APPENDIX B

SCHEMATIC DIAGRAM
CRUDE OIL STORAGE TANK
(Sheet 1 of 3)



TANK	MIXER	LEVEL		TEMPERATURE	
X	WYZ	LSHH	LIT	TI	TE
1	107/108/109	2026	1(T1)	1(T1)	1(T1)
2	110/111/112	2027	1(T2)	1(T2)	1(T2)
3	113/114	2028	1(T3)	1(T3)	1(T3)
4	115/116	2029	1(T4)	1(T4)	1(T4)
5	117/118/119	2030	1(T5)	1(T5)	1(T5)
6	120/121/122	2031	1(T6)	1(T6)	1(T6)



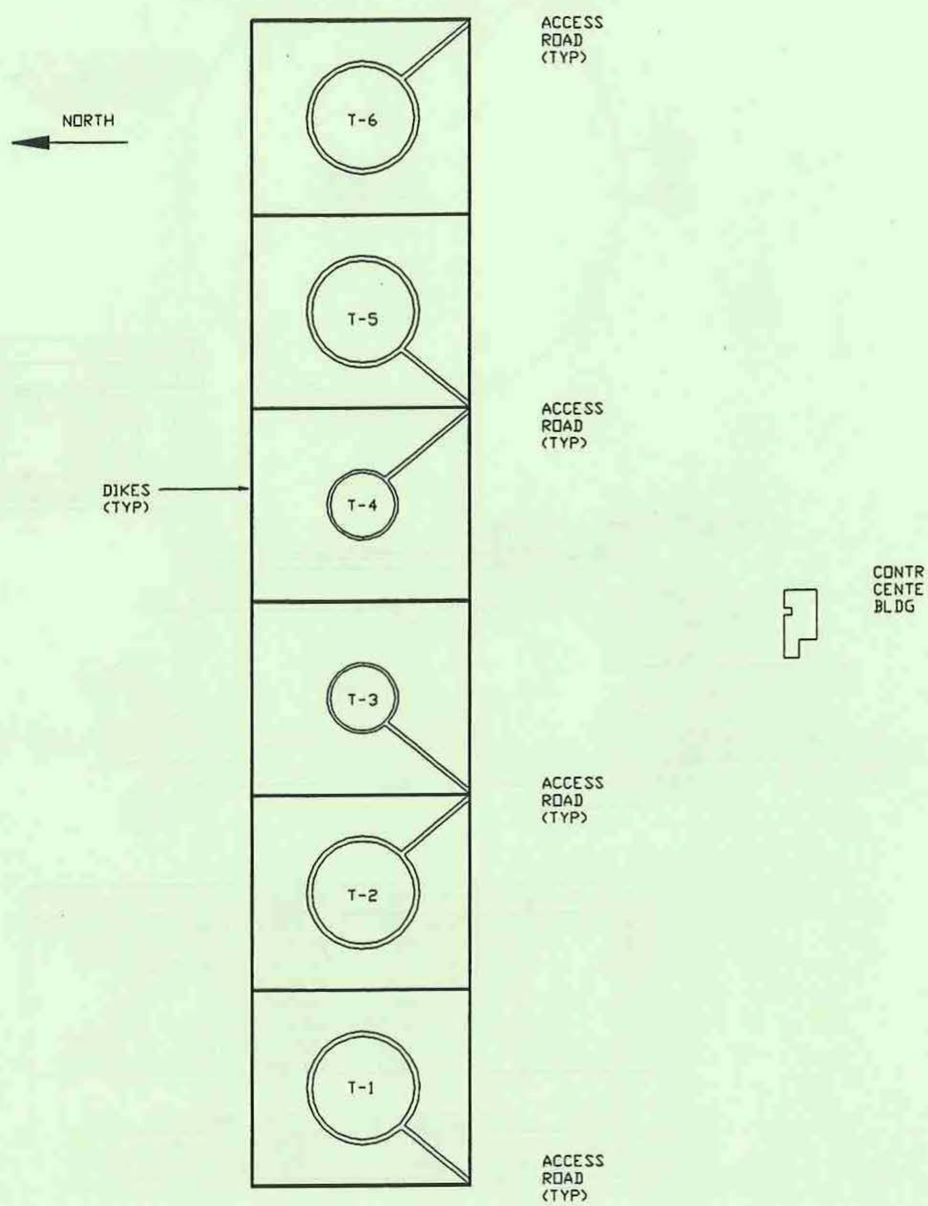
NOZZLE	SIZE	RATING	DESCRIPTION	ELN
A	4″	150# ANSI	STRIPPER PUMP	TX20DR7
B	36″	150# MSS	MAIN IN/OUTLET	TX201
C 1-2	24″	API	CLEAN OUT ACCESS	N. A.
D	8″	150# ANSI	ROOF DRAIN	*
E 1-4	4″	150# ANSI	DRAINS	*
F	8″	SCH 40 PIPE	GAUGE HATCH	N. A.
G	12″	150# ANSI	DRAIN SUCTION	TX206
H 1-2	2″	150# ANSI	DRAINS	N. A.

* TANK	ROOF DRAIN	TANK DRAIN
T1, T2	TX20DR3	TX20DR1, 2, 4, 5, 6
T3, T4, T5, T6	TX20DR4	TX20DR1, 2, 3, 4, 5, 6

APPENDIX B

SCHEMATIC DIAGRAM
CRUDE OIL STORAGE TANKS

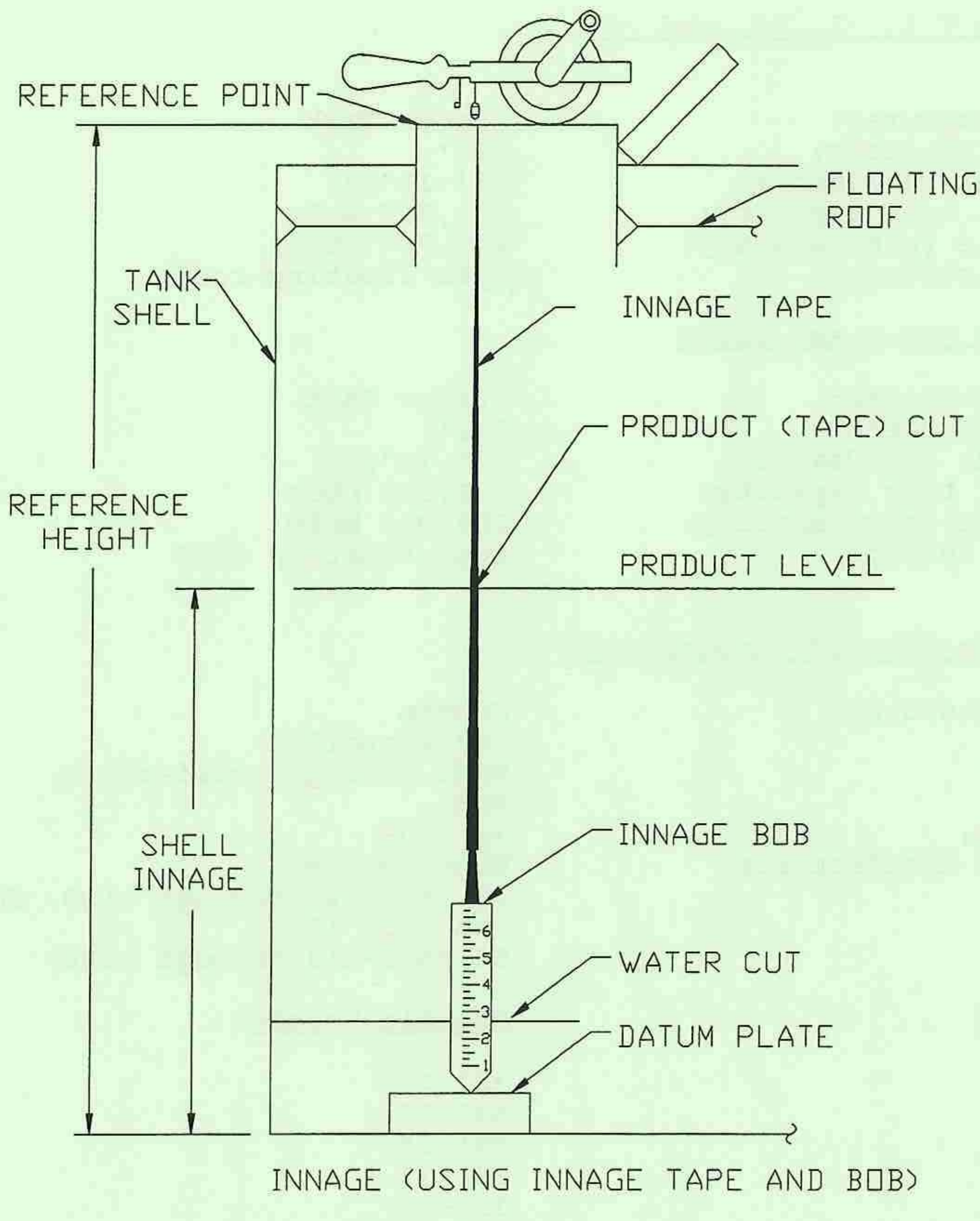
LAYOUT
(Sheet 2)



APPENDIX B

SCHEMATIC DIAGRAM
CRUDE OIL STORAGE TANKS

INNAGE GAUGE AND BOB
(Sheet 3)



INNAGE (USING INNAGE TAPE AND BOB)

APPENDIX C

TECHNICAL DATA
CRUDE OIL STORAGE TANKS
(Sheet 1 of 3)

Tanks T-1, -2, -5, and -6

Manufacturer:	Graver Tank
Mean Diameter:	300'
Height Max/Usable	36'-10"/*
Total tank capacity:	463,720 bbls
Usable tank capacity:	418,707 bbls
Roof system:	Open floating roof

Tanks SJT-3 and SJT-4

Manufacturer:	Graver Tank
Mean Diameter:	212'
Height Max/Usable	36'-10"/*
Total tank capacity:	231,571 bbls
Usable tank capacity:	209,084 bbls
Roof system:	Open floating roof

Mixers SJT-107 through -122

Manufacturer:	Jensen
Size:	35" Propeller
Type:	Side entering vari-angle
RPM:	425
Sweep:	+/- 30^{o}
Motor Manufacturer:	Westinghouse
HP	75 (SJT-107 through -112, SJT-117 through 122) 50 (SJT-113 through -116)

*Tank	Useable Height
T-1	32'-11"
T-2	33'-3"
T-3	33'-3"
T-4	33'-3"
T-5	33'-3"
T-6	33'-3/4"

APPENDIX C

TECHNICAL DATA
CRUDE OIL STORAGE TANKS
(Sheet 2)

SPR CALCULATION WORKSHEET FOR TANK** ☐ RECEIPTS ☐ SHIPMENTS ** CHECK (✓) APPROPRIATE BOX	TERMINAL/SITE NAME AND ADDRESS:
	TANK NUMBER
	SUPPORT FOR DD250 SERIES DOCUMENT NUMBER: (IF APPLICABLE)
NAME OF VESSEL, PIPELINE OR CAVERN NUMBERS:	

OPENING CALCULATION	CLOSING CALCULATION
1. DATE / 1A. TIME	12. DATE / 12A. TIME
2. API / 2A. BS&W % / 2B. TEMPERATURE °	13. API / 13A. BS&W % / 13B. TEMPERATURE °
3. GAUGE FT. IN. = BBLS.	14. GAUGE FT. IN. = BBLS.
4. WATER CUT* FT. IN. = BBLS.	15. WATER CUT* FT. IN. = BBLS.
5. ROOF CORRECTION (OBSERVED GRAVITY ______) BBLS.	16. ROOF CORRECTION (OBSERVED GRAVITY ______) BBLS.
6. GROSS @ AMBIENT OPENING BBLS.	17. GROSS @ AMBIENT CLOSING BBLS.
7. TEMPERATURE (°F) / 7A. FACTOR	18. TEMPERATURE (°F) / 18A. FACTOR
8. GROSS @ 60° OPENING BBLS.	19. GROSS @ 60° CLOSING BBLS.
9. LESS OPENING BS&W* ( ) BBLS.	20. LESS CLOSING BS&W* ( ) BBLS.
10. OPENING NET @ 60°* BBLS.	21. CLOSING NET @ 60°* BBLS.
11. GROSS @ 60° RECEIVED/SHIPPED (DIFFERENCE BETWEEN ITEMS 8 & 19) BBLS.	22. NET @ 60° RECEIVED/SHIPPED* (DIFFERENCE BETWEEN ITEMS 10 & 21) BBLS.
TANK SETTLING TIME WAS: ______ HOURS; OR CHECK (✓) ☐ MORE THAN 24 HOURS	TANK SETTLING TIME: HOURS
REMARKS	REMARKS * When an in-line sampler is used, omit steps 4, 9, 10 & 15, 20 thru 22 and use the following: GROSS @ 60° RECEIVED/SHIPPED (NO. 11): ______ BBLS. LESS LINE SAMPLER BS&W ______%: ( )BBLS. NET @ 60° RECEIVED/SHIPPED: ______ BBLS.
SIGNATURES FOR OPENING CALCULATIONS	SIGNATURES FOR CLOSING CALCULATIONS
TERMINAL/CONTRACTOR'S REPRESENTATIVE	TERMINAL/CONTRACTOR'S REPRESENTATIVE
WITNESS	WITNESS

SPRPMO-F-6110.2-2A (REV. 11/82) (REPLACES SPRPMO-F-6110.2-2 AND 6110.2-3 8/81)

APPENDIX C

TECHNICAL DATA
CRUDE OIL STORAGE TANKS
(Sheet 3)

SPR
TANK INVENTORY TICKET

LOCATION

MEASUREMENTS AND CALCULATIONS

TANK NO.		MONTH-END INVENTORY
		OTHER (SEE REMARKS)
DATE	TIME	
API @ 60°F	BS&W	SULPHUR %

GAUGE FT. IN.= BBLS.

WATER FT. IN.= BBLS.

ROOF CORRECTION
OBSERVED API GRAVITY ( ) BBLS.

GROSS @ AMBIENT BBLS.

TEMPERATURE	TEMPERATURE FACTOR

GROSS @ 60°F BBLS.

LESS BS&W BBLS.

NET @ 60°F BBLS.

TANK SETTING TIME HOURS

REMARKS

SIGNATURES

TERMINAL/CONTRACTOR'S REPRESENTATIVE

WITNESS

SPRPMO F6110.2-1 8/81 (Revised 11/92)

APPENDIX D

STANDBY VALVE AND SWITCH POSITIONS
CRUDE OIL STORAGE TANKS

	ITEM	POSITION
1.	MCC selector switch mixers	ON
2.	Local START/STOP mixer switch	STOP
3.	Local START/STOP mixer switch	Stop pin inserted
4.	TX201 MOV MCC starter	ON
5.	TX201 MOV selector switch	REMOTE
6.	TX201 MOV	Closed
7.	Roof drain valve TX20DR[1]	Open
8.	Tank drain valves TX20DR1, 2, 5, 6	Closed and Blinded
9.	Stripper pump suction valve TX20DR7	Closed
10.	Sump suction valve TX206	Closed[2]
11.	Entrained fluid valves T120F, (T220F)[3]	Open

1

Tank	Roof Drain Tank	Tank Drain
T-1	3	4
T-2	3	4
T-3	4	3
T-4	4	3
T-5	4	3
T-6	4	3

2 T-1 valve T1206 remains open for surge and thermal relief.

3 Only one of T120F or T220F is open depending on which tank is the designated sump receiving tank.

APPENDIX E
CRUDE OIL STORAGE TANKS

MCC TABLE

TANK	MIXER	MCC	MOV	MCC
T-1	SJT-107 SJT-108 SJT-109	MCC-4 MCC-4 MCC-4	T120-1	MCC-4E
T-2	SJT-110 SJT-111 SJT-112	MCC-4 MCC-4 MCC-4	T220-1	MCC-4E
T-3	SJT-113 SJT-114	MCC-1B MCC-1B	T320-1	MCC-2
T-4	SJT-115 SJT-116	MCC-1B MCC-1B	T420-1	MCC-2
T-5	SJT-117 SJT-118 SJT-119	MCC-5A MCC-5 MCC-5	T520-1	MCC-5E
T-6	SJT-120 SJT-121 SJT-122	MCC-5A MCC-5 MCC-5	T620-1	MCC-5E

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

OIL COLLECTION SYSTEM

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

OIL COLLECTION SYSTEM

List of Effective Work Package Pages

Page No.	Chg. No.	Page No.	Chg. No.	Page No.	Chg. No.
1 thru 22	0				

Record of Applicable Technical Directives

None

WARNING

Crude oil is a flammable liquid. The vapors given off by crude oil are far more susceptible to ignition than the crude oil liquid. "Gassy" crude oil with a vapor pressure of >14.7 psia has a significantly increased vapor flash risk (and, therefore, ignition risk) during depressurization. Crude oil contains petroleum hydrocarbons which may cause eye, skin, and lung irritation. Crude oil may contain significant quantities of hydrogen sulfide which is irritating to the eyes, skin, and lungs at low concentrations. At higher hydrogen sulfide concentrations, loss of ability to smell, respiratory paralysis or death may occur. Crude oil also contains benzene, a known carcinogen.

TABLE OF CONTENTS

1. INTRODUCTION.

The oil collection system collects, separates, and distributes fluids from minor oil spills and piping drains. All major collection equipment is piped to a closed oil sump oil system. This system consists of collection and distribution piping, tanks, and pumps. The collected oil is pumped into tank T-1 or T-2.

The pig launcher/receiver oil collection system (see Section 4) includes a below-the-ground sump T-10 and a vertical sump pump SJT-22. The sump collects oil or water drained from the pig launchers/receivers BCSTLR-2 and WISTLR-2, plus storm drainage from the pig launcher and inhibitor tank containment areas. The fluids are pumped from sump into tank T-1 or T-2.

The meter prover oil collection system (see Section 5) includes two identical sumps T-7 and T-8 each with a vertical pump SJT-19 and -20. Sump T-7 collects oil from the Weeks Island and Bayou Choctaw metering/prover station drains and the thermal relief valves from the accelerated fill pumps SJT-6, -7, and -8. Sump T-8 collects oil from the QA labs, the oil booster pump station drains, and the thermal relief valves from the oil booster pumps, SJT-1, -2, -3. -4. and -5. Fluids collected are pumped into tank T-1 or T-2.

The dock oil collection system (see Section 6) includes below-the-deck metal sumps T-202 (Dock #1) and T-201 (Dock #2) and vertical cantilevered centrifugal lift pumps SJTP-10 (Dock #1) and SJTP-12 (Dock #2). Both sumps collect liquids from the dock surface as well as oil drained from the 16" headers. The fluids are pumped from each sump (T-202 and T-201) to the oil stop valve SJT-V1, located on the main site (afterwards to either SJT-SEP1 or SJT-S3). The fire water platform adjacent to Dock #1 incorporates a below-the-deck metal sump SJT-703 and a submersible sump pump SJTP-14. The contents of this sump are pumped to the Dock #1 sump T-202.

The terminal collection system (see Section 7) includes a below-the-ground sump SJT-S3 and lift pumps SJTP-16A and -16B. This sump receives oil from the oil stop valve SJT-V1 and separator SJT-SEP1. The lift pumps transfer the oil into tank T-1 or T-2.

The table in Appendix A describes the equipment's operating and safety envelope. Appendix B shows typical schematic diagrams of the systems. Appendix C contains technical information on the systems.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the oil collection system under normal conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following:

A. Pig Launcher/Receiver Oil Collection System (Section 4.)

B. Meter Prover Oil Collection System (Section 5.)

C. Dock Oil Collection System (Section 6.)

D. Terminal Oil Collection System (Section 7.)

1.3 **Applicability.** This procedure applies under normal operating conditions. Under these conditions, there are two authorized operating modes, LOCAL MANUAL and LOCAL AUTOMATIC.

1.4. **Reference Documents.**

A. Piping and Instrumentation Diagrams, Pig Launcher/Receiver WI & BC, drawing no. SJ-M-103-018.

B. Piping and Instrumentation Diagrams, BC & WI Meter Prover, drawing no. SJ-M-103-021.

C. Piping and Instrumentation Diagrams, Crude Oil Loading/Unloading Dock No. 1, drawing no. SJ-M-103-026.

D. Piping and Instrumentation Diagrams, Crude Oil Loading/Unloading Dock No. 2, drawing no. SJ-M-103-027.

E. Piping and Instrumentation Diagram, Waste Water Treatment, drawing no. SJ-M-103-032.

F. Piping and Instrumentation Diagrams, Firewater Pumps SJTP-1 through -5 Pump Platform - Dock 1, drawing no. SJ-FP-103-048.

2. PRECAUTIONS AND LIMITATIONS.

The following precautions and limitations apply to the operation of the oil collection system.

A. The minimum and maximum safety envelope parameters in Appendix A shall be observed at all times.

B. Safety devices, including the pump coupling guards, shall be in place and operational.

3. **PREREQUISITE ACTIONS FOR PREPARING THE OIL COLLECTION SYSTEM PUMPS FOR OPERATION.**

The following steps shall be performed before starting the oil collection pumps:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present, piping is properly configured with vent valves closed, and motor grounding straps are in place.

[2] Verify at least every 6 months that the local (non-DCS) instrumentation at the pumps to be operated have current calibration stickers. Refer to Appendix B for specific tag numbers (ELNs).

[a] Level switch.

[b] Discharge pressure indicator.

4. **PIG LAUNCHER/RECEIVER OIL COLLECTION SYSTEM.**

This section provides instructions for operating the pig launcher oil collection system.

4.1 **Pig Launcher/Receiver Oil Collection System- Summary.** The pig launcher/receiver oil collection system includes a below the ground sump T-10. A vertical sump pump SJT-22 is used to transfer fluids into tank T-1 or T-2.

NOTE

The pump starts when the liquid level is at 2'-4" from the bottom of the sump tank. The pump stops when the liquid level is at 1'-8". When the pump starts at 2'-4", the high-level alarm is set off in the control room. Whenever this alarm is set off, notify the shift operator. (Refer to Appendix E.)

4.2 **Pig Launcher/Receiver Oil Collection System - Pump Start/Stop Procedure.** Perform the following steps to manually start and stop pump SJT-22.

[1] Move the pump RUN/OFF switch to the OFF position.

[2] Verify that the MCC-3E Compartment 2FD breaker is in the ON position and move the HOA switch to the "H" position. (Refer to Electrical Operations Manual, work package 020 00.)

[3] Verify that the pump discharge valves are in the full open position.

[4] Move the pump RUN/OFF switch to the RUN position

[5] Verify that the pump starts.

CAUTION

The pump will run continuously, until stopped manually.

[6] Verify that the pump stops after moving the pump RUN/OFF switch to the OFF position.

4.3 **Pump SJT-22 Emergency Stop Procedures.** The following subsections address the emergency stopping of the pump if the pump RUN/OFF switch fails to stop the pump.

[1] The field operator shall notify the control room operator that an emergency stop is necessary.

[2] The operations shift supervisor or the operations shift supervisor's designee shall go to MCC-3E and turn the HOA switch and breaker to the OFF positions.

[3] Verify that the motor stops.

4.4 **Pump SJT-22 Post Operation Activities.** When the pig launcher/receiver oil collection system is to be used for normal service, set all valves and switches to the standby positions shown in Appendix D.

5. **METER PROVER OIL COLLECTION SYSTEM.**

This subsection provides instructions for operating the meter prover oil collection system.

5.1. **Meter Prover Oil Collection System - Summary.** The meter prover oil collection system includes two identical sumps T-7 and T-8 each with a vertical pump, SJT-19 and -20. Both pumps discharge into tank T-1 or T-2.

5.2 **Meter Prover Oil Collection System - Pump Start/Stop Procedure.** Perform the following steps to manually start and stop the pumps SJT-19 and -20.

[1] Move the pump RUN/OFF switch to the OFF position.

[2] At MCC-4E for pump SJT-19 or MCC-1B for SJT-20, verify that the breaker is in the ON position and move the HOA switch to the "H" position. (Refer to Appendix E.)

[3] Verify that the pump discharge valves are the full open position.

[4] Move the pump RUN/OFF switch to the RUN position.

[5] Verify that the pump starts.

CAUTION

The pump will run continuously, until stopped manually.

[6] Verify that the pump stops after moving the pump RUN/OFF switch to the OFF position.

5.3 **Pump SJT-19 and -20 Emergency Stop Procedures.** The following subsections address the emergency stopping of the pump if the pump RUN/OFF switch fails to stop the pump.

[1] The field operator shall notify the control room operator that an emergency stop is necessary.

[2] The operations shift supervisor or the operations shift supervisor's designee shall go to either MCC-E or MCC-1B and turn the HOA switch and breaker to the OFF position.

[3] Verify that the motor stops.

5.4 **Pump SJT-19 and -20 Post Operation Activities.** When the meter prover oil collection system is to be for normal service, set all valves and switches to the standby positions shown in Appendix D.

6. DOCK OIL COLLECTION SYSTEM.

This subsection provides instructions for operating the dock oil collection system.

6.1 **Dock Oil Collection System - Summary.** The dock oil collection system includes below the deck metal sumps, T-202 (Dock #1) and T-201 (Dock #2), and vertical cantilevered centrifugal lift pumps, SJTP-10 (Dock #1) and SJTP-12 (Dock #2). The fluids are pumped from each sump (T-202 and T-201) to the oil stop valve SJT-V1. The fire water platform adjacent to Dock #1 incorporates a below the deck metal sump, SJT-703, and a submersible sump pump SJTP-14. The contents of this sump are pumped to the Dock #1 sump T-202.

6.2 **Dock Oil Collection System - Pump Start/Stop Procedure.** Perform the following steps to manually start and stop the pumps SJTP-10, -12, and -14.

[1] At the MCC-D1 for SJTP-10 and -14 or MCC-D2 for STJP-12, verify that the breaker is in the ON position. (Refer to Appendix E.)

[2] Open the pump discharge valves to the full open position.

[3] Move the pump HOA switch to the "H" position.

[4] Verify that the pump starts.

CAUTION

The pump will run continuously, until stopped manually.

[5] Verify that the pump stops after moving the pump HOA switch to the OFF position.

6.3 **Pump SJTP-10, SJTP-12, and SJTP-14 Emergency Stop Procedures.** The following subsections address the emergency stopping of the pump if the pump HOA switch fails to stop the pump.

[1] The field operator shall notify the control room operator that an emergency stop is necessary.

[2] The operations shift supervisor or the operations shift supervisor's designee shall go to either MCC-D1 or MCC-D2 and turn the breaker to the OFF position.

[3] Verify that the pump motor stops.

6.4 **Pump SJTP-10, SJTP-12, and SJTP-14 Post Operation Activities.** When the meter prover oil collection system is to be for normal service, set all valves and switches to the positions shown in Appendix D.

7. **TERMINAL OIL COLLECTION SYSTEM.**

This subsection provides instructions for operating the terminal oil collection system.

7.1 **Terminal Oil Collection System - Summary.** The terminal oil collection system includes a below-the-ground sump, SJT-S3 and lift pumps, SJTP-16A and -16B. The lift pumps transfer the oil from the sump SJT-S3 into tank T-1 or T-2.

7.2 Terminal Collection System - Pump Start/Stop Procedure. Perform the following steps to manually start and stop the pumps SJTP-16A and -16B.

[1] Verify that the MCC-6 Compartment 4FB breaker is in the ON position and that the HOA is in the "A" position. (Refer to Appendix E.)

[2] Verify that the pump discharge valves are the full open position.

[3] Verify that the pump ON/OFF switch is in the ON position and move the HOA switch to the "H" position.

[4] Verify that the pump starts.

CAUTION

The pump will run continuously, until stopped manually.

[5] Verify that the pump stops after moving the pump HOA switch to the "O" position.

7.3 Pump SJTP-16A and SJTP-16B Emergency Stop Procedures. The following subsections address the emergency stopping of the pump if the pump ON/OFF switch and the HOA switch fails to stop the pump.

[1] The field operator shall notify the control room operator that an emergency stop is necessary.

[2] The operations shift supervisor or the operations shift supervisor's designee shall go to MCC-6 and turn the breaker switches to the OFF position.

[3] Verify that the pump motor stops.

7.4 Pump SJT-16A and SJTP-16B Post Operation Activities. When the terminal oil collection system is to be used for normal service, set all valves and switches to the positions shown in Appendix D.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
OIL COLLECTION SYSTEM

		SAFETY ENVELOPE			
			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
SJTP-10 & T-202 (Section 6)					
Pump discharge pressure	psig	a	21.0	23.0	a
Sump level	ft/in	a	3'-0"[b]	6'-0"	a
SJTP-12 & T-201 (Section 6)					
Pump discharge pressure	psig	a	21.0	23.0	a
Sump level	ft/in	a	3'-0"[b]	6'-0"	a
SJTP-14 & SJTP-703 (Section 6)					
Pump discharge pressure	psig	a	11.0	13.0	a
Sump level	ft/in	a	2'-0"[b]	5'-0"	a
SJTP-16A, -16B, and SJT-S3 (Section 7)					
Pump discharge pressure	psig	a	42.0	44.0	a
Sump level	ft/in	a	1'-4"[b]	1'-10"	2'-2"[c]
SJTP-19, and -20, T-7 and T-8 (Section 5)					
Pump discharge pressure	psig	a	23.0	25.0	a
Sump level	ft/in	a	1'-4"[b]	2'-4"[d]	a
SJT-22 and T-10 (Section 4)					
Pump discharge pressure	psig	a	23.0	25.0	a
Sump level	ft/in	a	1'-8"[b]	2'-4"[d]	a

a These values have no defined limits.
b This is a pump shutdown level.
c These high-high values cause an alarm signal in the control room, at the CRT screen.
d These values cause an alarm signal in the control room, both at the annunciator panel and the CRT screen.

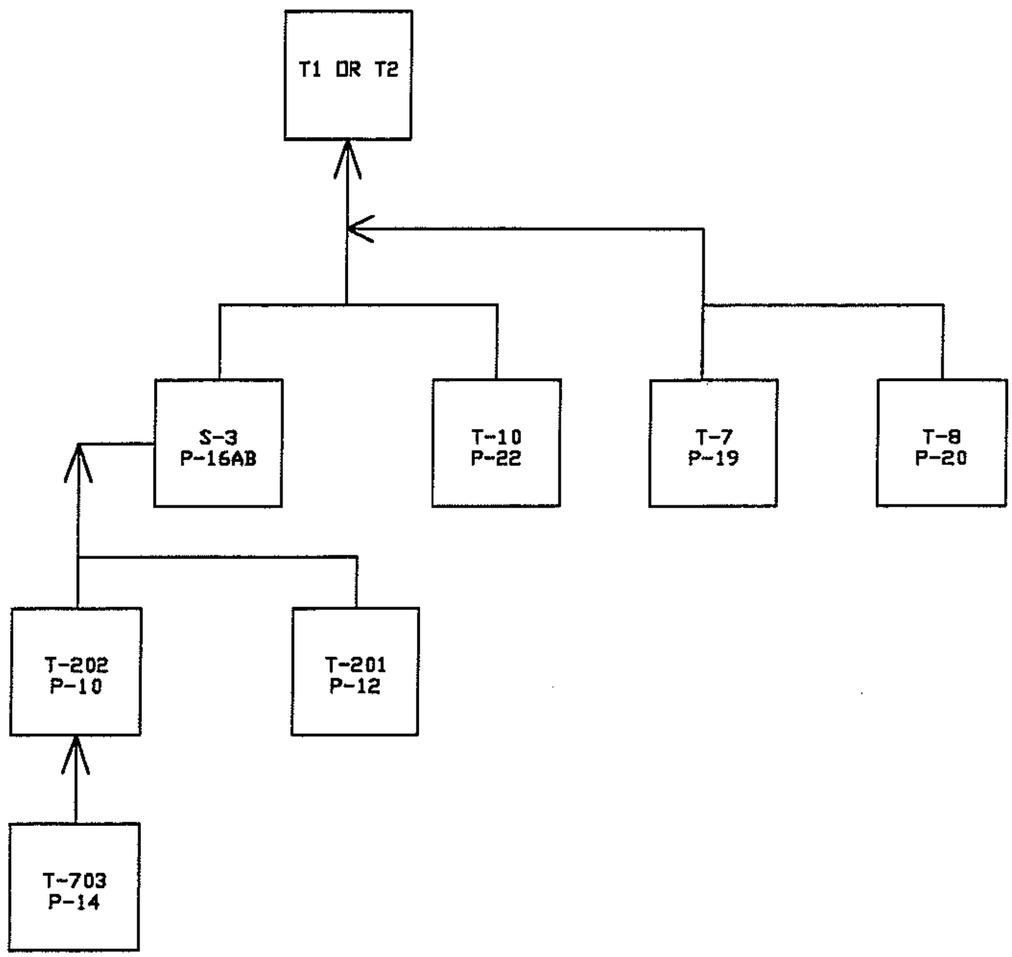
Support Equipment:

A. Terminal sump pumps SJTP-16A and -16B.
B. Slop oil sump pump SJTP-10 and sump tank T-202 (required for firewater slop pump SJTP-14 and sump tank T).

APPENDIX B

SCHEMATIC DIAGRAM
OIL COLLECTION SYSTEM

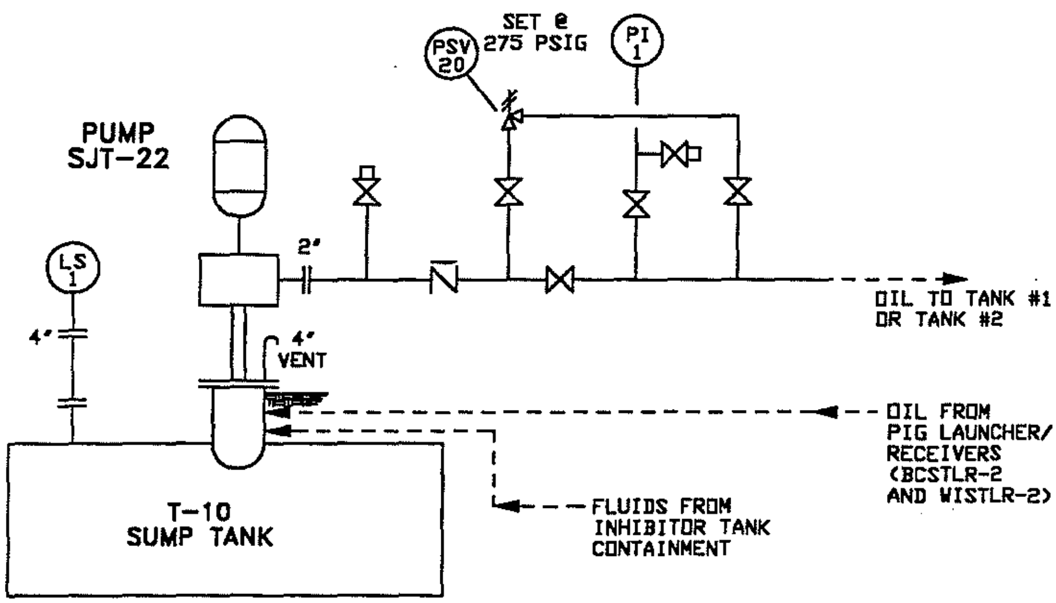
DISCHARGE BLOCK DIAGRAM
(Sheet 1 of 6)



APPENDIX B

SCHEMATIC DIAGRAM
OIL COLLECTION SYSTEM

PIG LAUNCHER/RECEIVER OIL COLLECTION SYSTEM
(Sheet 2)



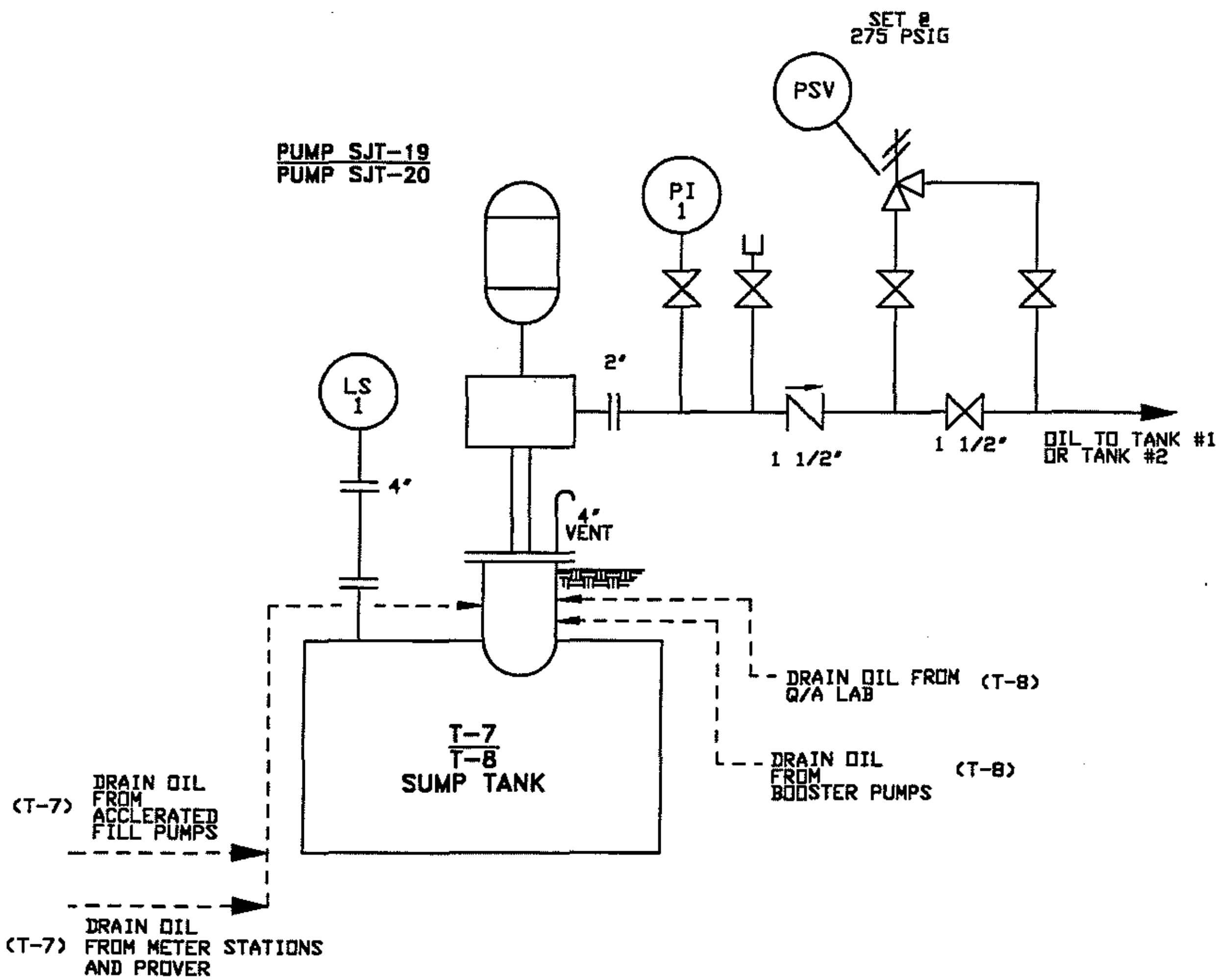
LEGEND:

ITEM	DESCRIPTION
LS-1	LEVEL SWITCH
PI-1	PRESSURE INDICATOR
PSV-20	PRESSURE SAFETY VALVE

APPENDIX B

SCHEMATIC DIAGRAM
OIL COLLECTION SYSTEM

METER PROVER OIL COLLECTION SYSTEM
(Sheet 3)



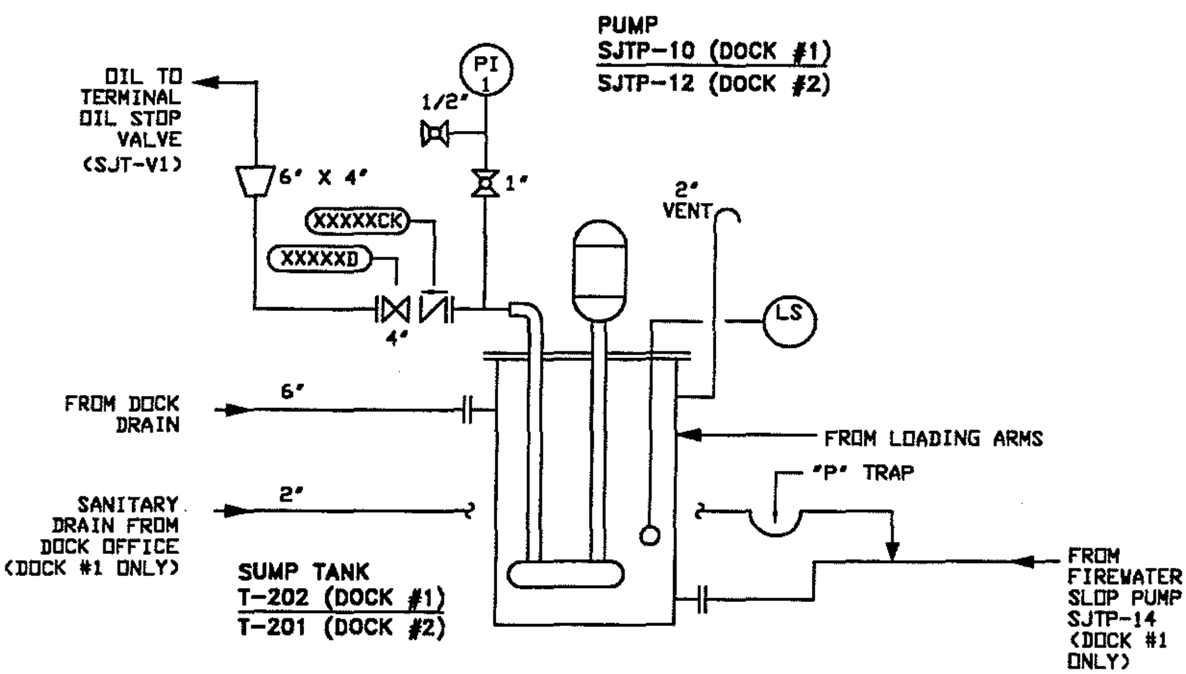
LEGEND:

ITEM	DESCRIPTION
LS-1	LEVEL SWITCH
PI-1	PRESSURE INDICATOR
PSV-20	PRESSURE SAFETY VALVE (T-7)
PSV-820	PRESSURE SAFETY VALVE (T-8)

APPENDIX B

SCHEMATIC DIAGRAM
OIL COLLECTION SYSTEM

DOCK OIL COLLECTION SYSTEM
(Sheet 4)



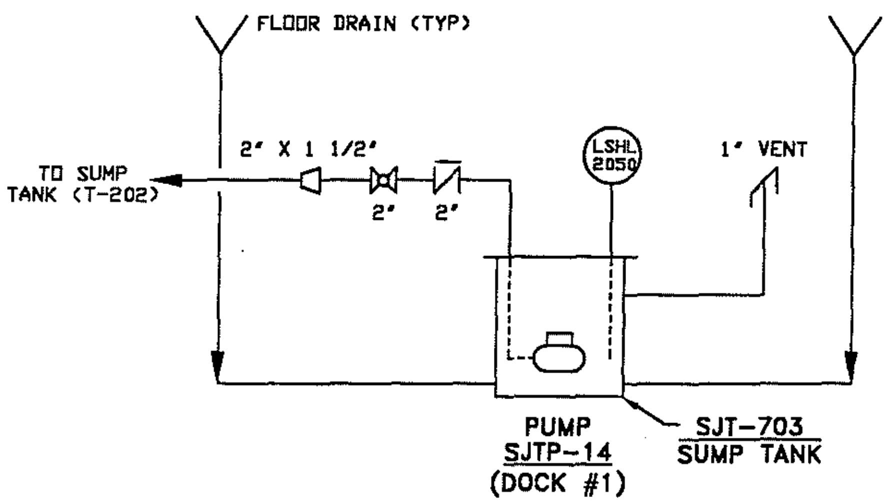
LEGEND:

ITEM	DESCRIPTION
P1020CK	CHECK VALVE (DOCK#1)
P1020D	GATE VALVE (DOCK#1)
P1220CK	CHECK VALVE (DOCK#2)
P1220D	GATE VALVE (DOCK#2)
LS-101	LEVEL SWITCH (DOCK #1)
LS-201	LEVEL SWITCH (DOCK #2)
PI-1	PRESSURE INDICATOR

APPENDIX B

SCHEMATIC DIAGRAM
OIL COLLECTION SYSTEM

DOCK OIL COLLECTION SYSTEM
(Sheet 5)



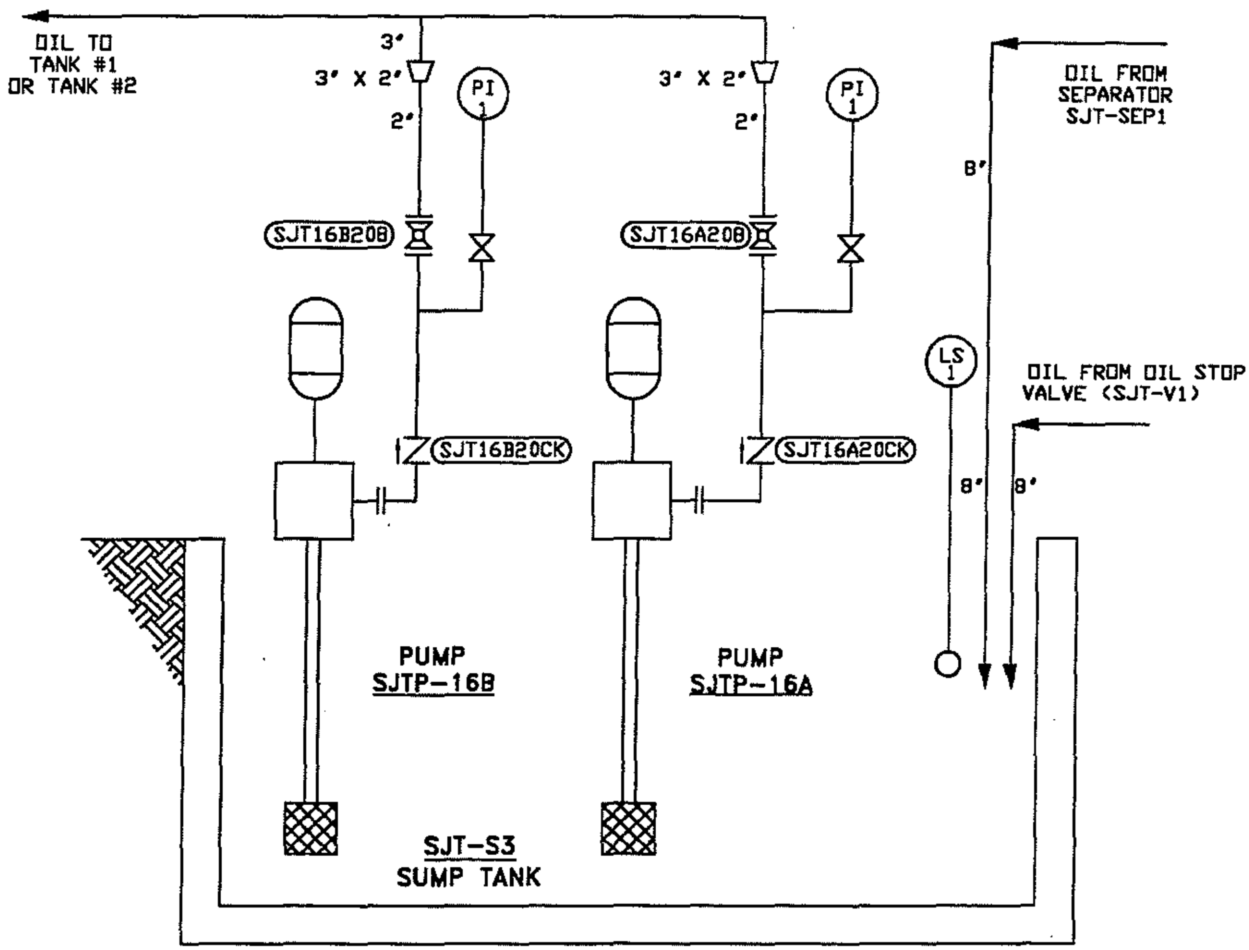
LEGEND:

ITEM	DESCRIPTION
LSHL 2050	LEVEL SWITCH HIGH-LOW

APPENDIX B

SCHEMATIC DIAGRAM
OIL COLLECTION SYSTEM

TERMINAL OIL COLLECTION SYSTEM
(Sheet 6)



LEGEND:

ITEM	DESCRIPTION
LS-1	LEVEL SWITCH
PI-1	PRESSURE INDICATOR

APPENDIX C

TECHNICAL DATA
OIL COLLECTION SYSTEM

PIG LAUNCHER/RECEIVER OIL COLLECTION SYSTEM
(Sheet 1 of 4)

Pump (SJT-22):	Name Plate Data
GPM:	150
RPM:	1735
Head:	50 feet

Motor:

Horsepower:	5
Volts:	460
RPM:	1735

Sump (T-10):

Size:	4′-0" Diameter x 12′-6" Length

APPENDIX C

TECHNICAL DATA
OIL COLLECTION SYSTEM

METER PROVER OIL COLLECTION SYSTEM
(Sheet 2)

Pump (SJT-19 and -20):	Name Plate Data
Manufacturer:	Goulds
GPM:	71
RPM:	3540
Head (TDH):	68 feet

Motor:

Horsepower:	15
Volts:	460
RPM:	3540

Sump (T-7 and T-8):

Size:	4'-0" Diameter x 6'-0" Length

APPENDIX C

TECHNICAL DATA
OIL COLLECTION SYSTEM

DOCK OIL COLLECTION SYSTEM
(Sheet 3)

Pump (SJT-10 on Dock #1 and SJTP-12 on Dock #2):
Name Plate Data

Manufacturer:	Aurora
GPM:	250
RPM:	1745

Motor:

Horsepower:	7.5
Volts:	460
RPM:	1745

Sump (T-202 on Dock #1 and T-201 on Dock #2):

Size:	31" Inside Diameter x 9'-3" Height
Nominal Capacity:	250 gallons

Pump (SJTP-14 on Firewater Dock):

GPM:	25

Motor:

Horsepower	3/4

Sump (SJT-703 on Firewater Dock):

Size:	24" Diameter x 7'-0" Height

APPENDIX C

TECHNICAL DATA
OIL COLLECTION SYSTEM

TERMINAL OIL COLLECTION SYSTEM
(Sheet 4)

Pump (SJTP-16A and -16B):	Name Plate Data
Manufacturer:	Goulds
GPM:	150
RPM:	1755

Motor:

Horsepower:	15
Volts:	460
RPM:	1755

Sump (SJT-S3):

Size:	22" Length x 14'-6" Width x 5'-0" Height

APPENDIX D

STANDBY VALVE AND SWITCH POSITIONS
OIL COLLECTION SYSTEM

ITEM	POSITION
1. Pump discharge valve(s)	Open
2. PSV inlet and discharge valve(s)	Open
3. Isolation valve(s) for pressure indicator(s)	Open
4. Vent and drain valves	Closed
5. Local RUN/OFF switch	ON
6. MCC HOA selector switch	AUTO
7. Motor MCC starter	ON

APPENDIX E

PUMP START/STOP CAPABILITIES
OIL COLLECTION SYSTEM

PUMP NO.	LOCAL CONTROL		MCC CONTROL	PUMP MCC	
	HS	HOA	HOA	NO.	COMPARTMENT
SJTP-10	NA	A	NA	MCC-D1	1FC
SJTP-12	NA	A	NA	MCC-D2	1FB
SJTP-14	NA	A	NA	MCC-D1	4FEL/LP5
SJTP-16A	R	A	A	MCC-6	4FB
SJTP-16B	R	A	A	MCC-6	4FB
SJT-19	R	NA	A	MCC-4E	1FB
SJT-20	R	NA	A	MCC-1B	11FC
SJT-22	R	NA	A	MCC-3E	2FD

LEGEND:

Item	Description
Local Control:	Control at the pump
MCC Control:	Pump control at the pump's MCC panel.
HOA:	Hand-Off-Automatic selector switch.
HS:	Hand Switch.

H - Indicates Hand (LOCAL) position.
O - Off Position.
A - Indicates Auto (DCS) position on the Hand-Off-Automatic Switch.
R - Run position.

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

List of Effective Work Package Pages

Page No.	Chg. No.	Page No.	Chg. No.	Page No.	Chg. No.
1 thru 20	0				

Record of Applicable Technical Directives

None

WARNING

Crude oil is a flammable liquid. The vapors given off by crude oil are far more susceptible to ignition than the crude oil liquid. "Gassy" crude oil with a vapor pressure of >14.7 psia has a significantly increased vapor flash risk (and, therefore, ignition risk) during depressurization. Crude oil contains petroleum hydrocarbons which may cause eye, skin, and lung irritation. Crude oil may contain significant quantities of hydrogen sulfide which is irritating to the eyes, skin, and lungs at low concentrations. At higher hydrogen sulfide concentrations, loss of ability to smell, respiratory paralysis or death may occur. Crude oil also contains benzene, a known carcinogen.

TABLE OF CONTENTS

1. INTRODUCTION.

The oily water environmental collection system collects, separates, and distributes water effluent from drainage sources. The water is pumped into the Mississippi River.

Foam retention pond no. 1 FRP-1 (see foam collection system - Section 4) provides for collection of oily water or foam drainage from the east/west crude oil valve manifold areas and the meter/prover area. Vertical sump pumps SJTP-19 and -20 are used for transferring the contents of the sump into lift station sump SJT-S1.

Foam retention pond no. 2 FRP-2 (see foam collection system - Section 4) provides for collection of oily water or foam drainage from the SJT-1 thru -5 crude oil booster pump pad area. Vertical sump pumps SJTP-21 and -22 are used for transferring the contents of the sump into lift station sump SJT-S1.

Sump SJT-S1 (see waste water collection system - Section 5) provides for collection of oily water drainage from the foam retention ponds (see Section 4), dikes around TK-1 through -6, sludge settling pond SJT-S2, and open drains on SJT-6, -7, and -8 pump pads. Vertical sump pumps SJTP-15A, -15B, and -15C are used for transferring the contents of the sump into the weir box SJT-WB1. Overflow from the weir box can gravity flow into retention pond SJT-S5 (into SJT-S6).

Sump SJT-S6 (see effluent collection system - Section 6) provides for collection of drainage runoff water from retention pond SJT-S5 (see Section 5). Vertical sump pumps SJTP-18A, -18B, and -18C, are used for transferring the contents of the sump to either the Mississippi River (at Dock No. 1) or back to the weir box SJT-WB1.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the oily water environmental collection system under normal conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following:

A. Foam Collection System (Section 4).

B. Waste Water Collection System (Section 5).

C. Effluent Collection System (Section 6).

1.3 **Applicability.** This procedure applies under normal operating conditions. Under these conditions, there is only one authorized operating mode, LOCAL.

1.4. **Reference Documents.**

A. Piping and Instrumentation, Foam-Oil-Water Drainage System, drawing no. SJ-M-103-030.

B. Piping and Instrumentation, Waste Water Collection, drawing no. SJ-M-103-031.

C. Piping and Instrumentation, Waste Water Treatment, drawing no. SJ-M-103-032.

2. **PRECAUTIONS AND LIMITATIONS.**

The following precautions and limitations apply to the operation of the oily water environmental collection system.

A. All local instrumentation relating to the oily water collection system pumps shall have current calibration stickers.

B. The minimum and maximum safety envelope parameters in Appendix A shall be observed at all times.

C. Safety devices, including the pump coupling guards, shall be in place and operational.

3. **PREREQUISITE ACTIONS FOR PREPARING THE OILY WATER ENVIRONMENTAL COLLECTION SYSTEM FOR OPERATION.**

The following steps shall be performed before starting the pumps:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present, piping is properly configured with vent and drain valves closed, and motor grounding straps are in place.

[2] Verify at least every 6 months that the local (non-DCS) instrumentation at the pumps to be operated have current calibration stickers. Refer to Appendix B for specific tag numbers.

[a] Level switch.

[b] Discharge pressure indicator.

4. **FOAM COLLECTION SYSTEM.**

This subsection provides instructions for operating the foam collection system.

4.1 **Foam Collection System - Summary.** Concrete foam retention ponds (FRP-1 and -2) provide for collection of water drainage. Vertical sump pumps SJTP-19, -20, -21, and -22 are used for transferring fluids into the lift station sump. The system normally operates in the LOCAL AUTOMATIC mode. (Refer to Appendix A.)

4.2 **Foam Collection System - Pump Start/Stop Procedure.** Perform the following steps to start and stop pumps SJTP-19, -20, -21, and -22.

[1] At MCC-4 for SJTP-19 and -20 and MCC-1A for SJTP-21 and -22, verify that the breaker is in the ON position. (Refer to Electrical Operations Manual, Work Packages 008 00 and 010 00 and Appendix E in this work package).

[2] Verify that the pump discharge valves are in the full open position.

[3] Verify that the pump ON/OFF switch is in the ON position.

[4] At the pump, move the HOA switch to the "H" position.

[5] Verify that the pump starts.

CAUTION

The pump will run continuously, until stopped manually.

NOTE

The pumps are to be used only to remove drainage water from the ponds. If foam is discharged into the ponds, it should be removed by vacuum trucks. Whenever the fire foam system is activated, the pump motors are automatically locked out and must be reset afterwards.

[6] Move the HOA switch to the "O" position.

[7] Verify that the pump stops after moving the pump HOA switch to the "O" position.

4.3 **Emergency Stop Procedures for Pumps SJTP-19, -20, -21, and -22.** The following subsections address the emergency stopping of the pump if the pump ON/OFF switch and HOA switch fails to stop the pump.

[1] The field operator shall notify the control room operator that an emergency stop is necessary.

[2] The operations shift supervisor or the operations shift supervisor's designee shall go to MCC-4 or MCC-1A and turn the breaker switch to the OFF position for the associated pump.

[3] Verify that the motor stops.

4.4 **Post Operation Activities for Pumps SJTP-19, -20, -21, and -22.** When the foam collection system is to be used for normal service, position all valves and switches to the standby positions shown in Appendix D.

5. **WASTE WATER COLLECTION SYSTEM.**

This subsection provides instructions for operating the waste water collection system.

5.1 **Waste Water Collection System - Summary.** Sump SJT-S1 provides for collection of oily water drainage. Vertical sump pumps SJTP-15A, -15B, and -15C are used for transferring fluids into retention pond SJT-S5. This system normally operates in the LOCAL AUTOMATIC mode

5.2 **Waste Water Collection System - Pump Start/Stop Procedure.** Perform the following steps to start and stop pumps SJTP-15A, -15B, and -15C.

[1] Verify that the MCC-6 breaker is in the ON position. (Refer to Electrical Operations Manual Work Package 015 00.)

[2] Verify that the pump discharge valves are in the full open position.

[3] Move the pump HOA switch to the "H" position.

[4] Verify that the pump starts.

CAUTION

The pump will run continuously, until stopped manually.

NOTE

A level switch in the sump will activate an alarm in the control room at high level, both on the annunciator panel and CRT screen.

[5] Verify that the pump stops after moving the HOA switch to the "O" position.

5.3 **Emergency Stop Procedures for Pumps SJTP-15A, -15B, and -15C.** The following subsections address the emergency stopping of the pump if the pump HOA switch fails to stop the pump.

[1] The field operator shall notify the control room operator that an emergency stop is necessary.

[2] The operations shift supervisor or the operations shift supervisor's designee shall go to MCC-6 and turn the breaker switch to the OFF position.

[3] Verify that the motor stops.

5.4 **Post Operation Activities for Pump SJTP-15A, -15B, and -15C.** When the waste water oil collection system is to be used for normal service, position all valves and switches to the standby positions as shown in Appendix D.

6. EFFLUENT COLLECTION SYSTEM.

This subsection provides instructions for operating the effluent collection system.

6.1 **Effluent Collection System - Summary.** Sump SJT-S6 provides for collection of drainage runoff water. Vertical sump pumps SJTP-18A, -18B, and -18C are used for transferring the contents of the sump to the Mississippi River (at Dock No. 1) This system normally operates in the LOCAL MANUAL mode.

NOTE
At present, these pumps are wired to allow an AUTOMATIC start. Care should be taken not to place the LOCAL HOA switch into the "A" position.

6.2 **Effluent Collection System - Pump Start/Stop Procedure.** Perform the following steps to start and stop pumps SJTP-18A, -18B, and -18C.

[1] The site environmental department representative shall check the oily water content before the pumps are to be started.

[2] Verify that the MCC-6 breaker is in the ON position. (Refer to Electrical Operations Manual, Work Package 015 00.)

[3] Verify that the discharge valves are in the full open position.

[4] Move the pump HOA switch to the "H" position.

[5] Verify that the pump starts.

CAUTION 1

The pump will run continuously, until stopped manually.

CAUTION 2

Liquids in the sump must be analyzed for oil content before starting the pump and directing flow to the Mississippi River.

NOTE
The settling pond associated with the retention pond SJT-S5 is monitored by an infrared reflectance analyzer AE-SW. The detection of oil activates an alarm in the control room which alerts the control room operator of an oily water condition.

[6] Verify that the pump stops after moving the HOA switch to the "O" position.

6.3 **Emergency Stop Procedures for Pumps SJTP-18A, -18B, and -18C.** The following subsections address the emergency stopping of the pumps if the pump HOA switch fails to stop the pump.

[1] The field operator shall notify the control room operator that an emergency stop is necessary.

[2] The operations shift supervisor or the operations shift supervisor's designee shall go to MCC-6 and turn the breaker switch to the OFF position.

[3] Verify that the motor stops.

6.4 **Post Operation Activities for Pumps SJTP-18A, -18B, and -18C.** When the effluent oil collection system is to be used for normal operation, position all valves and switches to the standby position as shown in Appendix D.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

		SAFETY ENVELOPE			
			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
SJTP-19 & SJTP-20					
Pump discharge pressure	psig	b	20.0	22.0[a]	b
Sump level	ft/in	b	1'-2"	6'-0"	b
SJTP-21 & SJTP-22					
Pump discharge pressure	psig	b	8.0	10.0[a]	b
Sump level	ft/in	b	1'-2"	6'-0"	b
SJTP-18A, -18B, AND -18C					
Pump discharge pressure	psig	b	38.0	40.0[a]	b
Sump level	ft/in	b	4'-6"	10'-0"	b
SJTP-15A, 15B, and -15C					
Pump discharge pressure	psig	b	13.0	15.0[a]	b
Sump level	ft/in	b	6'-7"	12'-0"[c]	b

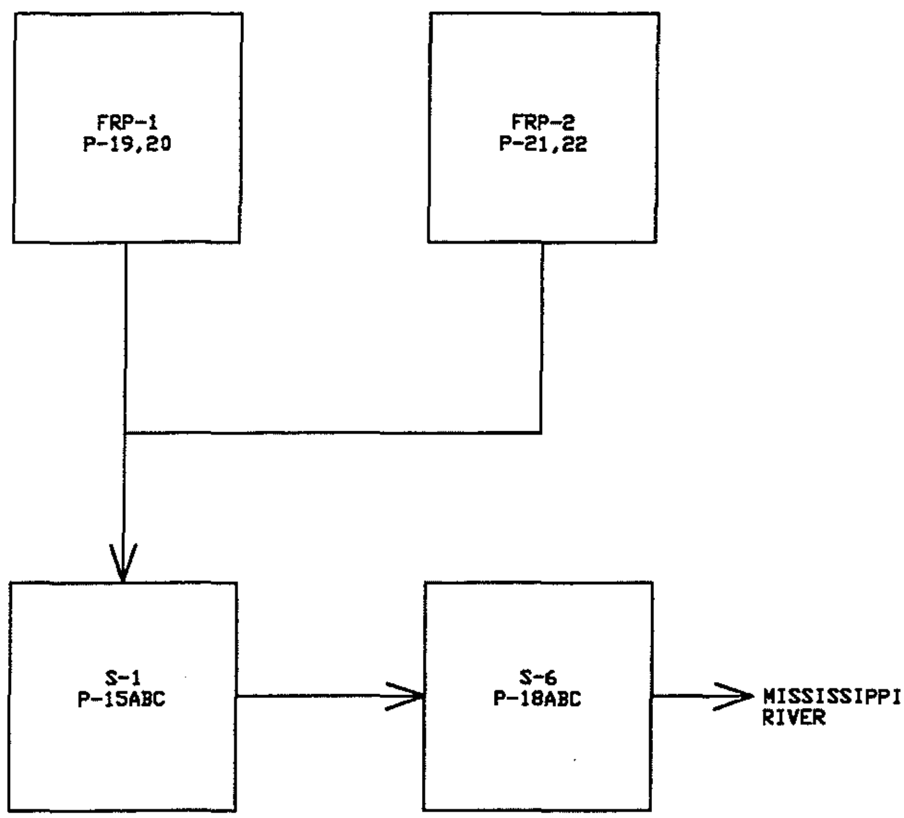
a These values must be monitored by an operator.
b These values have no defined limits.
c These values cause an alarm signal in the control room, both on the annunciator panel and CRT screen..

Support Equipment: None Required.

APPENDIX B

SCHEMATIC DIAGRAM
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

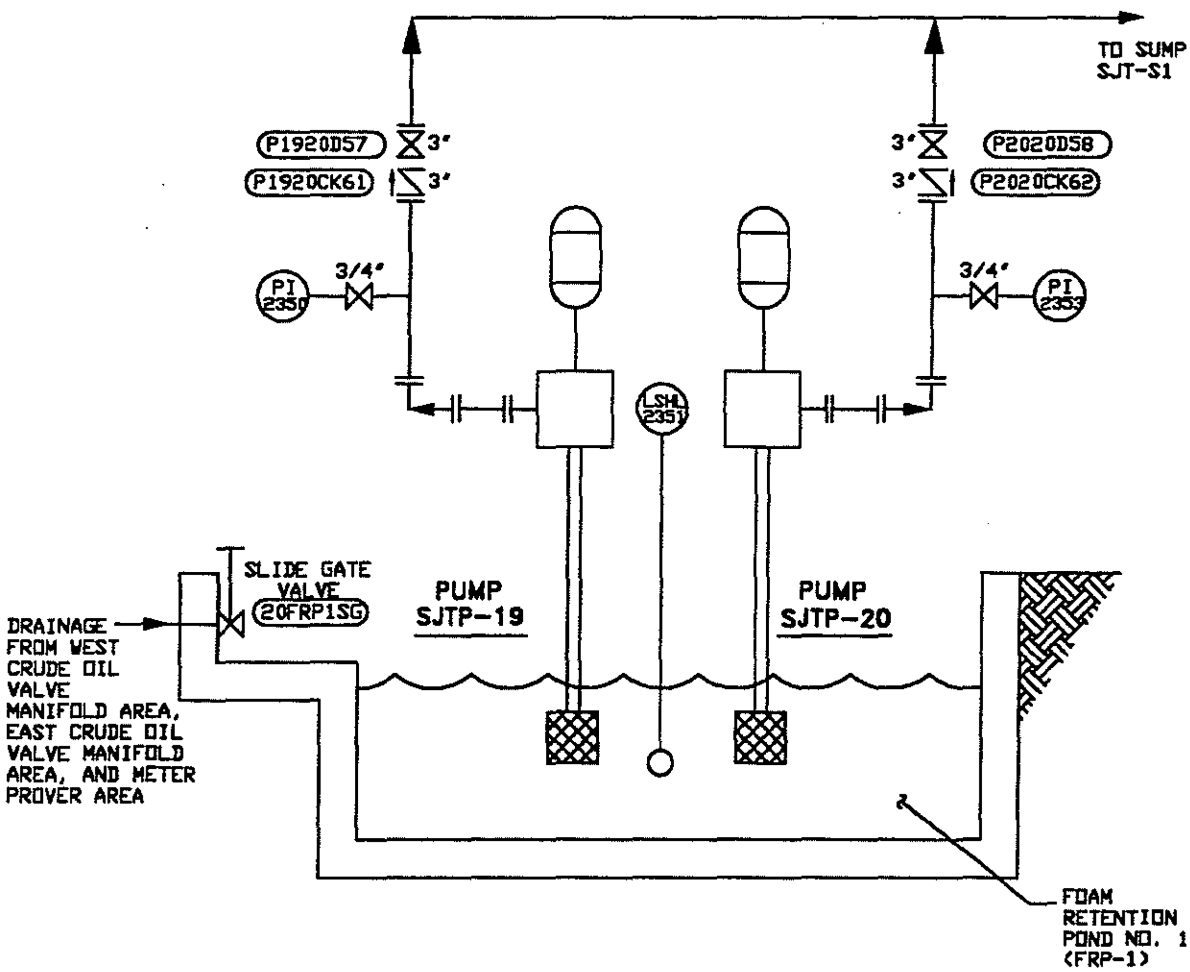
DISCHARGE BLOCK DIAGRAM
(Sheet 1 of 5)



APPENDIX B

SCHEMATIC DIAGRAM
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

FOAM COLLECTION SYSTEM
(Sheet 2)



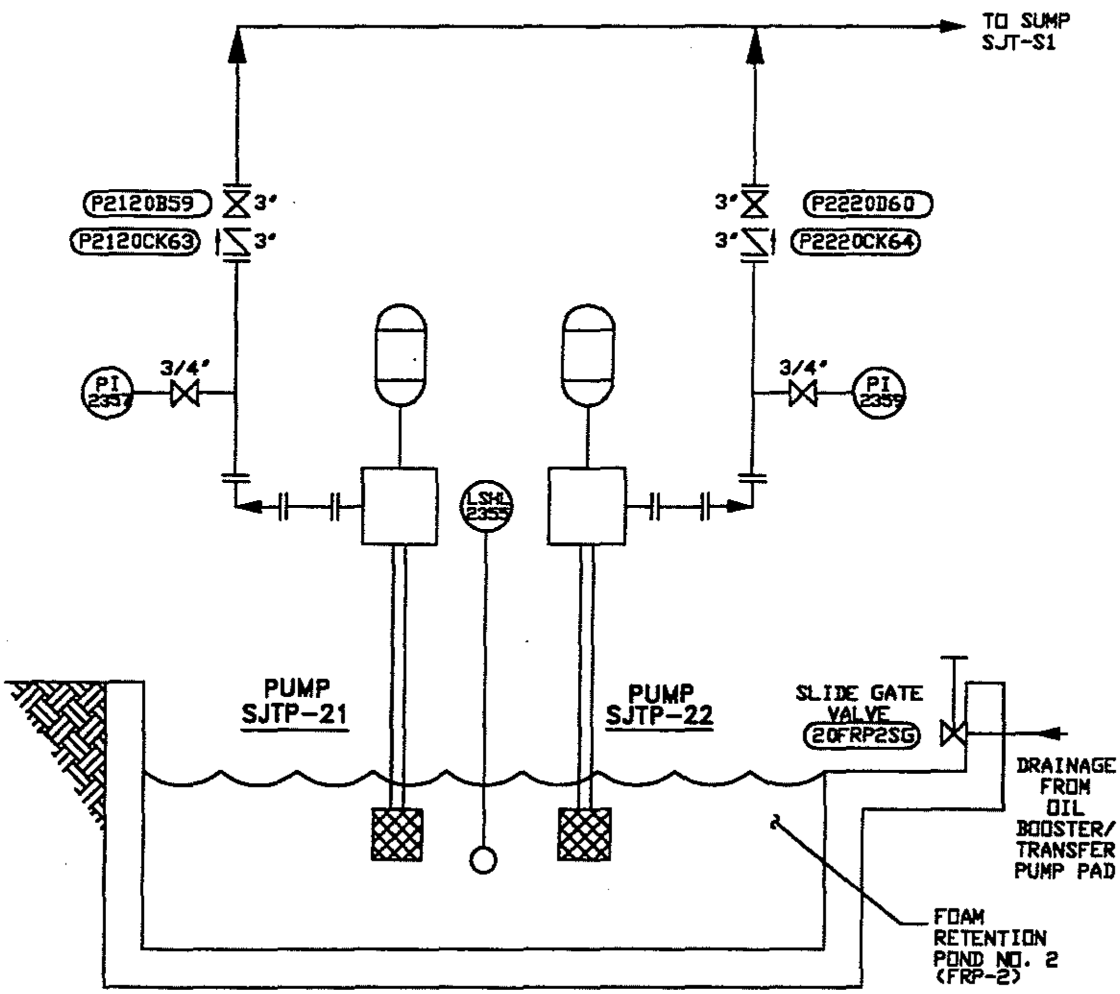
LEGEND:

ITEM	DESCRIPTION
PI-2350	PRESSURE INDICATOR
PI-2353	PRESSURE INDICATOR
LSHL-2351	LEVEL SWITCH HIGH-LOW

APPENDIX B

SCHEMATIC DIAGRAM
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

FOAM COLLECTION SYSTEM
(Sheet 3)



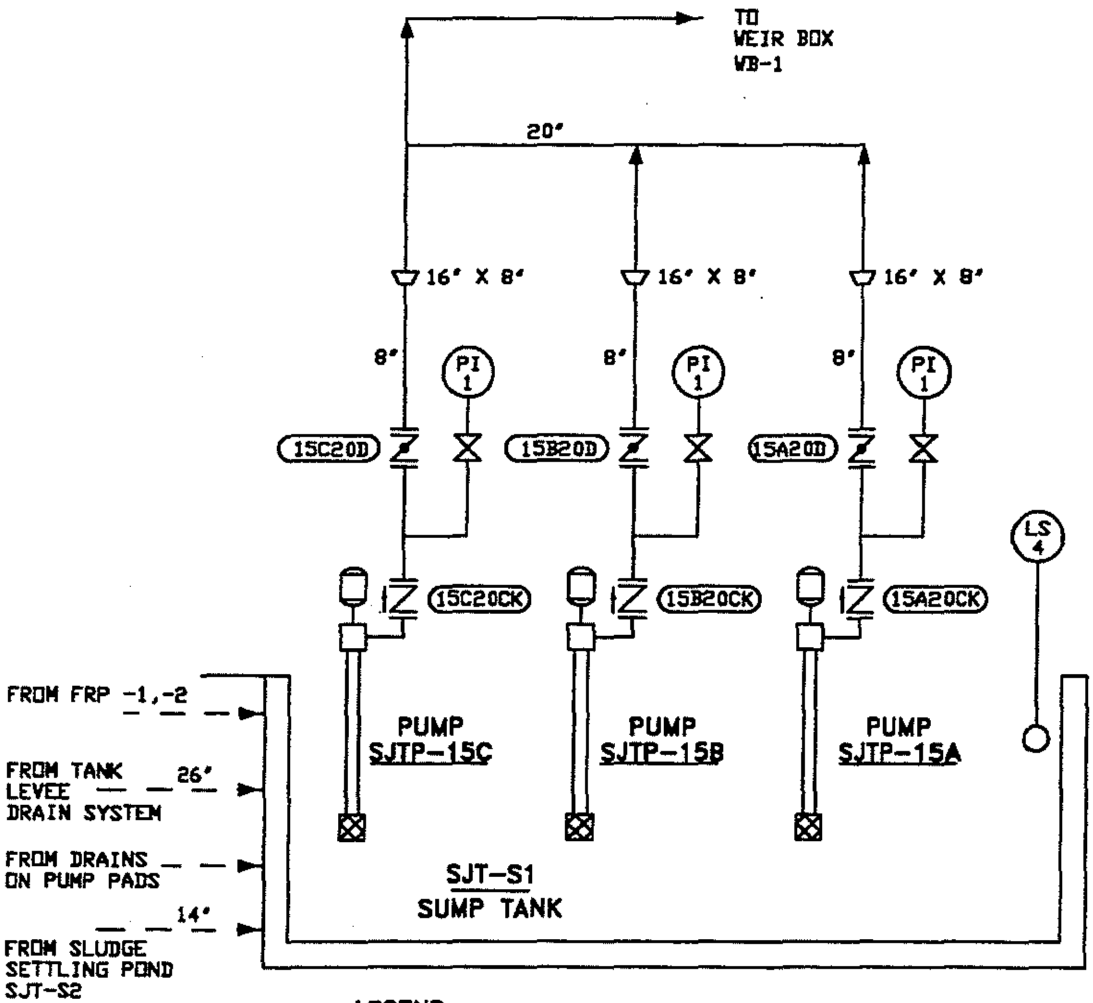
LEGEND:

ITEM	DESCRIPTION
PI-2357	PRESSURE INDICATOR
PI-2359	PRESSURE INDICATOR
LSHL-2355	LEVEL SWITCH HIGH-LOW

APPENDIX B

SCHEMATIC DIAGRAM
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

WASTE WATER COLLECTION SYSTEM
(Sheet 4)



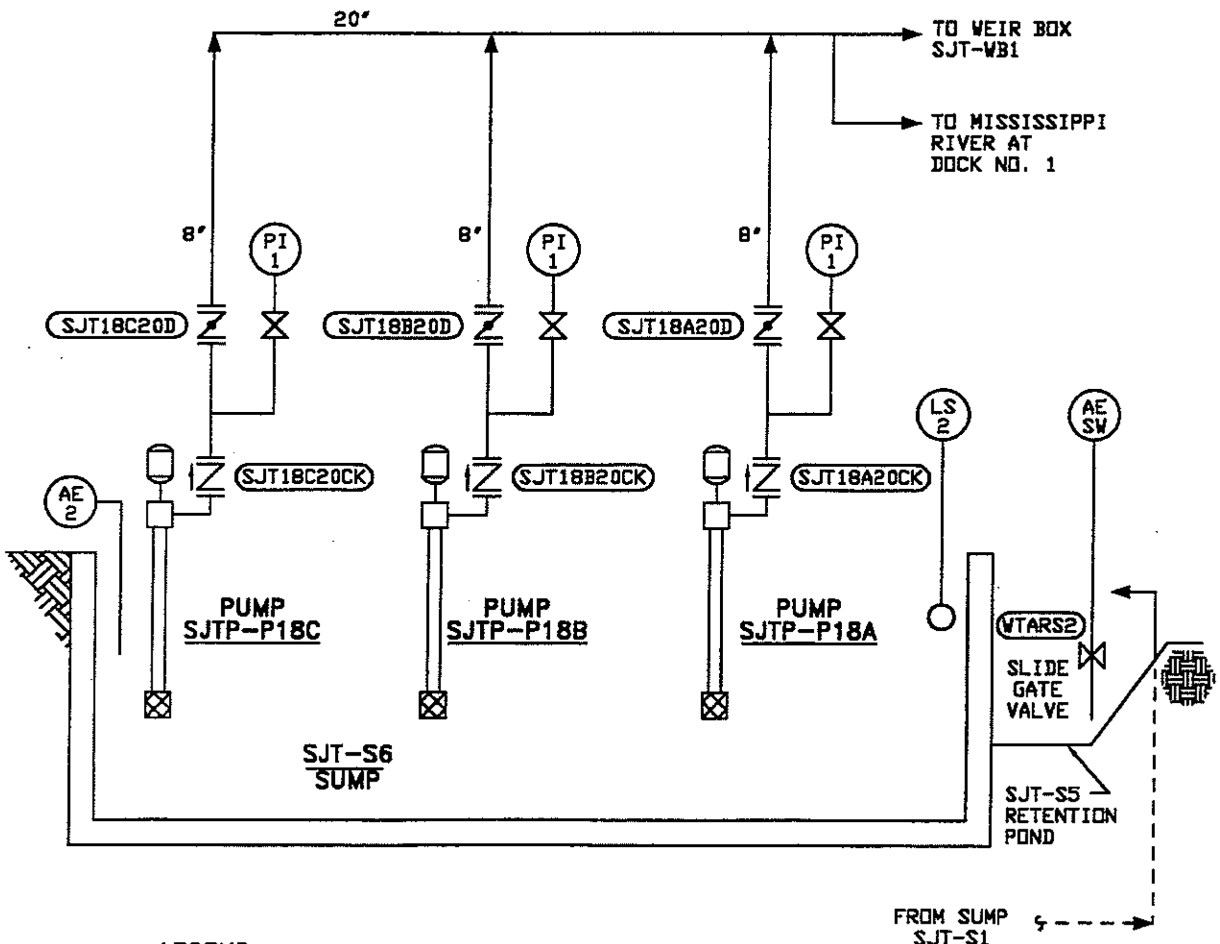
LEGEND:

ITEM	DESCRIPTION
PI-1 LS-4	PRESSURE INDICATOR LEVEL SWITCH

APPENDIX B

SCHEMATIC DIAGRAM
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

EFFLUENT COLLECTION SYSTEM
(Sheet 5)



LEGEND:

ITEM	DESCRIPTION
PI-1	PRESSURE INDICATOR
LS-2	LEVEL SWITCH
AE-SW	ANALYSIZER ELEMENT FOR SERVICE WATER

APPENDIX C

TECHNICAL DATA
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

FOAM COLLECTION SYSTEM
(Sheet 1 of 3)

Pump (SJTP-19, -20, -21, and -22):

GPM:	150
RPM:	1735
Head:	23 feet

Motor:

Horsepower:	5
Volts:	460
RPM:	1735

Sump (Foam Retention Pond No. 1):

Size:	60'-0" L x 30'-0" W x 8'-9" D
Capacity:	107,800 gallons

Sump (Foam Retention Pond No. 2):

Size:	40'-0" L x 20'-0" W x 8'-0" D
Capacity:	41,900 gallons

APPENDIX C

TECHNICAL DATA
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

WASTE WATER COLLECTION SYSTEM
(Sheet 2)

Pump (SJTP-15A, -15B, and -15C):

GPM:	1600
RPM:	1170

Motor:

Horsepower:	25
Volts:	460
RPM:	1170

Sump (SJT-S1):

Size:	23'-0" L x 23'-0" W x 16'-0" D
Capacity:	50,360 gallons

Weir Box (SJT-WB1):

Size:	7'-9" L x 7'-9" H
Capacity:	2,900 gallons

Sludge Settling Pond (SJT-S1):

Size:	13' L x 13' W x 2' D
Capacity:	2,500 gallons

APPENDIX C

TECHNICAL DATA
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

EFFLUENT COLLECTION SYSTEM
(Sheet 3)

Pump (SJTP-18A, -18B, and -18C):

GPM:	1600
RPM:	1720

Motor:

Horsepower:	50
Volts:	460
RPM:	1720

Sump (SJT-S6):

Size:	23'-0" L x 14'-0" W x 14'-0" D
Capacity:	24,100 Gallons

APPENDIX D

STANDBY VALVE AND SWITCH POSITIONS
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

ITEM	POSITION
1. Pump discharge valve(s)	Open
2. Isolation valve(s) for pressure indicator(s)	Open
3. Vent and drain valves	Closed
4. Local ON/OFF switch (SJTP-19, -20, -21, -22 only)	On
5. Motor MCC starter	On
6. Local HOA switches for SJTP-19, -20, -21, -22, -15A, -15B, -15C	AUTO
7. Local HOA switches for SJTP-18A, -18B, -18C	OFF

APPENDIX E

PUMP START/STOP CAPABILITIES
OILY WATER ENVIRONMENTAL COLLECTION SYSTEM

PUMP NO.	LOCAL CONTROL				PUMP MCC	
	START DS	STOP DS	START HOA	STOP HOA	NO.	COMPARTMENT
SJTP-19	ON	OFF	A	O	MCC-4	11FD
SJTP-20	ON	OFF	A	O	MCC-4	12FE
SJTP-21	ON	OFF	A	O	MCC-1A	6RA
SJTP-22	ON	OFF	A	O	MCC-1A	6RB
SJTP-15A	NA	NA	A	O	MCC-6	4FA
SJTP-15B	NA	NA	A	O	MCC-6	4FA
SJTP-15C	NA	NA	A	O	MCC-6	4FA
SJTP-18A	NA	NA	H	O	MCC-6	1FC
SJTP-18B	NA	NA	H	O	MCC-6	1FD
SJTP-18C	NA	NA	H	O	MCC-6	1FEL

LEGEND:

Item	Description
Local Control:	Control at the pump
DCS Control:	Pump control from the Distributed Control System (DCS) control panel at the main control room.
MCC Control:	Pump control at the pump's MCC panel.
PB:	Pushbutton switch.
HOA:	Hand-Off-Automatic selector switch.
DS:	Local disconnect OFF-ON switch

H - Indicates Hand (ON) position.
O - Indicates Off Position.
A - Indicates Auto position.
NA - Not Applicable.

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

STRIPPING PUMPS

SJTP-101, -102, -103, -104, -105, AND -106

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

STRIPPING PUMPS SJTP-101, -102, -103, -104, -105, AND -106

List of Effective Work Package Pages

Page No.	Chg. No.	Page No.	Chg. No.	Page No.	Chg. No.
1 thru 14	0				

Record of Applicable Technical Directives

None

WARNING

Crude oil is a flammable liquid. The vapors given off by crude oil are far more susceptible to ignition than the crude oil liquid. "Gassy" crude oil with a vapor pressure of >14.7 psia has a significantly increased vapor flash risk (and, therefore, ignition risk) during depressurization. Crude oil contains petroleum hydrocarbons which may cause eye, skin, and lung irritation. Crude oil may contain significant quantities of hydrogen sulfide which is irritating to the eyes, skin, and lungs at low concentrations. At higher hydrogen sulfide concentrations, loss of ability to smell, respiratory paralysis or death may occur. Crude oil also contains benzene, a known carcinogen.

TABLE OF CONTENTS

1. **INTRODUCTION.**

St. James has six stripping pumps, SJP-101, -102, -103, -104, -105, and -106, on site, one located adjacent to each crude oil storage tank. The rotary positive displacement pumps are capable of delivering 571 BPH (400 GPM). The pumps are rated for 125 psig discharge pressure. The pump suctions are manifolded to enable any pump to be used to strip any tank. The pump discharges are manifolded to the same suction line.

The primary purpose of the stripping pumps is to pump out the residual crude oil from the tanks. The crude oil booster pumps will pump out the majority of the tank inventory. The stripping pump is used to complete the oil removal from the tank.

The stripping pumps may be used to make transfers between tanks. These are small capacity pumps and transfers are practical only for relatively small quantities.

The stripping pumps are used to "pack" (pressurize and vent air from) the line between the docks and the terminal, CAPLINE or LOCAP pipelines, and pressure test equipment.

Appendix A describes the pump's operating and safety envelope. Appendix B shows typical schematic diagrams and equipment layout of the pumps. Appendix C contains technical information on the pumps.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the stripping pumps under normal conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Prerequisite actions for operating of the stripping pumps.

B. Starting, monitoring, and stopping the stripping pumps in LOCAL mode.

C. Emergency stopping of the stripping pumps.

D. Performing required post operation actions on the stripping pumps.

1.3 **Applicability.** This procedure applies under normal operating conditions. Under these conditions, there is one authorized operating mode, LOCAL (Section 4).

1.4. **Reference Documents.**

A. Piping and Instrumentation Diagrams, Crude Oil Storage Tanks T-1 through T-3, drawing no. SJ-M-103-022.

B. Piping and Instrumentation Diagrams, Crude Oil Storage Tanks T-4 through T-6, drawing no. SJ-M-193-025.

C. Work Package 009 00, Crude Oil Storage Tanks.

D. Viking Model M-125R, horizontal internal gear pump Operating and Maintenance Manual.

2. PRECAUTIONS AND LIMITATIONS.

The following precautions and limitations apply to the operation of the stripping pumps in the LOCAL operating mode:

A. All local instrumentation relating to the stripping pumps to be operated shall have current calibration stickers.

B. The minimum and maximum safety envelope parameters in Appendix A shall be observed at all times.

C. Safety devices, including the pump coupling guards and pressure safety relief valves, shall be in place and operational.

D. Valve alignment shall be in accordance with the valve line-up sheet for the particular fluid movement procedure.

E. The pump, motor, and gear shafts alignment shall have been aligned according to St. James Maintenance Procedure. If the pump/gear/motor shafts are not properly aligned, damage to the pump, gear, and/or motor can occur.

3. PREREQUISITE ACTIONS FOR PREPARING THE STRIPPING PUMPS FOR OPERATION.

The following actions shall be taken prior to operating the stripping pumps. These actions apply to operation in the LOCAL mode.

3.1 **Field Preparations.** The following steps shall be performed before starting the stripping pumps:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present (no open work orders in log), piping is properly configured with vent and drain valves closed, and motor grounding straps are in place.

[2] Verify that the support equipment shown in Appendix A is fully functional and available for service, prior to starting the pumps.

[3] Verify that the valves and switches are in the standby position, as shown in Appendix D.

[4] Verify that the local (non-DCS) instrumentation at the pumps to be operated have current calibration stickers. Refer to Appendix B, Sheet 1 for specific tag numbers (ELNs).

[a] Flow switch low.

[b] Discharge pressure indicator.

[5] Verify that the pump/motor shafts have been properly aligned.

3.2 **Approvals and Notifications.** All pump operations shall be in accordance with an approved fluid movement procedure.

4. STARTING, MONITORING, AND STOPPING THE STRIPPING PUMPS IN THE LOCAL OPERATING MODE.

The following subsections provide step-by-step instructions for operating in the LOCAL mode. The stripping pumps shall be started and stopped from the local STOP/START pushbutton station next to the pump. The pumps can be configured for parallel. This would be an unusual situation. The operation described below is for a single pump but could be used for multiple pump operation.

4.1 **Pump Start Procedure - LOCAL mode.** Perform the following steps to start the stripping pumps manually in the LOCAL mode.

[1] At the MCC motor starter for the stripping pump to be used in the fluid movement, verify that the breaker switch is in the ON position. The MCCs associated with the pumps are shown in Appendix E.

[2] Verify that the area around the pump is clear of any hazards.

NOTE

The specific fluid movement procedure will identify the correct suction tank valve(s) and the correct discharge valve(s) to be opened for the pump(s). The suction valves are TX20D47 and/or TX20B1. The discharge valves are TX2082 and/or TX20B3. These valves will be verified in the fluid movement walk-down.

[3] Open the stripping pump manual suction valve(s).

[4] Open the stripping pump manual discharge valve(s).

[5] Remove the stop pin from the STOP/START selector switch.

CAUTION

If pressure indicator indicates a shutdown condition or if the pump's built-in PSV is relieving, the field operator shall push the STOP pushbutton.

[6] Push the START button and verify that the pump motor starts.

NOTE

After an aborted motor pump start, wait 2 minutes before attempting a restart to allow the motor windings to cool down and no more than 30 starts per hour.

[7] After the pump comes up to speed and the pump pressures have stabilized, verify that the pump discharge pressure is less than 125 psig.

4.2 **Performance Monitoring - LOCAL Mode.** The field operator shall record the pump discharge pressure indicator reading at the pump as required by the operations shift supervisor.

4.3 **Pump Stop Procedure - LOCAL Mode.** Perform the following steps to stop the stripping pump manually in the LOCAL operating mode.

[1] Push the STOP pushbutton of the STOP/START selector switch.

[2] Verify that the pump motor stops.

[3] Insert the stop pin and lock out (for operational safeguard).

5. **EMERGENCY STOPPING PROCEDURE FOR THE STRIPPING PUMPS.**

The following subsections address emergency stopping of the pump from the LOCAL mode. If the pump has not stopped in the LOCAL mode, begin with step **[2]**.

[1] Press the local STOP button at the STOP/START selector switch at the motor and insert the stop pin. If this fails to stop the motor, then the motor shall be stopped from the motor starter in the motor control center (MCC) according to the following steps:

[2] The field operator shall notify the control room operator that an emergency stop is necessary.

[3] The control room operator shall notify the operations shift supervisor of the emergency stop requirement.

[4] The operations shift supervisor or the operations shift supervisor's designee shall go to the MCC and turn the breaker to the OFF position. MCC location is shown in Appendix E. The location of the breaker selector is shown in Appendix C.

6. **POST STRIPPING PUMP OPERATION PROCEDURE.**

When the stripping pumps are no longer needed for the fluid movement, set all valves and selector switches associated with the pumps as shown in Appendix D.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
STRIPPING PUMPS

CAUTION

The stripping pumps shall be operated within the following safety envelope at all times. Failure to do so could result in damage to the equipment.

		SAFETY ENVELOPE			
			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
Pump discharge pressure[c]	psig	a	a	125	125
Flow switch low[d]	MBD	b,c	13.7	13.7	13.7

a These values have no defined limits.
b This is a hard-wired shutdown (not through DCS).
c This must be monitored by an operator.
d This is a positive displacement pump. The flow is constant at a constant speed. Low flow means the suction is cavitating.

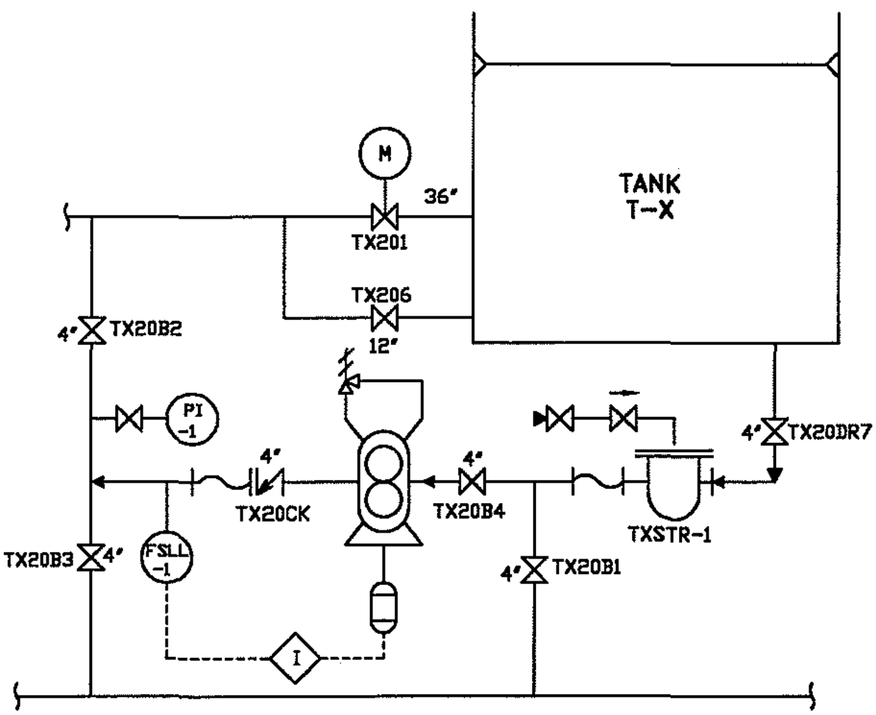
Support Equipment:

The following support equipment shall be operational if required for the fluid movement before the stripping pumps are started.

A. Crude oil storage tanks.

APPENDIX B

SCHEMATIC DIAGRAM
STRIPPING PUMPS
(Sheet 1 of 2)

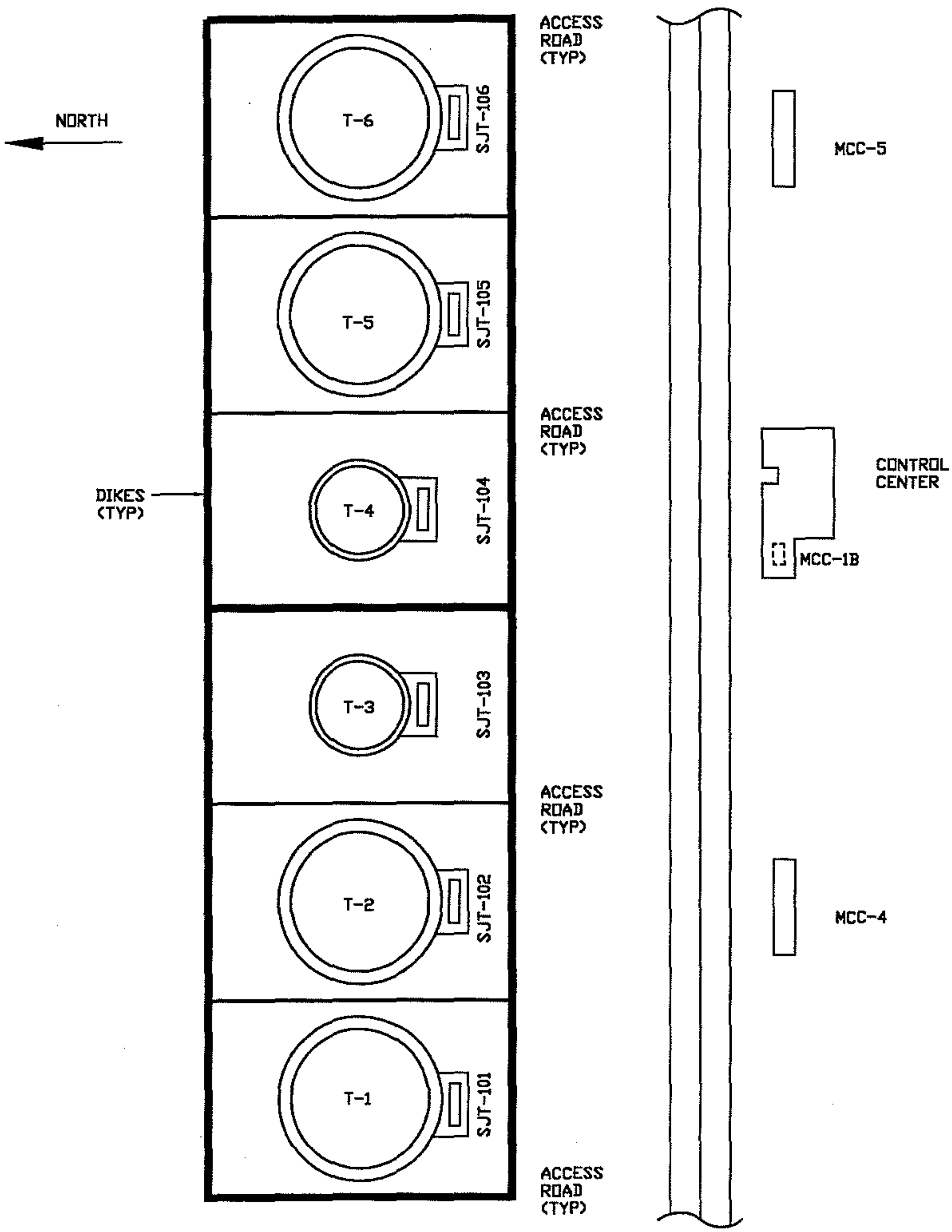


ITEM	DESCRIPTION	EQUIPMENT TAG NUMBERS SJTP-101	SJTP-102	SJTP-103	SJTP-104	SJTP-105	SJTP-106
FSLL-1	FLOW SWITCH, SHUT DOWN LOW	2012	2013	2014	2015	2016	2019
PI-1	DISCHARGE PRESSURE	2006	2007	2008	2009	2010	2011
TANK	TANK NUMBER	T-1	T-2	T-3	T-4	T-5	T-6

APPENDIX B

SCHEMATIC DIAGRAM
STRIPPING PUMPS

EQUIPMENT LAYOUT
(Sheet 2)



APPENDIX C

TECHNICAL DATA
STRIPPING PUMPS
(Sheet 1 of 2)

Pump:

Manufacturer:	Viking
Model:	M-125 R
Capacity:	400 GPM @ 420 RPM
Discharge Pressure:	10-125 psig

Motor:

Manufacturer:	U.S. Electric
Rated:	25 HP
Full Load Speed	1760 RPM
Frame:	284 TS, Type L
Enclosure:	TE for I-D
Volts:	460
Hertz:	60
Phase:	3
Full Load Current:	30.6 Amps
Full Load RPM:	1760
Insulation:	B
Continuous Rating:	75°Rise

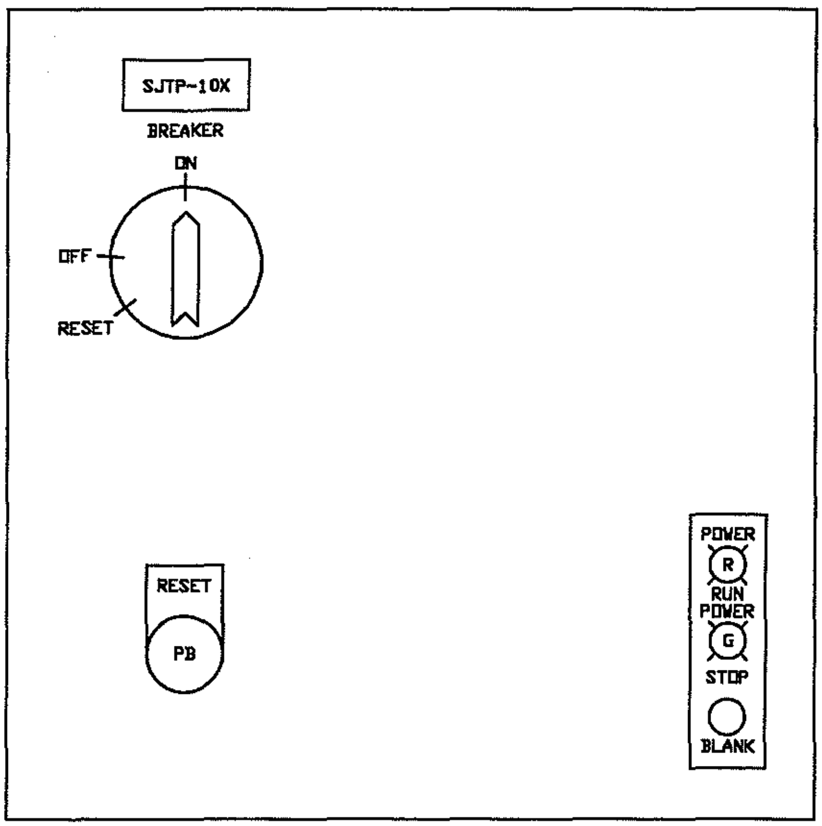
Gear:

Ratio:	4.21 to 1

APPENDIX C

TECHNICAL DATA
STRIPPING PUMPS

TYPICAL MCC PANEL
(Sheet 2)



APPENDIX D

STANDBY VALVE AND SWITCH POSITIONS
STRIPPING PUMPS

ITEM	POSITION
1. MCC HOA Selector Switch	ON
2. Local STOP/START switch	Stop Pin Inserted and Locked Out
3. Valve (TX20DR7)	Closed
4. Suction valve (TX20B4)	Closed
5. Valve (TX20B1)	Closed
6. Valve (TX20B3)	Closed
7. Valve (TX20B2)	Closed
8. Pressure indicator	Open

APPENDIX E

PUMP START/STOP CAPABILITIES
STRIPPING PUMPS

PUMP NO.	LOCAL CONTROL		DCS CONTROL		MCC CONTROL			PUMP MCC	
	START PB	STOP PB	START HOA	STOP HOA	START HOA	START PB	STOP	NO.	COM-PART-MENT
SJT-101	Y	Y	NA	NA	NA	N	OFF	MCC-4	1FA
SJT-102	Y	Y	NA	NA	NA	N	OFF	MCC-4	1FB
SJT-103	Y	Y	NA	NA	NA	N	OFF	MCC-1B	12RD
SJT-104	Y	Y	NA	NA	NA	N	OFF	MCC-1B	11RD
SJT-105	Y	Y	NA	NA	NA	N	OFF	MCC-5	3FA
SJT-106	Y	Y	NA	NA	NA	N	OFF	MCC-5	3FC

LEGEND:

Item	Description
Local Control:	Control at the pump
DCS Control:	Pump control from the Distributed Control System (DCS) control panel at the main control room.
MCC Control:	Pump control at the pump's MCC panel.
PB:	Pushbutton switch.
HOA:	Hand-Off-Automatic selector switch.

Y - Indicates that a pushbutton operation is possible.
N - Indicates that a pushbutton operation is not possible.
H - Indicates Hand (LOCAL) position on the Hand-Off-Automatic Switch.
O - Off Position on the Hand-Off-Automatic Switch.
A - Indicates Auto (DCS) position on the Hand-Off-Automatic Switch.
NA - Indicates that this control is not available.
OFF - Breaker OFF position.

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

MAIN SITE FIRE WATER PUMP SYSTEM

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

MAIN SITE FIRE WATER PUMP SYSTEM

List of Effective Work Package Pages

Page No.	Chg. No.	Page No.	Chg. No.	Page No.	Chg. No.
1 thru 37	0	38(Blank)	0		

Record of Applicable Technical Directives

None

TABLE OF CONTENTS

1. **INTRODUCTION.**

This procedure describes the normal operation of the main terminal area fire water pumps. The pumps are the main site jockey pump SJTP-23; the main site electric driven fire water pump, SJTP-24; and the main site diesel driven fire water pump, SJTP-25. The pumps are located in building 716, fire pump house on site. The fire water supply comes from the fire water tank V-3.

If the main site jockey pump cannot maintain pressure during fire water usage, the main site electric fire water pump will start at a lower pressure. Once started from this automatic mode, the main site electric fire water pump will continue to run until shut off manually. If the main site electric fire water pump can not maintain system pressure, if the main site electric fire water pump does not start, or if there is an electric power failure in the control power, the main site diesel fire water pump will start. The system and equipment are designed in accordance with NFPA-20.

The jockey pump SJTP-23 is a close coupled end suction top discharge horizontal centrifugal pump model AC 2000 manufactured by ITT. It has a design flow of 50 GPM and a pressure of 140 psig (323′ TDH). The pump's purpose is to maintain pressure in the static system. The pump is driven by a 15 horsepower 3480 RPM 480-volt motor. The motor is started and stopped by pressure switch PS-2399 that reads system pressure.

The main site electric fire water pump SJTP-24 is a side suction side discharge horizontal split case pump manufactured by Reddy Buffaloes. It has a design flow of 1500 GPM at a pressure of 125 psig (289′ TDH). The pump is driven by a 200 horsepower 1780 RPM 480-volt motor. It is started from a pressure switch in the pump's controller (refer to Appendix P). Once started, SJTP-24 must be stopped at the pump controller. If the pump is running and there is no flow through the system, PSV-2393 will open and provide minimum continuous flow back to the fire water tank V-3.

The main site diesel fire water pump SJTP-25 is identical to the electric fire water pump. It is driven by a Caterpillar six cylinder four cycle turbocharged diesel engine. The engine develops 231 brake horsepower at 1750 RPM. The fuel for the engine is stored in the diesel fuel tank V-4 (350 GAL) in the pump house building. Once started, SJTP-25 must be stopped at the

P-25 Controller. If the pump is running and there is no flow through the system, PSV-2385 will open and provide minimum continuous flow back to the fire water tank V-3.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the main site fire water jockey pump, main site electric fire water pump, and main site diesel fire water pump, under normal operating conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Preparing the pumps for operation.

B. Starting, stopping, and emergency stopping.

C. Performing required post operation actions.

1.3 **Applicability.** This procedure applies under normal operating conditions when the local control system is operational. There is one authorized operating mode, LOCAL.

1.4 **Reference Documents.**

A. Operating Procedure ASR4330.5, Interim Repair/ Mitigation Procedure.

B. Piping and Instrumentation Diagrams, Fire Protection Fire Water Pumps SJTP-23, SJTP-24, and SJTP-25, drawing no. SJ-FP-103-038.

C. Reddy Buffaloes Pump Installation, Operation and Maintenance Instructions.

D. ITT/AC Model 2000 Installation, Operation and Maintenance Instructions.

2. **PRECAUTIONS AND LIMITATIONS.**

The following precautions and limitations apply to the operation of the fire water pump in both LOCAL Automatic and LOCAL Manual.

A. All instrumentation associated with the main site fire water pumps shall have current calibration stickers. For any device that is out of compliance, refer to the shift supervisor for direction. Refer to operating procedure ASR4330.5, Interim Repair/Mitigation Procedure.

B. The minimum and maximum operating envelope parameters in Appendix A shall be observed at all times.

C. The following safety devices shall be in place and operational:

1. Coupling guards.

2. Overspeed trip.

3. Safety valves PSV-2393 and PSV-2385.

D. All personnel entering the fire water pump house with SJTP-24 or SJTP-25 running shall wear OSHA approved hearing protection.

E. Valves P2320S76, P2320D84, P2420S77, P2420D82, P2520S78, and P2520D80 shall be locked and chained open.

3. PREREQUISITE ACTIONS.

The following actions shall be taken prior to operating the main site fire water pumps. These actions apply to operation in both LOCAL Automatic and LOCAL Manual.

3.1 **Special Tools and Equipment.** None required.

3.2 **Field Preparation.** The following steps shall be performed as part of the operational ready mode:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present, piping is properly configured, and motor grounding straps are in place.

[2] Verify that all valves and switches are in the operational ready mode. (Refer to Appendix D, Sheets 1, 2, and 3.)

[3] Verify that the local control panel LFCP-800 is reset. (Refer to Appendix C, Sheet 10.)

[4] Verify that the motor starter circuit breakers are reset. (Refer to Appendix C, Sheets 4 and 6.)

[5] The support equipment listed in Appendix A, Sheet 2 shall be fully functional at all times.

[6] Verify that the local instrumentation shown in Appendix B, Sheets 2, 3, and 4 have current calibration.

For SJTP-23 in Appendix B, Sheet 2:

[a] Suction pressure gauge, PI-2404.

[b] Discharge pressure gauge, PI-2403.

[c] High/low pressure switch, PS-2399.

[d] High pressure switch, PS-2400.

For SJTP-24 in Appendix B, Sheet 3:

[e] Level pressure gauge, LI-2427.

[f] Suction pressure indicator, PI-2395.

[g] Discharge pressure indicator, PI-2397.

[h] Pressure switch high, PS-2416.

[i] Pressure switch in the P-24 Controller to start SJTP-24.

For SJTP-25 in Appendix B, Sheet 4:

[j] Suction pressure indicator, PI-2384.

[k] Discharge pressure indicator, PI-2.

[l] Pressure switch high, PS-2382.

[m] Pressure switch in the P-25 Controller to start SJTP-25.

For system devices in the main site fire water pump house in Appendix B, Sheet 1:

[n] Pressure recorder, PR-2394.

[o] The pressure indicator PI-2394 attached to the pressure recorder.

[p] Pressure indicator PI-2383 on the pump's discharge header.

[7] Verify that no warning lights on the fire water control panel monitor LFCP-800 in the main site fire water pump house are illuminated and that in the control room no abnormal conditions are indicated on RFAP-100. (Refer to Appendix C, Sheets 10 and 11.)

[8] On P-24 Controller, verify that the red POWER ON light is illuminated indicating that the pump is in the ready mode. (Refer to Appendix C, Sheet 6). The power comes from transformer TX-FW, located outside the southeast corner of the main site fire water pump house. (Refer to Appendix B, Sheet 1.)

[9] On P-25 Controller, verify that the green POWER ON light is illuminated indicating that the controller is in the ready mode. (Refer to Appendix C, Sheet 9.) Location of the MCC which feeds the panel is shown in Appendix E. If any red lights on the P-25 Controller panel are illuminated, notify the shift supervisor.

[10] Verify (by touch) that there is power to the heater circuits:

[a] On SJTP-24 motor winding heaters.

[b] On SJTP-25 engine jacket water heater.

[11] Verify that the fuel level in the diesel fuel tank V-4 is at least 75% full of diesel fuel.

4. MAIN SITE FIRE WATER JOCKEY PUMP.

The main site fire water jockey pump can operate only out of its local panel in LOCAL mode. In LOCAL mode there are two modes of operation: AUTOMATIC and HAND. These operating modes are controlled through the HOA switch on the local panel.

4.1 AUTOMATIC Mode. In the AUTOMATIC operating mode, the main site fire water jockey pump runs off set points in PS-2399 and requires only occasional monitoring once the system is initially verified. Initial verification shall include the following steps:

[1] Place the HOA switch in the AUTO position.

[2] Verify that the motor starts at its lower set point by observing PI-2383 on the main discharge header.

[3] Verify that the motor stops at its upper set point by observing PI-2383 on the main discharge header.

NOTE
The set points are set by the instrumentation group, verified by the weekly fire pump test (MRC-316), and are listed in Appendix A, Sheet 1.

[4] Verify that the pump does not immediately start again. If the pump restarts within minutes, it indicates that the check valve failed to close or the system has a severe leak.

[5] If the motor immediately restarts or does not shut off automatically, contact the shift supervisor.

4.2 **HAND Mode.** In the HAND mode, the fire water jockey pump will run continuously until manually shut off. In this operating mode, it must be monitored continuously to be kept within its operating limits as follows:

[1] When the system pressure is at or below the low operating pressure, place the HOA switch in the HAND position.

[2] Verify that the motor starts.

[3] When the system pressure reaches the high operating pressure, place the HOA switch in the OFF position.

[4] Verify that the motor stops.

[5] If the system pressure as shown on PI-2383 immediately goes back to the low operating pressure, contact the shift supervisor.

4.3 **Pump Stop Procedure.** To stop the main site fire water jockey pump from either the AUTOMATIC or HAND operating modes:

[1] Place the HOA switch on the local panel to the OFF position.

[2] If this fails to stop the pump, place the local panel's disconnect lever to the OFF position. (Refer to Appendix C, Sheet 3.)

[3] Verify that the pump stops.

4.4 **Emergency Stop Procedure.** The following procedure shall be used when the local panel disconnect switch was unable to stop the main site fire water jockey pump.

[1] The field operator shall notify the control room operator that an EMERGENCY STOP is necessary.

[2] The field operator shall go to MCC-4 (compartment 5FAL) and place the disconnect selector switch to the OFF position.

[3] Verify that the pump motor stops.

4.5 **Post Operation Activities.** After the main site fire water jockey pump is stopped, verify that the position of all valves and selector switches associated with the pump are set for the READY mode, as shown in Appendix D, Sheet 1.

5. MAIN SITE ELECTRIC FIRE WATER PUMP.

The main site electric fire water pump SJTP-24 is on local "hard wire" control through P-24 Controller. Signals from P-24 Controller (refer to Appendix C, Sheet 6), are transferred to the local panel LFCP-800 (refer to Appendix C, Sheet 10) and from there to the control room panel RFAP-100 (refer to Appendix C, Sheet 11).

The following subsections provide instructions for starting, monitoring, and stopping the main site electric fire water pump.

5.1 **Operational Ready Mode.** The electric fire water pump is designed to start from the READY mode. Once the P-24 Controller panel disconnect is put in the ON position, SJTP-24 is in the READY mode. In this mode the pump is ready to operate after receiving a start signal. In AUTOMATIC operation, this signal comes from the pressure switch in P-24 Controller. In MANUAL operation, this signal comes from the manual START pushbutton on P-24 Controller. (Refer to Appendix C, Sheet 6.)

WARNING

If there is insufficient pressure in the system to satisfy the pressure switch in P-24 Controller, once the disconnect is put in the ON position, SJTP-24 will start immediately.

[1] Lock the P-24 Controller door by putting the disconnect to the ON position.

[2] Verify that the red POWER ON light illuminates indicating that SJTP-24 is in the READY mode.

5.2 **Pump Manual Start Procedure.** Perform the following steps to manually start the main site electric fire water pump:

[1] On P-24 Controller panel, push the START button.

[2] Verify that SJTP-24 motor starts.

[3] If the pump does not start, push and turn the EMERGENCY RUN handle to the ON position (either the right or left side of the handle). This by-passes all of the controls in the local cabinet.

5.3 **Pump Monitoring.** In the READY mode, the main site electric fire water pump is designed to start from a low pressure switch in P-24 Controller and operate without monitoring. Once started the circuit "latches" and the motor will run continuously. The circuit must be broken at the local control panel to stop the pump. When the STOP is initiated, the circuit will open and the motor will stop. If there is insufficient pressure in the discharge header, returning the switch to the ON position will immediately start the motor again. If the header pressure remains above PSH-2416 set point, initiating the STOP will open the circuit and stop the pump even when the STOP button is released.

The following should be monitored by the operator:

[1] In the operational READY mode, verify that the red POWER light is illuminated.

[2] When the pump is running,

[a] The pressure should be between the normal operating ranges given in Appendix A, Sheet 1.

[b] Verify on the local control panel LFCP-800 that the SJTP-24 RUNNING and P-24 FLOW DETECTED lights illuminate.

5.4 **Pump Stop Procedure.** Use the following procedures to stop the main site electric fire water pump.

[1] If the pump started from an AUTOMATIC or MANUAL mode start signal, stop the pump by turning the STOP switch on P-24 Controller cabinet to the STOP position. The location of the stop switch is shown in Appendix C, Sheet 6.

NOTE

If the STOP is initiated before the P-24 Controller pressure switch has sufficient pressure, the pump will remain stopped as long as the switch is held in the STOP position. The motor will start immediately when the STOP is released. When the pressure is high enough to reset the P-24 Controller pressure switch, initiating the STOP will immediately break the circuit and the motor will remain stopped when the STOP is released.

[2] If the pump was started with the manual start EMERGENCY RUN switch, push and turn the EMERGENCY RUN handle into the OFF position.

[3] Verify that the motor starts.

5.5 **Emergency Stop Procedure.** If the steps in 5.4 failed to stop the pump, pull the breaker lever on the local control panel down to the OFF position. (Refer to Appendix C, Sheet 6.)

5.6 **Post Operation Activities.** When the main site electric fire water pump is no longer needed, return the system to its READY mode. To put this pump in the READY mode:

[1] Complete the items in Section 5.1.

[2] Push the RESET button in LFCP-800. The RESET button location is shown in Appendix C, Sheet 10.

6. MAIN SITE DIESEL FIRE WATER PUMP.

The main site diesel fire water pump SJTP-25 is on local "hard wire" control through P-25 Controller. Signals from P-25 Controller (refer to Appendix C, Sheet 9), are transferred to the local panel LFCP-800 (refer to Appendix C, Sheet 10) and from there to the control room panel RFAP-100 (refer to Appendix C, Sheet 11).

The following subsections provide instructions for starting, monitoring, and stopping the main site diesel fire water pump.

NOTE

If there are enough site personnel when the diesel fire water pump is running, an operator should monitor its functioning. The only automatic shutdowns of the diesel fire water pump are the governor over-speed and low fuel.

6.1 **Operational Ready Mode.** The main site diesel fire water pump is designed to start automatically from the READY mode. In this mode the pump will start after receiving a start signal. In AUTOMATIC operation, this signal comes from the pressure switch in P-25 Controller. In MANUAL operation, this signal comes from the MANUAL/OFF/AUTO switch inside the P-25 Controller cabinet door.

To put SJTP-25 in the READY mode:

[1] On the engine mounted panel, place the MANUAL/OFF/AUTO switch in the AUTO position (refer to Appendix C, Sheet 8).

[2] Open the door on the P-25 Controller cabinet and place the MANUAL/OFF/AUTO switch in the AUTO position (refer to Appendix C, Sheet 9).

[3] Verify that the green POWER ON light on the P-25 Controller cabinet front illuminates. (Refer to Appendix C, Sheet 9.)

6.2 **Pump Manual Start Procedure.** Perform the following steps to start the main site diesel fire water pump manually:

[1] On the P-25 Control cabinet, put the selector switch in the MANUAL position. (Refer to Appendix C, Sheet 9).

[2] Verify that the "P-25 Not In Automatic" light illuminates on the LFCP-800 on the local panel. (Refer to Appendix C, Sheet 10) and prints out and indicates on the control room panel RFAP-100.

NOTE

The manufacturer recommends cranking for approximately 15 seconds. If the engine does not start in this interval, wait 15 seconds. Repeat the above on alternating batteries until the engine starts.

[3] On the front of P-25 Controller compartment, push the CRANK ON BATT 1 pushbutton and hold it in until the engine starts. (Refer to Appendix C, Sheet 9.)

CAUTION

Do not hold a start button after the engine has started. This will cause damage to the starter motor, pinion, ring gear, and will cause the OVER CRANK light to indicate that the starter motor has run too long.

[4] If the engine does not crank when CRANK ON BATT 1 is pushed, push CRANK ON BATT 2.

[5] If the engine does not crank when CRANK ON BATT 2 is pushed, on the engine mounted panel, place the MANUAL/AUTO/STOP switch in the MANUAL position. (Refer to Appendix B, Sheet 5 and Appendix C, Sheet 8).

[6] Push in the MANUAL START 1 lever. (Refer to Appendix B, Sheet 5 for location.)

[7] If the engine still does not crank, push in the MANUAL START 2 lever.

[8] If the engine is started from the MANUAL START 1 or 2, switch the engine mounted MANUAL/AUTO/STOP switch to the AUTO position.

[9] Verify that the "P-25 ENGINE RUNNING" and "P-25 DISCHARGE FLOW DET" lights, on the local panel LFCP-800, illuminate when the engine starts. These signals indicate on RFAP-100 in the control room and print out when acknowledged.

6.3 **Pump Monitoring.** The diesel fire water pump is designed to start and run automatically without monitoring. Once started, the engine should be monitored at least once (continually if personnel are available). The following should be observed:

[1] Coolant flow coming from the discharge by-pass of SJTP-25 to:

[a] The engine coolant heat exchanger. Indication will be by coolant flow spilling into the pump drain hub. If the jacket coolant temperature exceeds 200^{O}F (refer to engine temperature listed on Appendix C, Sheet 9), open the bypass line around the regulator and adjust the flow until the engine temperature is within operating range. Notify the control room operator.

[b] The engine oil cooler. This has no direct sensor reading. Lube oil return temperature should be approximately 250^{O}F.

[2] Engine RPM. (Refer to Appendix A, Sheet 1 for normal range.)

[3] Verify locally that PI-2383, on the fire water discharge line, reads above the set pressure for SJTP-25. (Refer to Appendix A, Sheet 1.) Also, observe the pressure indicator in the control room.

[a] If the local discharge pressure gauge does not show adequate pressure, if there is no flow through the cooler spill lines back to the drain hub, and if there is no water spewing out of the shaft seal packing, the pump is not moving fluid. Immediately shut the engine off and notify the control room and shift supervisor as to what action to take.

[b] If the pump is pumping and the gauge does not show adequate pressure, notify the control room that pressure remains low. This may be because of unusually large usage (a large fire) or may indicate a broken line and severe leakage.

[4] Once the diesel fire water pump is started, LFCP-800 will give an audible alarm and the common trouble light will illuminate. In the control room there will be an audible alarm, a display function, and printout on the RFAP-100 panel. (Refer to Appendix C, Sheet 10 and 11, respectively.)

[5] Fuel level. Refuel when the level of the diesel fuel tank V-4 goes below 1/2 full as indicated on the sight glass level indicator.

6.4 **Pump Stop Procedure.** Perform the following steps to stop the diesel fire water pump:

[1] If the pump started from an AUTOMATIC mode start signal, stop the pump by pushing the STOP pushbutton on the P-25 Controller panel. This should shut off fuel and stop the engine.

[2] If the pump was started in the MANUAL start procedure, push the STOP switch on the front of P-25 Controller. (Refer to Appendix C, Sheet 9.)

NOTE

If the STOP is initiated before the P-25 Controller pressure switch has sufficient pressure, the pump will remain stopped as long as the STOP is held in. The engine will start again as soon as the STOP button is released. When the pressure is high enough to reset the P-25 Controller pressure switch, initiating the STOP will stop the engine and it will remain stopped when released.

[3] Verify that the engine stops.

6.5 **Emergency Stop Procedure.** If the steps in Section 6.4 failed to stop the pump, manually disengage the overspeed trip by pulling the lever down.

6.6 **Post Operation Activities.** When the diesel fire water pump is no longer needed, return the system to its READY mode. To put this pump in the READY mode:

[1] Complete the items in Section 6.1.

[2] Push the reset button in the local panel LFCP-800. This clears the LFCP-800 panel and resets it.

APPENDIX A

OPERATING PARAMETERS
MAIN SITE FIRE WATER PUMP SYSTEM
(Sheet 1 of 2)

PUMP	PRESSURE (PSIG) START	STOP	HIGH
SJTP-23	135±5	145±5[a]	150
SJTP-24	130±5	b	c
SJTP-25	125±5[d]	b	c

a The pressure must be above the value for 30±3 seconds to stop the pump.
b Must be stopped manually.
c Relief PSV set to by-pass minimum continuous flow at 150 psig.
d The pressure must be below the value for 10±2 seconds to cause a start.

CAUTION

The main site fire water pumps shall be operated within the following operating parameters at all times.

PARAMETER	UNITS	MIN	NORMAL OPER. RANGE LO	HI	MAX
SJTP-23					
Pump discharge pressure	psig	130	135	145	150
SJTP-24					
Pump discharge pressure	psig	125	130	150[e]	165
SJTP-25					
Pump discharge pressure	psig	120	125	150[e]	165
Engine coolant temperature	°F	g	175	197	g
Engine oil pressure	psig	g	15	50	g
Engine speed	RPM	1750	1800	1842	2165[f]
Engine coolant supply	psig	g	g	40	50

e This is the pressure relief valve setting.
f This is the overspeed trip setting.
g These values have no defined limits.

APPENDIX A

OPERATING PARAMETERS
MAIN SITE FIRE WATER PUMP SYSTEM
(Sheet 2)

Support Equipment List

A. LFCP-800 and RFAP-100 (FAP-200)
B. Fire water tank
C. Diesel fuel tank.

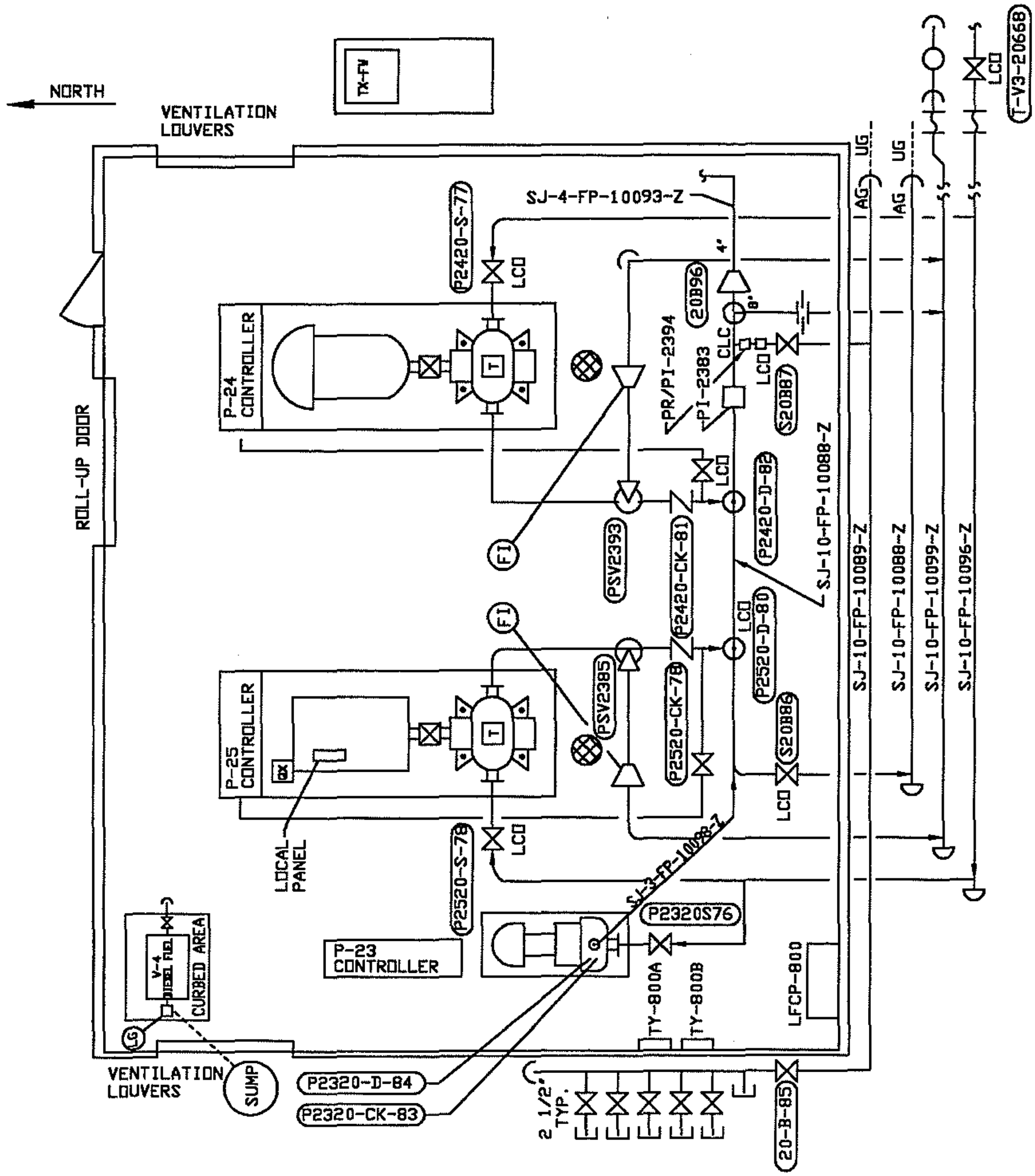
Personnel Equipment:

A. Hearing protection.

APPENDIX B

SCHEMATIC DIAGRAM
MAIN SITE FIRE WATER PUMP SYSTEM

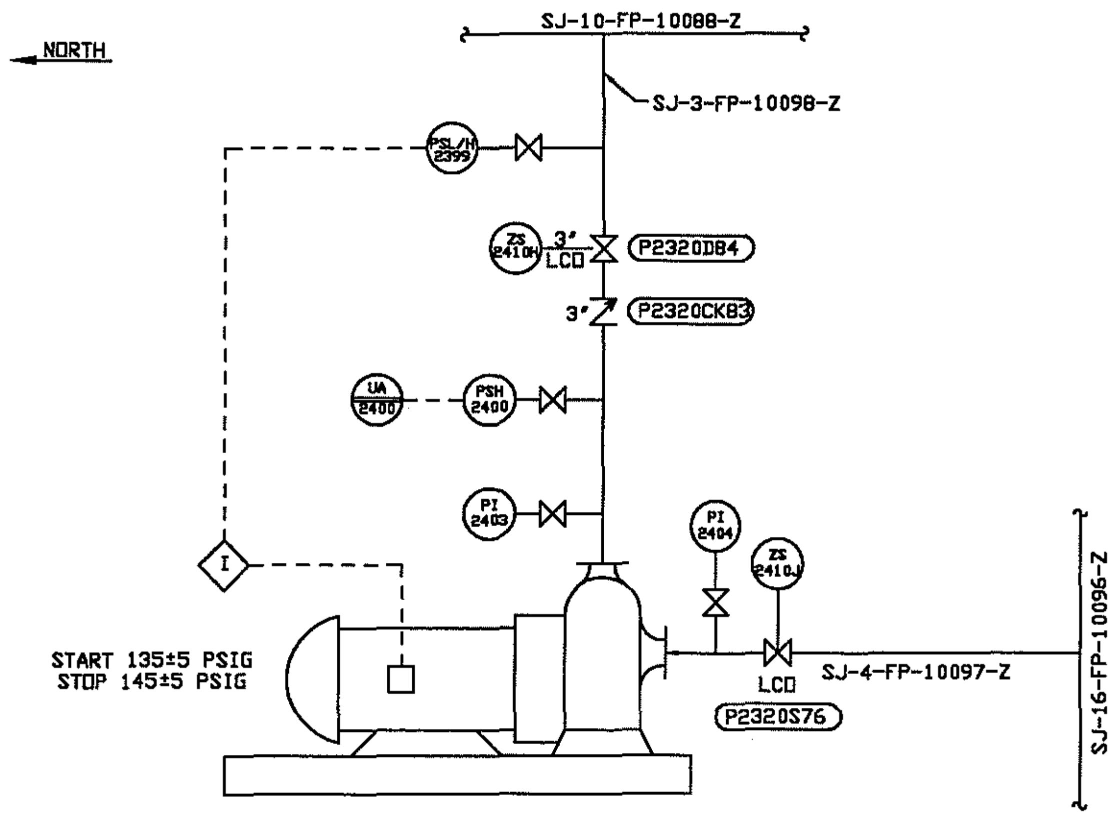
BUILDING 716
(Sheet 1 of 5)



APPENDIX B

SCHEMATIC DIAGRAM
MAIN SITE FIRE WATER PUMP SYSTEM

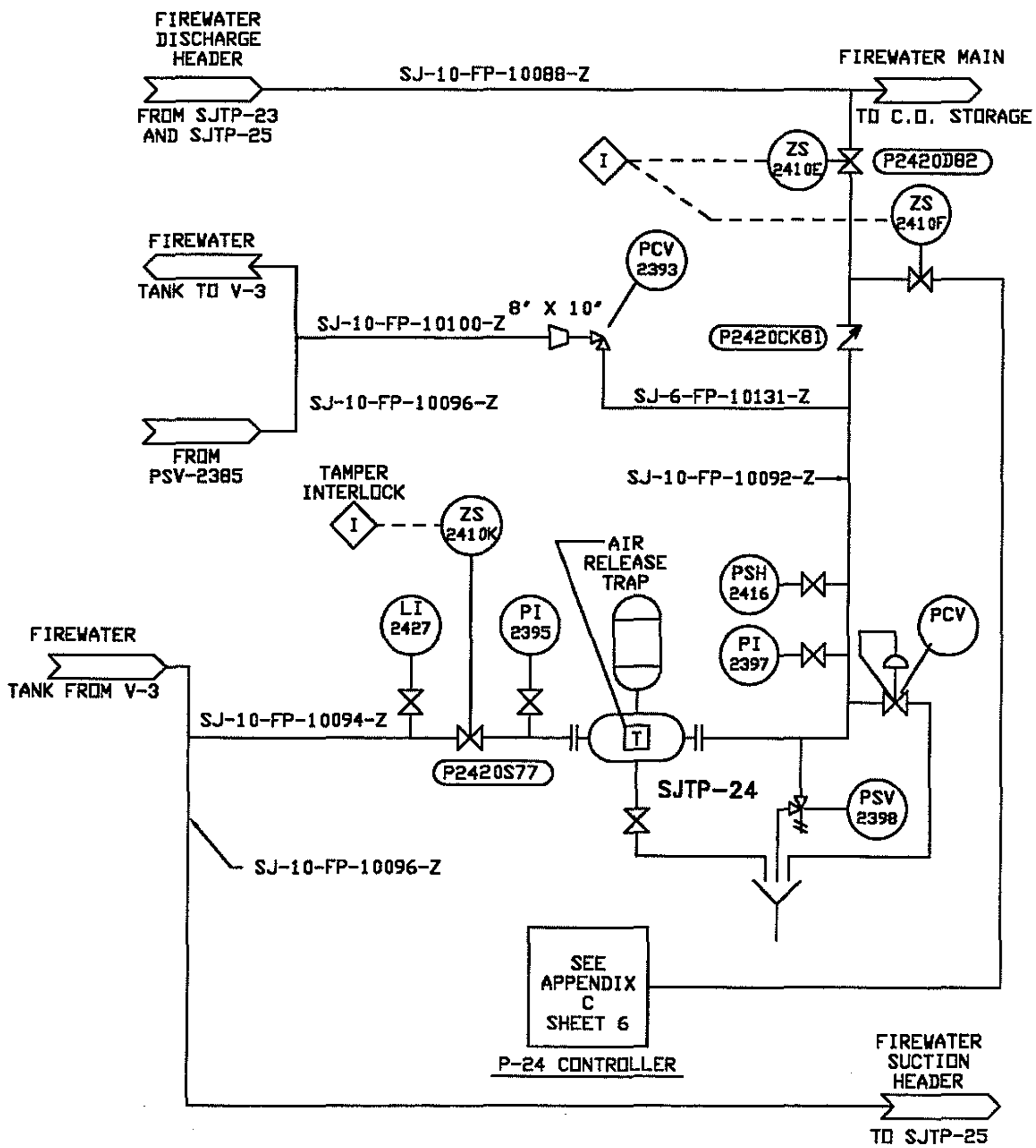
MAIN SITE FIRE WATER JOCKEY PUMP SJTP-23
CONTROL FUNCTION DIAGRAM
(Sheet 2)



APPENDIX B

SCHEMATIC DIAGRAM
MAIN SITE FIRE WATER PUMP SYSTEM

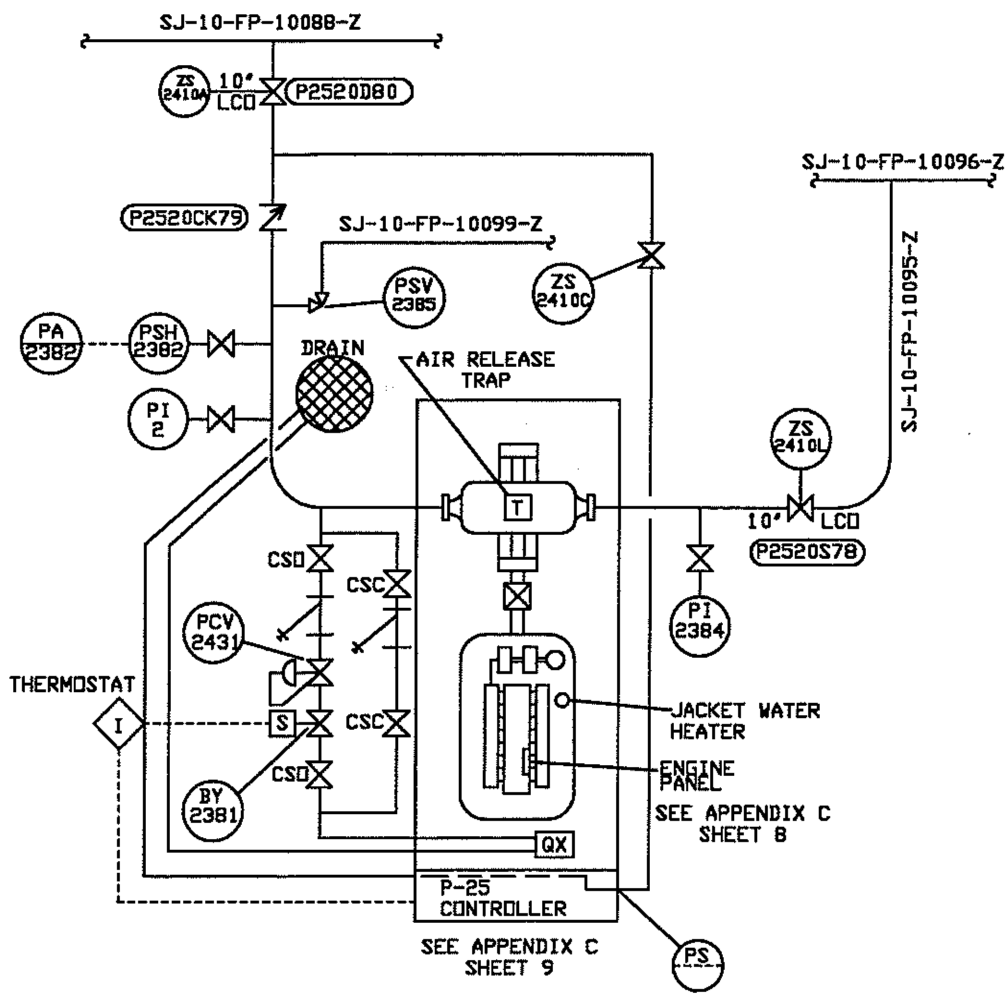
MAIN SITE ELECTRIC FIRE WATER PUMP SJTP-24
CONTROL FUNCTION DIAGRAM
(Sheet 3)



APPENDIX B

SCHEMATIC DIAGRAM
MAIN SITE FIRE WATER PUMP SYSTEM

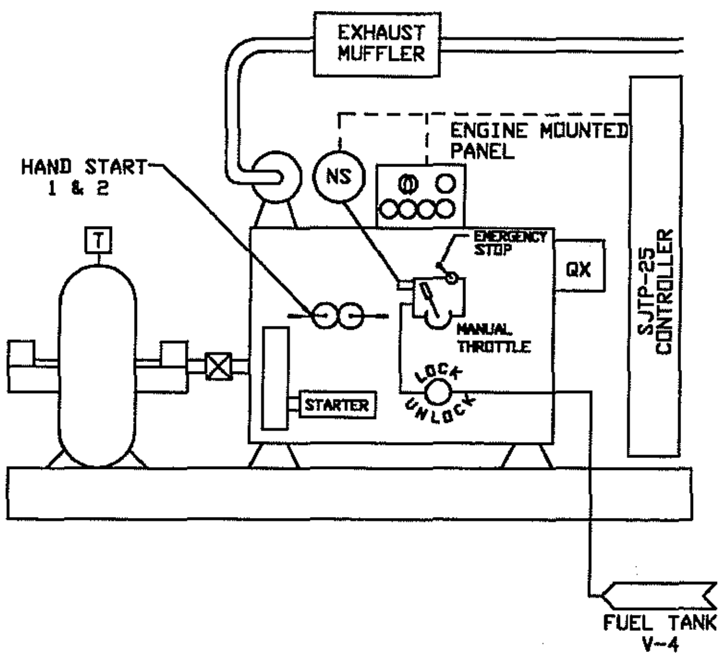
MAIN SITE DIESEL FIRE WATER PUMP SJTP-25
CONTROL FUNCTION DIAGRAM
(Sheet 4)



APPENDIX B

SCHEMATIC DIAGRAM
MAIN SITE FIRE WATER PUMP SYSTEM

MAIN SITE DIESEL FIRE WATER PUMP SJTP-25
EQUIPMENT LAYOUT
(Sheet 5)



APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM
(Sheet 1 of 11)

V-3 Main Site Fire Water Tank

Nominal Capacity	400,000 gal.
Diameter	66 ft.
Height	16 ft.
Working Height	14'-9"
Working Capacity	340,000 gal.

APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM

MAIN SITE FIRE WATER JOCKEY PUMP SJTP-23
(Sheet 2)

Pump

Type	Horizontal End Suction Top Discharge Close Coupled
Manufacturer	ITT
Model	AC 2000
Size	1-1/2 x 1-1/2 x 9
TDH, Design	140 psi (323 ft.)
Flow design	50 GPM

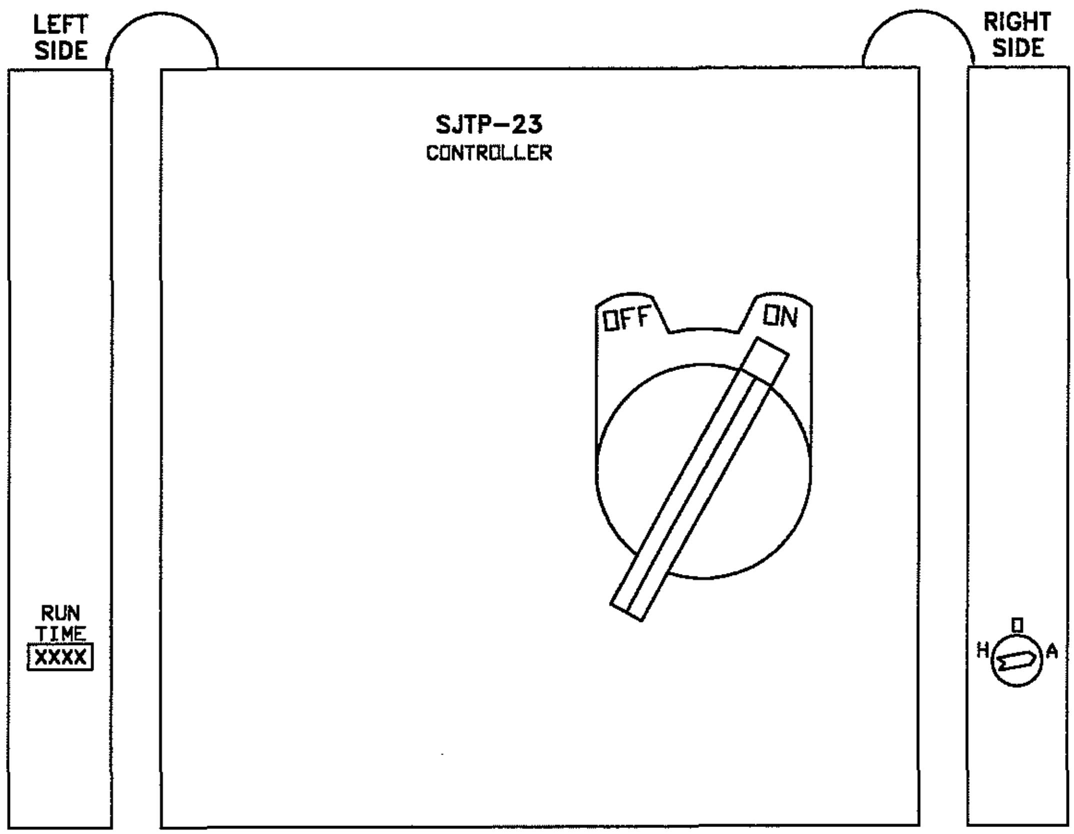
Motor

Size	15 HP
Power	480-Volt, 60Hz, 3 phase
Speed	3480 RPM
Frame	215JP
Service Factor:	1.0
Accessories	PS-2399

APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM

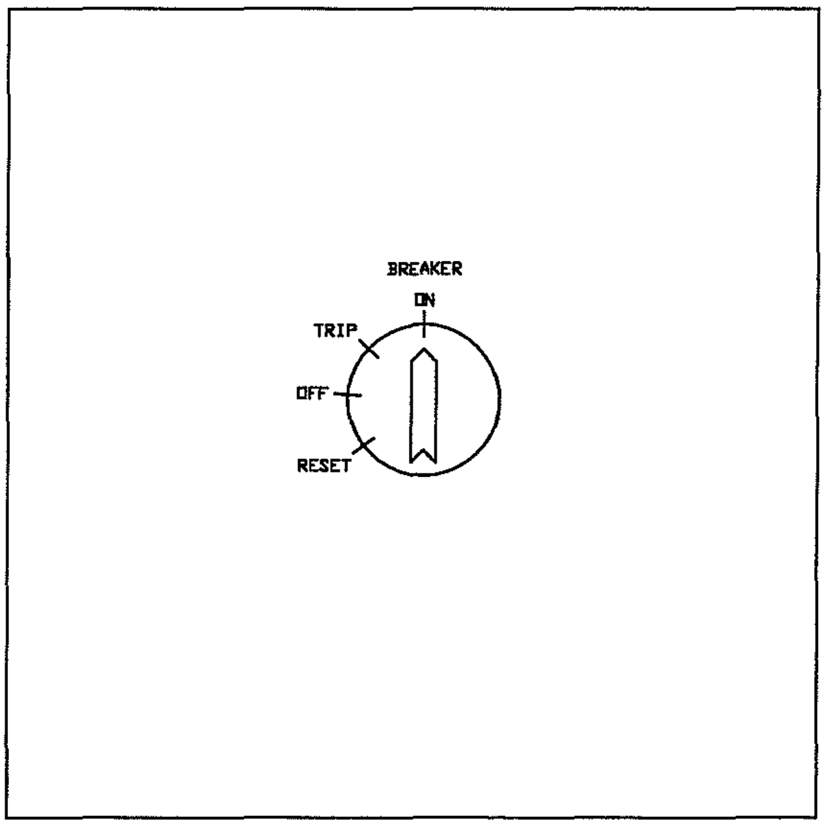
MAIN SITE FIRE WATER JOCKEY PUMP SJTP-23
LOCAL PANEL
(Sheet 3)



APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM

MAIN SITE FIRE WATER JOCKEY PUMP SJTP-23
MCC-4, CABINET 5FAL
(Sheet 4)



APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM

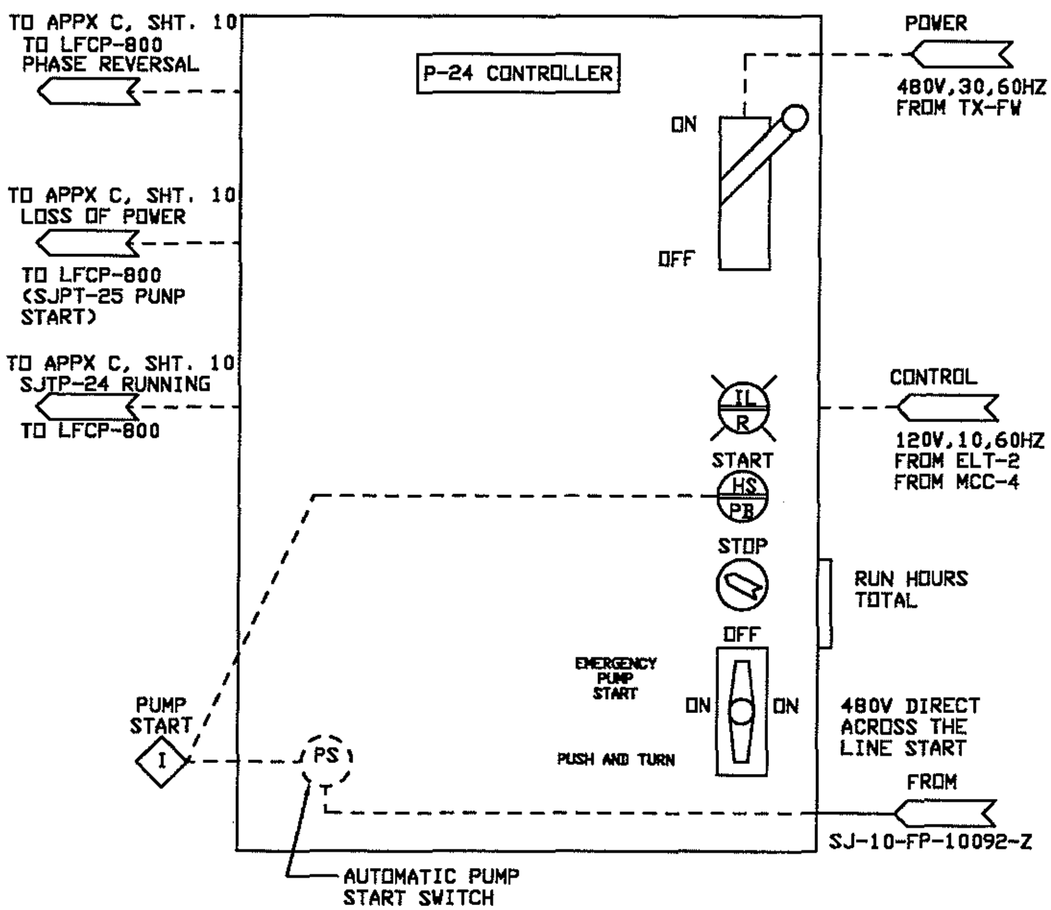
MAIN SITE ELECTRIC FIRE WATER PUMP SJTP-24
(Sheet 5)

Pump Type:	Horizontal split case, foot mounted, side suction, side discharge
Manufacturer:	Reddy Buffaloes
Model:	33L3, 10 x 10DF
Size:	10" x 10" x 17
Flow	150 GPM
RPM	1780
Pressure	125 psig
Accessories:	PSV-2393
Design	NFPA-20
Driver Type:	Induction Motor
Manufacturer:	Lincoln Electric
Frame:	445T
HP/RPM:	200/1780
Volts/Phase/Hertz:	480/3/60
Enclosure:	TEFC
Service Factor:	1.15
Accessories:	Stator Strip Heater

APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM

MAIN SITE ELECTRIC FIRE WATER PUMP SJTP-24
LOCAL CONTROL PANEL
(Sheet 6)



APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM

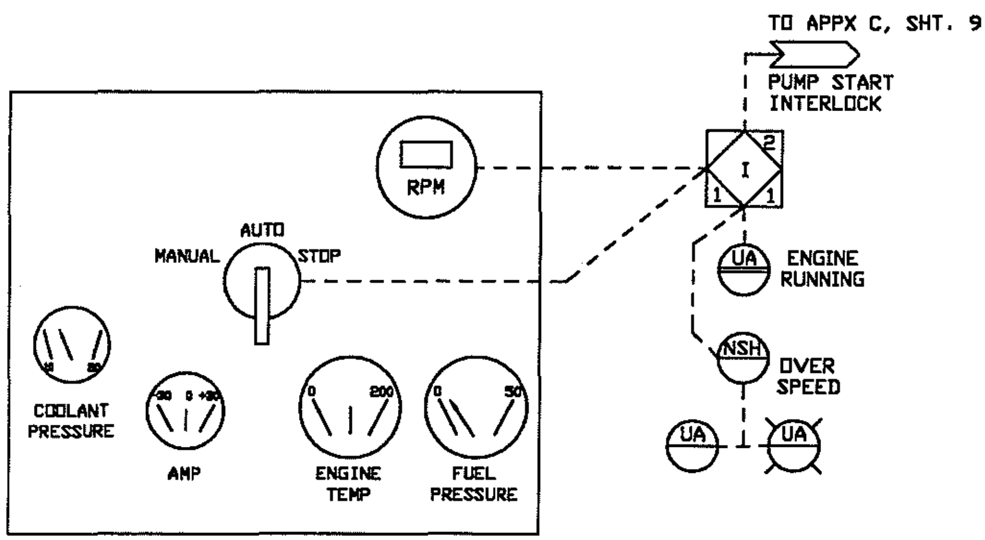
MAIN SITE DIESEL FIRE WATER PUMP SJTP-25
(Sheet 7)

SJTP-25:	Horizontal split case, foot mounted, side suction, side discharge
Manufacturer:	Reddy Buffaloes
Model:	
Size:	10" x 10" x XX
RPM	1780
Flow	1500 GPM
Pressure	125 psig
Design	NFPA-20
Driver Type:	Diesel engine
Manufacturer:	Caterpillar
Model:	
HP:	231
Speed:	1800(-50, +42) RPM
Size:	xxx C.I.D., 6 cyl., 4 stroke, turbocharged
Accessories:	Local control panel LFCP-800 Oil heater Coolant heat exchanger Jacket water heater Pressure relief valve PSV-2385 Overspeed governor
V-4 Fuel Tank:	
Capacity:	350 gal.

APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM

MAIN SITE DIESEL FIRE WATER PUMP SJTP-25
ENGINE MOUNTED PANEL
(Sheet 8)

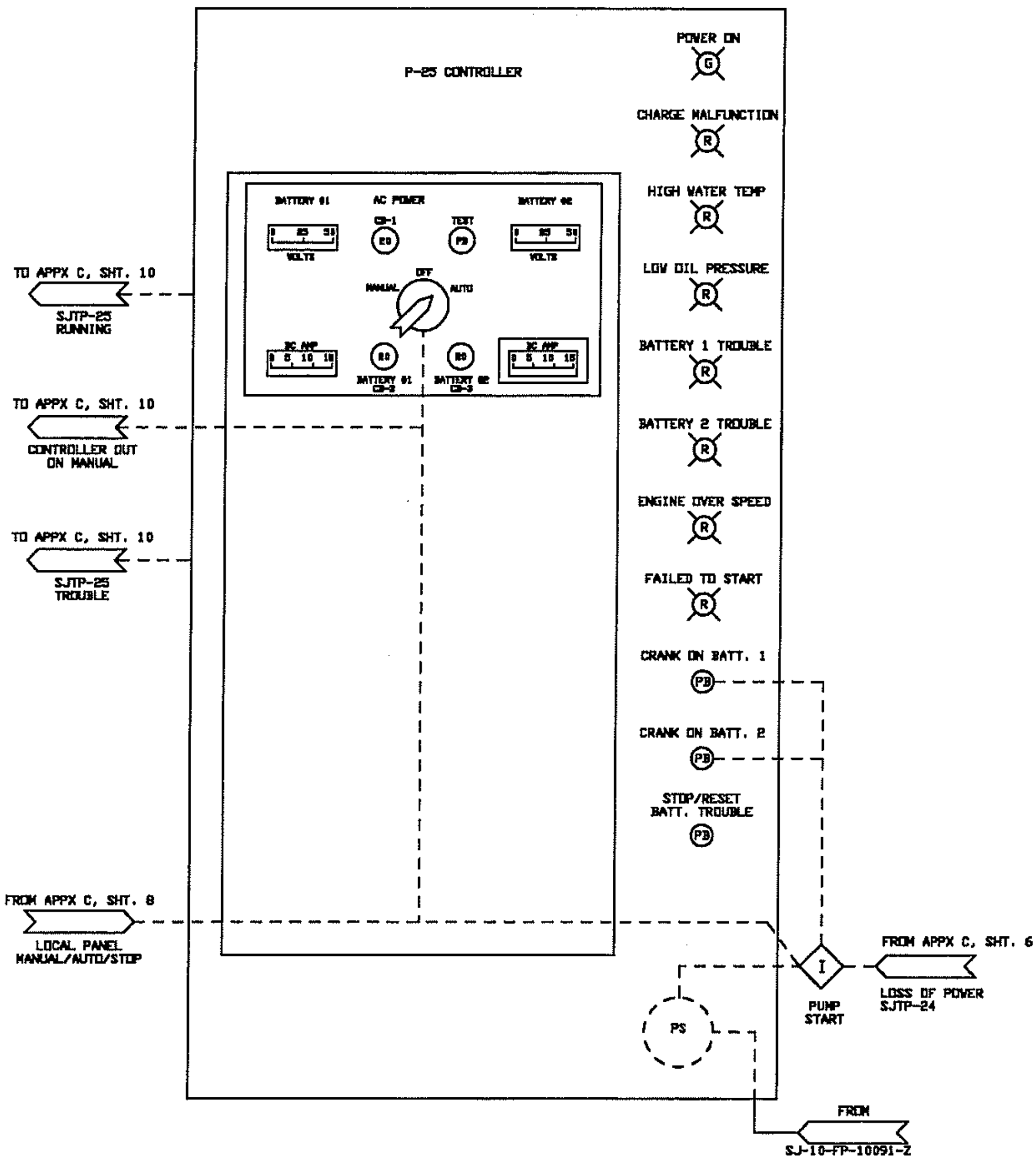


W= NUMBER OF DIGITAL INPUTS
X= NUMBER OF DIGITAL OUTPUTS
Y= NUMBER OF ANALOG INPUTS
Z= NUMBER OF ANALOG OUTPUTS

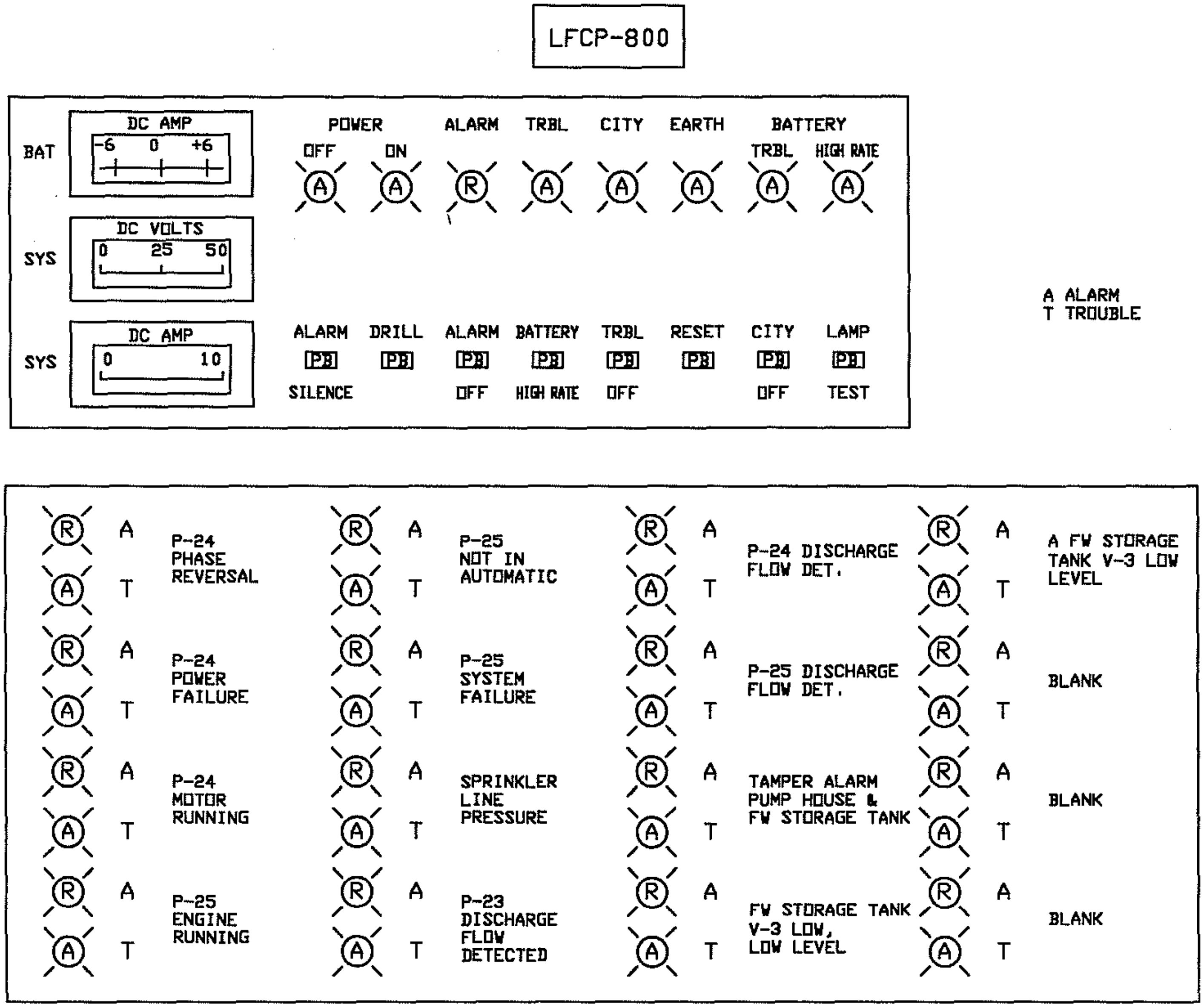
APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM

MAIN SITE DIESEL FIRE WATER PUMP SJTP-25
CONTROL PANEL
(Sheet 9)



APPENDIX C
TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM
LOCAL PANEL LFCP-800
(Sheet 10)

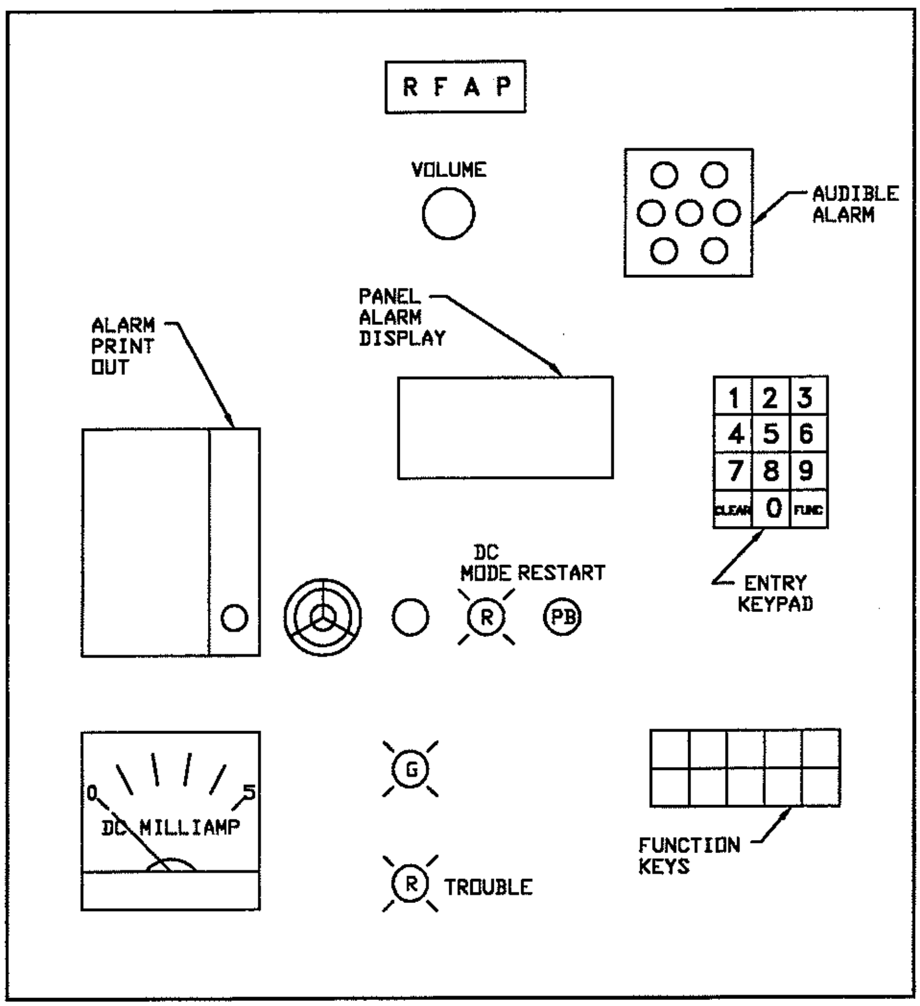


A ALARM
T TROUBLE

APPENDIX C

TECHNICAL DATA
MAIN SITE FIRE WATER PUMP SYSTEM

CONTROL ROOM PANEL *RFAP-100
(Sheet 11)



*FAP-100 Identical is in SOC

APPENDIX D

READY MODE VALVE AND SWITCH POSITIONS
MAIN SITE FIRE WATER PUMP SYSTEM

MAIN SITE FIRE WATER JOCKEY PUMP SJTP-23
(Sheet 1 of 3)

	ITEM	POSITION
1.	Local panel selector switch (HOA)	Auto
2.	Local panel door disconnect switch	ON
3.	Suction valve, P2320S78	Open
4.	Discharge valve, P2320D84	Open
5.	Impulse line valve to PSL/H-2399	Open
	Impulse line valve to PSH-2400	Open

APPENDIX D

READY MODE VALVE AND SWITCH POSITIONS
MAIN SITE FIRE WATER PUMP SYSTEM

MAIN SITE ELECTRIC FIRE WATER PUMP SJTP-24
(Sheet 2)

1.	Hand valve on impulse line to start/stop PS	Open
2.	Hand valve: On impulse line to LI-2427	Open
	On impulse line to PI-2392	Open
	On impulse line to PSH-2416	Open
	On impulse line to PI-2397	Open
3.	P-24 Controller panel disconnect	ON
4.	Emergency start lever position (both)	OFF
5.	Transformer TXFW	ON
6.	Test line valve, S20B86	Closed
7.	SJTP-24 suction isolation valve P2420S77	Open LCO
	SJTP-24 discharge isolation valve P2420D82	Open LCO
8.	Main site fire water header valve S20B87	Open LCO
9.	LFCP-800 reset button	Pushed

APPENDIX D

READY MODE VALVE AND SWITCH POSITIONS
MAIN SITE FIRE WATER PUMP SYSTEM

MAIN SITE DIESEL FIRE WATER PUMP SJTP-25
(Sheet 3)

1.	Engine mounted panel HOA	AUTO
2.	P-25 Controller cabinet HOA	AUTO
3.	Hand valve on impulse line to P-25 Controller pressure switch	Open
4.	Battery charger #1	On
5.	Battery charger #2	On
6.	MCC No. 4	On
7.	Coolant supply by-pass	Closed
8.	Engine fuel pump shut off valve	Open
9.	Test line valve, S20886	Closed LCC
10.	SJTP-25 suction isolation valve, P2520S78	Open LCO
11.	SJTP-25 discharge isolation valve, P2520D80	Open LCO
12.	Main site fire water header valve, S20B87	Open LCO
13.	LFCP-800 reset button	Pushed
14.	Hand valve on impulse lines to PI-2 and PI-2384	Open

APPENDIX E

PUMP START/STOP CAPABILITIES
MAIN SITE FIRE WATER PUMP SYSTEM

PUMP NO.	CONTROLLER PANEL		DISCONNECT		MCC CONTROL		MCC COMPARTMENT	
	START	STOP	START	STOP	START	STOP	POWER	CONTROL
SJTP-23	H or A	O	N	OFF	N	OFF	MCC-4 (5FAL)	
SJTP-24	Y[1]	Y[2]	N	OFF	NA[3]		NA[3]	MCC-4 (5FAR)
SJTP-25	H or A[4]	Y	NA	NA	NA		NA	MCC-4 (5FAR)

1 START: Normal from pushbutton on Controller panel; emergency from EMERGENCY RUN (turn handle to horizontal).
2 STOP: Normal from selector switch on Controller panel; emergency from disconnect OFF position
3 NO MCC: Fed directly off 5KV Bus 1 through transformer TX-FW.
4 START: On panel BATT 1 or 2 start, engine mounted panel in AUTO, too. On engine mounted MANUAL START 1 or 2, engine mounted panel in MANUAL

LEGEND:

<u>Item</u>	<u>Description</u>
Local Control:	Control at the pump.
DCS Control:	Operates in local mode only, there is no DCS function.
MCC Control:	Pump control at the pump's MCC panel.
PB:	Pushbutton switch.
HOA:	Hand-Off-Automatic selector switch.

Y - Indicates that a pushbutton operation is possible.
N - Indicates that a pushbutton operation is not possible.
H - Indicates Hand (LOCAL) position on the Hand-Off-Automatic Switch.
O - Off Position on the Hand-Off-Auto Switch.
A - Indicates Auto (DCS) position on the Hand-Off-Auto Switch.
NA - Not applicable.

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

DOCK FIRE WATER PUMP SYSTEM

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

DOCK FIRE WATER PUMP SYSTEM

List of Effective Work Package Pages

Page Number	Revision Number	Page Number	Revision Number
1 thru 53/(54 Blank)	1		

Record of Applicable Technical Directives

None

TABLE OF CONTENTS

1. INTRODUCTION.

This procedure describes the normal operation of the dock area fire water pumps. The pumps are the dock jockey pump SJTP-5; the dock electric driven fire water pumps, SJTP-1 and SJTP-3; and the dock diesel driven fire water pumps, SJTP-2 and SJTP-4. The pumps are located in fire pump house building 720 on Dock 1. The fire water supply comes from the Mississippi River. The pumps supply fire water to the docks and to the main site.

The dock fire water pumps are designed to cascade from the main site fire water pumps. If the main site pumps cannot maintain pressure during fire water usage, the dock electric fire water pump SJTP-1 will start at a lower pressure. If the dock electric fire water pump SJTP-1 can not maintain system pressure, the dock diesel fire water pump SJTP-2 will start. If the pressure continues to fall after SJTP-2 starts, SJTP-3 will start. If the pressure continues to fall, SJTP-4 will start. SJTP-1 through -4 must all be shut off manually once they have started. The equipment is designed in accordance with NFPA-20. The system design conforms to NFPA-20 because it is not the primary system.

The jockey pump SJTP-5 is a 14 stage vertical turbine pump with a design flow of 100 GPM and a pressure of 140 psig (340' TDH). The pump's purpose is to maintain pressure in the static system. The pump is driven by a 15 horsepower motor. The motor is started and stopped by pressure switch PSL/H-2050 that reads system pressure. Jockey pump SJTP-5 is the back-up to the main site fire water jockey pump SJTP-23.

The dock electric fire water pump SJTP-1 is a three stage vertical turbine pump with a design flow of 1300 GPM at a pressure of 120 psig (293' TDH). The pump is driven by a 200 horsepower motor. It is started from pressure switch PSL-2060 on the pump's controller. (Refer to Appendix C, Sheet 5.) Once started, SJTP-1 must be stopped at the pump controller. If the pump is running and there is no flow through the system, PSV-2059 will open and return minimum continuous flow back into the Mississippi River.

The dock diesel fire water pump SJTP-2 is identical to the electric fire water pump SJTP-1. It is driven by a diesel engine. The engine develops 238 brake horsepower at 2100 RPM. The fuel for the engine is stored in its own tank in the pump house building. The engine is started from a signal from PSL-2055 on the pump's controller. (Refer to Appendix C, Sheet 8.) Once started, SJTP-2 must be stopped at the pump controller. (Refer to Appendix C, Sheet 8.) If the pump is running and there is no flow through the system, PSV-2054 will open and return minimum continuous flow back into the Mississippi River.

The dock electric fire water pump SJTP-3 is a two stage vertical turbine pump with a design flow of 10,000 GPM at a pressure of 112 psig (297' TDH). The pump is driven by a 1000 horsepower motor. It is started from pressure switch PSL-2046 in the pump's controller (refer to Appendix C, Sheet 9). Once started, SJTP-3 must be stopped at the pump controller. If the pump is running and there is no flow through the system, PSV-2045 will open and return minimum continuous flow back into the Mississippi River.

The dock diesel fire water pump SJTP-4 is identical to the electric fire water pump SJTP-3. It is driven by a diesel engine. The engine develops 1065 brake horsepower at 1750 RPM. The fuel for the engine is stored in its own tank in the pump house building. The engine is started from a signal from PSL-2041 on the pump's controller. (Refer to Appendix C, Sheet 13.) Once started, SJTP-4 must be stopped at the pump controller. If the pump is running and there is no flow through the system, PSV-2040 will open and return minimum continuous flow back into the Mississippi River.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the dock fire water jockey pump, SJTP-5; dock electric fire water pump, SJTP-1; and dock diesel fire water pump, SJTP-2; dock electric fire water pump, SJTP-3; and dock diesel fire water pump, SJTP-4, under normal operating conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Preparing the pumps for operation.

B. Starting, stopping, and emergency stopping.

C. Performing required post operation actions.

1.3 **Applicability.** This procedure applies under normal operating conditions when the local control system is operational. There is one authorized operating mode, LOCAL.

1.4 Reference Documents.

A. Operating Procedure ASR4330.5, Interim Repair/ Mitigation Procedure.

B. Piping and Instrumentation Diagrams, Fire Water Pumps SJTP-1, through SJTP-5 Pump Platform Dock No. 1, drawing no. SJ-FP-103-048.

C. Fluid Power Equipment, Inc., Pump Installation, Operation and Maintenance Instructions.

D. Electrical work package 025 00, 5 KV Switchgear Dock No. 1.

2. PRECAUTIONS AND LIMITATIONS.

The following precautions and limitations apply to the operation of the fire water pump in both LOCAL Automatic and LOCAL Manual.

A. All instrumentation associated with the dock fire water pumps shall have current calibration stickers. For any device that is out of compliance, refer to the shift supervisor for direction. Refer to operating procedure ASR4330.5, Interim Repair/Mitigation Procedure.

B. The minimum and maximum operating envelope parameters in Appendix A shall be observed at all times.

C. The following safety devices shall be in place and operational:

1. Coupling guards.

2. Over speed trip.

3. Safety valves PSV-2059, PSV-2054, PSV-2045, and PSV-2040.

D. All personnel entering the fire water pump house with SJTP-1, -2, -3 or -4 running shall wear OSHA approved hearing protection.

E. Valves P120D, P220D, P320D, P420D, P520D, P520D1, P520D2, FW40201 and FW37201 shall be locked and chained open.

3. PREREQUISITE ACTIONS.

The following actions shall be taken prior to operating the dock fire water pumps. These actions apply to operation in both LOCAL Automatic and LOCAL Manual.

3.1 Field Preparation. The following steps shall be performed as part of the operational ready mode:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present, piping is properly configured, and motor grounding straps are in place.

[2] Verify that all valves and switches are in the operational ready mode. (Refer to Appendix D, Sheets 1 through 5.)

[3] Verify that the Dock No. 1 control room panel LFCP-500 is reset. (Refer to Appendix C, Sheet 14.)

[4] Verify that the motor starter circuit breakers are reset. (Refer to Appendix C, Sheets 3, 5 and 10.)

[5] Verify that the local instrumentation shown in Appendix B, Sheets 2, 3, 4, 6 and 7 have current calibration.

For SJTP-5 in Appendix B, Sheet 2:

[a] Discharge pressure gauge, PI-1(P5).

[b] High/low pressure switch, PSL/H-2050.

For SJTP-1 in Appendix B, Sheet 3:

[c] Discharge pressure indicator, PI-1(P1).

[d] Pressure switch low, PSL-2060.

For SJTP-2 in Appendix B, Sheet 4:

[e] Discharge pressure indicator, PI-1(P2).

[f] Pressure switch low, PSL-2055.

[g] Level indicator, LG-2456 on the diesel fuel tank.

For SJTP-3 in Appendix B, Sheet 6:

[h] Discharge pressure indicator, PI-1(P3).

[i] Pressure switch low, PSL-2046.

For SJTP-4 in Appendix B, Sheet 7:

[j] Discharge pressure indicator, PI-1(P4).

[k] Pressure switch low, PSL-2041.

[l] Level indicator LG-2457 on the diesel fuel tank.

For system devices in the dock fire water pump house:

[m] Pressure indicator PI-2345 on the pumps' discharge header, SJ-10-FW-48-UAF.

[n] Pressure indicator PI-2432 on the pumps' discharge header SJ-20-FW-37-UAF.

[7] Verify that no warning lights on the local fire water control panels P-1, P-2, P-3, P-4 and LFCP-500 in the Dock No. 1 control room are illuminated and that RFAP-100 indicates normal conditions. (Refer to Appendix B, Sheets 14 and 15, respectively.)

[8] On P-1 and P-3 Controllers, verify that the amber POWER AVAILABLE lights are illuminated indicating that the pumps are in the ready mode. The power comes from the Dock No. 1 5KV switchgear.

[9] On SJTP-2 and SJTP-4 Controllers, verify that the green BATTERY ON CHARGER lights are illuminated. (Refer to Appendix C, Sheets 8 and 13.) If any red lights on the SJTP-2 or SJTP-4 Controller panels are illuminated, notify the shift supervisor.

[10] Verify that there is power from LP-6 to the heater circuits by noting that they are warm (hot):

[a] On SJTP-1 and SJTP-3 motor winding heaters.

[b] On SJTP-2 and SJTP-4 engine oil heater.

[c] On SJTP-2 and SJTP-4 engine jacket water heater.

[11] Verify that the fuel level as indicated by LG-2456 and LG-2457 in the diesel fuel tanks for SJTP-2 and SJTP-4, respectively, show at least 75% full of diesel fuel.

4. **DOCK FIRE WATER JOCKEY PUMP SJTP-5.**

The dock fire water jockey pump can operate only out of its local panel in LOCAL mode. In LOCAL mode there are two modes of operation: AUTOMATIC and HAND. These operating modes are controlled through the HOA switch on the local panel. (Refer to Appendix C, Sheet 2.)

4.1 **AUTOMATIC Mode.** In the AUTOMATIC operating mode, the dock fire water jockey pump runs off set points in PSL/H-2050 and requires only occasional monitoring once the system is initially verified. To put SJTP-5 into AUTOMATIC mode:

NOTE
The dock fire water jockey pump SJTP-5 is used as a back up to the main site fire water jockey pump SJTP-23. SJTP-5 HOA normal position is in the OFF position.

[1] Place the HOA switch in the AUTO position.

[2] Verify that the motor starts at its lower set point by observing PI-2435 on the 10" discharge header.

[3] Verify that the motor stops at its upper set point by observing PI-2435 on the 10" discharge header.

NOTE
The set points are verified by the instrumentation group and are listed in Appendix A, Sheet 1.

[4] Verify that the pump does not immediately start again. If the pump restarts within minutes, it indicates that the check valve failed to close or the system has a severe leak.

[5] If the motor immediately restarts or does not shut off automatically, contact the shift supervisor.

4.2 **HAND Mode.** In the HAND mode, the dock fire water jockey pump will run continuously until manually shut off. In this operating mode, it must be monitored continuously to be kept within its operating limits as follows:

[1] When the system pressure is at or below the low operating pressure, place the HOA switch in the HAND position and press the START pushbutton.

[2] Verify that the motor starts.

[3] When the system pressure reaches the high operating pressure, place the HOA switch in the OFF position.

[4] Verify that the motor stops.

[5] If the system pressure as shown on PI-2435 or PI-2432 immediately goes back to the low operating pressure, contact the shift supervisor.

4.3 **Pump Stop Procedure.** To stop the dock fire water jockey pump from either the AUTOMATIC or HAND operating modes:

[1] Place the HOA switch on P-5 Controller, the local panel, to the OFF position.

[2] If this fails to stop the pump, place the local panel's disconnect lever in the OFF position. (Refer to Appendix C, Sheet 2.)

[3] Verify that the pump stops.

4.4 **Emergency Stop Procedure.** The following procedure shall be used when the local panel disconnect switch is unable to stop the dock fire water jockey pump.

[1] The field operator shall notify the control room operator that an EMERGENCY STOP is necessary.

[2] The field operator shall go to MCC-D1 (compartment 1FB) and place the disconnect selector switch to the OFF position. (Refer to Appendix C, Sheet 3.)

[3] Verify that the pump motor stops.

4.5 **Post Operation Activities.** After the dock fire water jockey pump is stopped, verify that the position of all valves and selector switches associated with the pump are set for the READY mode, as shown in Appendix D, Sheet 1.

5. DOCK ELECTRIC FIRE WATER PUMP SJTP-1.

The dock electric fire water pump SJTP-1 is on local "hard wire" control through P-1 Controller. Signals from the local controller, P-1 Controller (refer to Appendix C, Sheet 5), are transferred to the local panel LFCP-500 (Refer to Appendix C, Sheet 14) and from there to the control room panel RFAP-100. (Refer to Appendix C, Sheet 15.)

The following subsections provide instructions for starting, monitoring, and stopping the dock electric fire water pump SJTP-1.

5.1 **Operational Ready Mode.** The electric fire water pump SJTP-1 is designed to start from the READY mode. Once the P-1 Controller panel disconnect is put in the ON position, SJTP-1 is in the READY mode. In this mode the pump is ready to operate after receiving a start signal. In AUTOMATIC operation, this signal comes from pressure switch PSL-2060 on P-1 Controller. In MANUAL operation, this signal comes from the manual START pushbutton on P-1 Controller. (Refer to Appendix C, Sheet 5.)

WARNING

If there is insufficient pressure in the system to satisfy the pressure switch PSL-2060 on P-1 Controller, once the disconnect is put in the ON position, SJTP-1 will start immediately.

[1] Verify that there is sufficient pressure as indicated on PI-2435 so that SJTP-1 will not start immediately. Refer to Appendix A, Sheet 1 for this pressure.

[2] Verify that an authorized electrician has closed the disconnect on P-1 Controller to the ON position. The disconnect is behind the door in the lower section of P-1 Controller.

[3] Verify that the amber POWER ON light illuminates indicating that SJTP-1 is in the READY mode.

5.2 **Pump Manual Start Procedure.** Perform the following steps to manually start the dock electric fire water pump SJTP-1:

WARNING

The operator must stand to the hinged side of the controller cabinet door when starting or shutting down the pumps from the controller. Breaker malfunction could cause an explosion that could violently push open the cabinet door, exposing the operator to possible injury.

[1] On the P-1 Controller panel, or at the remote START pushbutton on the East wall of the pumphouse near the door, push the red START button.

[2] Verify that SJTP-1 motor starts.

5.3 **Pump Emergency Start Procedure.** If the diesel fire water pumps did not start on AUTOMATIC or MANUAL, if the electric pump is required for service and did not start from the pressure switch or from the pushbutton on P-1 Controller, contact the control room and notify the shift supervisor of an emergency start requirement.

NOTE
The emergency start must be performed by authorized electricians according to Electrical Operations Manual work package 025 00.

5.4 **Pump Monitoring.** In the READY mode, the dock electric fire water pump SJTP-1 is designed to start from low pressure switch PSL-2060 on P-1 Controller and operate without monitoring. Once started the circuit "latches" and the motor will run continuously. The circuit must be broken at P-1 Controller panel to stop the pump. When the STOP is initiated, the circuit will open and the motor will stop. If there is insufficient pressure in the discharge header, releasing the switch will immediately start the motor again. If the header pressure remains above PSL-2060 set point, initiating the STOP will open the circuit and stop the pump even when the STOP button is released. The following should be monitored during the operator's normal rounds:

[1] In the operational READY mode, the items listed in Section 3.1.

[2] When the pump is running,

[a] The pressure is between the normal operating ranges of 110 psig to 165 psig.

[b] The Dock No. 1 control room panel LFCP-500 that only the SJTP-1 RUNNING light illuminates.

[c] The main site control room receives an alarm on the RFAP.

5.5 **Pump Stop Procedure.** Use the following procedures to stop the dock electric fire water pump SJTP-1.

WARNING

The operator must stand to the hinged side of the controller cabinet door when starting or shutting down the pumps from the controller. Breaker malfunction could cause an explosion that could violently push open the cabinet door, exposing the operator to possible injury.

[1] If the pump started from an AUTOMATIC or MANUAL mode start signal, stop the pump by pushing the STOP pushbutton on the P-1 Controller cabinet or the remote

STOP pushbutton on the East wall of the pumphouse near the door. The location of the stop pushbutton is listed in Appendix C, Sheet 5.

NOTE

If the STOP is initiated before the P-1 Controller pressure switch has sufficient pressure, the pump will remain stopped as long as the STOP switch is pushed in. The motor will start immediately if the STOP button is released. When the pressure is high enough to reset the pressure switch PSL-2060, initiating the STOP will immediately break the circuit and the motor will remain stopped.

[2] Verify that the motor stops.

5.6 **Emergency Stop Procedure.** If the steps in Section 5.5 failed to stop the pump, notify the electricians. Only the electricians are qualified to perform an emergency stop procedure. The motor and pump can run safely until the qualified electricians shut down the motor.

5.7 **Post Operation Activities.** When the dock electric fire water pump SJTP-1 is no longer needed, return the system to its READY mode. To put this pump in the READY mode:

[1] Complete the items in Section 3.1.

[2] Push the RESET button in LFCP-500 in the Dock No. 1 control room building 701. The RESET button location is shown in Appendix C, Sheet 14.

6. DOCK DIESEL FIRE WATER PUMP SJTP-2.

The dock diesel fire water pump SJTP-2 is on local "hard wire" control through P-2 Controller. Signals from the local controller, P-2 Controller (Refer to Appendix C, Sheet 8), are transferred to the Dock No. 1 control room panel LFCP-500 (Refer to Appendix C, Sheet 14) and from there to the main site control room panel RFAP-100. (Refer to Appendix C, Sheet 15.)

The following subsections provide instructions for starting, monitoring, and stopping the dock diesel fire water pump SJTP-2.

NOTE

If there are enough site personnel when the dock diesel fire water pump SJTP-2 is running, an operator should monitor its functioning. The only automatic shutdown of the dock diesel fire water pump SJTP-2 is the governor overspeed trip.

6.1 **Operational Ready Mode.** The dock diesel fire water pump SJTP-2 is designed to start automatically from the READY mode. In this mode the pump will start after receiving a start signal. In AUTOMATIC operation, this signal comes from the pressure switch PSL-2055 on P-2 Controller. In MANUAL operation, this signal comes from the MANUAL/OFF/AUTO switch and either MANUAL CRANK 1 or MANUAL CRANK 2 pushbutton inside the P-2 Controller cabinet door. To put SJTP-2 in the READY mode open the door on P-2 Controller cabinet and place the MANUAL/OFF/AUTO switch in the AUTO position. (Refer to Appendix C, Sheet 8.)

6.2 **Pump Manual Start Procedure.** Perform the following steps to start the dock diesel fire water pump SJTP-2 manually:

[1] On the P-2 Controller cabinet, put the selector switch in the MANUAL position. (Refer to Appendix C, Sheet 8.)

[2] Verify that the "P-2 Not In Automatic" light illuminates on the LFCP 500 on the Dock No. 1 control room panel. (Refer to Appendix C, Sheet 14.)

CAUTION

If the red OVERCRANK light illuminates during starting, release the button or lever. The light indicates that the starting motor has run too long and will overheat and burn its windings. Allow the motor to cool and push the reset pushbutton. (Refer to Appendix C, Sheet 8.)

NOTE

The manufacturer recommends cranking for approximately 15 seconds. If the engine does not start in this interval, wait 15 seconds. Repeat the above on alternating MANUAL CRANK buttons until the engine starts.

[3] On the front of P-2 Controller compartment, push the MANUAL CRANK 1 pushbutton and hold it in until the engine starts. (Refer to Appendix C, Sheet 8.)

CAUTION

Do not hold a start button after the engine has started. This will cause damage to the starter motor, pinion, ring gear, and will cause the OVER CRANK light to indicate that the starter motor has run too long.

[4] If the engine does not crank when MANUAL CRANK 1 is pushed, push MANUAL CRANK 2.

[5] If the engine does not crank when MANUAL CRANK 2 is pushed, push in the MANUAL START 1 lever. (Refer to Appendix B, Sheet 5.)

[6] If the engine still does not crank, push in the MANUAL START 2 lever.

[7] Verify that the "P-2 ENGINE RUNNING" light, on the Dock No. 1 control room panel LFCP-500, illuminates when the engine starts.

6.3 **Pump Monitoring**. The diesel fire water pump SJTP-2 is designed to start and run automatically without monitoring. Once started, the engine should be monitored at least once (continually if personnel are available). The following should be observed:

[1] Coolant coming from the discharge by-pass of SJTP-2, flows to the following:

[a] The engine coolant heat exchanger. Indication will be by coolant flow spilling back into the Mississippi River. If the jacket coolant temperature exceeds 200^{O}F (Refer to engine temperature listed on Appendix A, Sheet 2), open the bypass line around the regulator and adjust the flow until the engine temperature is within operating range. Notify the control room operator.

[b] The engine oil cooler. This has no direct sensor reading. Lube oil return temperature should be approximately 250^{O}F. Adequate cooling may be assumed if the lube oil pressure gauge indicates normal range. (Refer to Appendix A, Sheet 2.)

[2] Engine RPM. The normal operating range is 1890 to 2310 RPM.

[3] Lube oil pressure. The normal lube oil pressure range is 20 psig to 80 psig.

[4] Pressure indicator PI-1(P2), on the fire water discharge line, reads above the set pressure for PSL-2055. (Refer to Appendix A, Sheet 1.) Also, observe the pressure gauge in the control room for the following.

[a] If the local discharge pressure indicator PI-1(P2) does not show adequate pressure, if there is no flow through the cooler spill lines back through the drain hub, and if there is no water spewing out of the shaft seal packing, the pump is not moving fluid. Immediately shut the engine off and notify the control room and shift supervisor as to what action to take.

[b] If the pump is pumping and the indicator does not show adequate pressure, notify the main site control room that pressure remains low. This may be because of unusually large usage (a large fire) or may indicate a broken line and severe leakage.

[5] Once the diesel fire water pump is started, the system will give an audible alarm and a common trouble light will illuminate both locally and in the main site control room if additional corrections are needed. (Refer to Appendix C, Sheets 14 and 15.)

[6] Fuel level. Refuel when the level goes below 75% full as indicated on the sight glass level indicator LG-2456.

6.4 **Pump Stop Procedure.** Perform the following steps to stop the diesel fire water pump SJTP-2:

[1] If the pump started from an AUTOMATIC mode start signal, stop the pump by pushing the STOP pushbutton on the P-2 Controller panel. This should shut off fuel and stop the engine.

[2] If the pump was started in the MANUAL start procedure, put the selector switch on the front of P-2 Controller panel in the AUTO or OFF position and push the STOP button on the P2 Controller panel. (Refer to Appendix C, Sheet 8.)

6.5 **Emergency Stop Procedure.** If the steps in Section 6.4 failed to stop the pump, manually disengage the over-speed trip by pulling the lever down. (Refer to Appendix B, Sheet 5.)

CAUTION

If the engine was stopped with the over-speed trip, check the supercharger seals for inverted lips. Inverted lip on seals can cause a run-away trip.

6.6 **Post Operation Activities.** When the dock diesel fire water pump SJTP-2 is no longer needed, return the system to its READY mode. To put this pump in the READY mode:

[1] Complete the items in Section 6.1.

[2] Push the reset button in the Dock No. 1 control room panel LFCP-500. (Refer to Appendix C, Sheets 14.)

7. DOCK ELECTRIC FIRE WATER PUMP SJTP-3.

The dock electric fire water pump SJTP-3 is on local "hard wire" control through P-3 Controller. Signals from the local controller, P-3 Controller (refer to Appendix C, Sheet 10), are transferred to the Dock Nol 1 control room panel LFCP-500 (refer to Appendix C, Sheet 14) and from there to the main site control room panel RFAP-100. (Refer to Appendix C, Sheet 15.)

The following subsections provide instructions for starting, monitoring, and stopping the dock electric fire water pump SJTP-3.

7.1 **Operational Ready Mode.** The dock electric fire water pump SJTP-3 is designed to start from the READY mode. Once the P-3 Controller panel disconnect is put in the ON position, SJTP-3 is in the READY mode. In this mode the pump is ready to operate after receiving a start signal. In AUTOMATIC operation, this signal comes from the pressure switch PSL-2046 on P-3 Controller. In MANUAL operation, this signal comes from the manual START pushbutton on P-3 Controller. (Refer to Appendix C, Sheet 10.)

WARNING

If there is insufficient pressure in the system to satisfy the pressure switch PSL-2046 in P-3 Controller, once the disconnect is put in the ON position, SJTP-1 will start immediately.

[1] Verify that there is sufficient pressure as indicated on PI-2432 so that SJTP-3 will not start immediately. (Refer to Appendix A, Sheet 1.)

[2] Verify that an authorized electrician has closed the disconnect on P-3 Controller to the ON position. The disconnect is behind the door in the lower section of P-3 Controller.

[3] Verify that the amber POWER AVAILABLE light illuminates indicating that SJTP-3 is in the READY mode.

7.2 **Pump Manual Start Procedure.** Perform the following steps to manually start the dock electric fire water pump SJTP-3:

WARNING

The operator must stand to the hinged side of the controller cabinet door when starting or shutting down the pumps from the controller. Breaker malfunction could cause an explosion that could violently push open the cabinet door, exposing the operator to possible injury.

[1] On the P-3 Controller panel or at the remote START pushbutton on the East wall of the pumphouse near the door, push the red START button.

[2] Verify that SJTP-3 motor starts.

7.3 **Pump Emergency Start Procedure.** If the diesel fire water pumps did not start on AUTOMATIC or MANUAL, if the electric pump is required for service and did not start either from its pressure switch or from the pushbutton on P-3 Controller, contact the control room and notify the shift supervisor of an emergency start requirement.

NOTE

The emergency start must be performed by authorized electricians according to the Electrical Operations Manual work package 025 00.

7.4 **Pump Monitoring.** In the READY mode, the dock electric fire water pump SJTP-3 is designed to start from a low pressure switch PSL-2046 on P-3 Controller and operate without monitoring. Once started the circuit "latches" and the motor will run continuously. The circuit must be broken at P-3 Controller panel to stop the pump. When the STOP is initiated, the circuit will open and the motor will stop. If there is insufficient pressure in the discharge header, releasing the switch will immediately start the motor again. Once the pressure switch PSL-2046 on P-3 Controller is satisfied, there is an internal timer that will hold the circuit latched until it is timed out. If the STOP is initiated between the pressure switch PSL-2046 opening and the timer timing out, the motor will start again. If the header pressure remains above PSL-2046 set point, and once the timer has timed out, initiating the STOP will open the circuit and stop the pump even when the STOP button is released. The following should be monitored during the operator's normal rounds:

[1] In the operational READY mode, the items listed in Section 3.1.

[2] When the pump is running,

[a] The pressure should be between the normal operating ranges of 100 psig and 165 psig.

[b] The Dock No. 1 control room panel LFCP-500 SJTP-3 RUNNING light illuminates.

[c] The main site control room receives an alarm on the RFAP.

7.5 **Pump Stop Procedure.** Use the following procedures to stop the dock electric fire water pump SJTP-3.

WARNING

The operator must stand to the hinged side of the controller cabinet door when starting or shutting down the pumps from the controller. Breaker malfunction could cause an explosion that could violently push open the cabinet door, exposing the operator to possible injury.

[1] If the pump started from an AUTOMATIC or MANUAL mode start signal, stop the pump by pushing the STOP pushbutton on the P-3 Controller cabinet or the remote STOP pushbutton on the East wall of the pumphouse near the door. The location of the stop pushbutton is listed in Appendix C, Sheet 10.

NOTE

If the STOP is initiated before the P-3 Controller pressure switch has sufficient pressure, the pump will remain stopped as long as the switch is pushed in. The motor will start immediately if the STOP button is released. When the pressure is high enough to reset the pressure switch PSL-2046, initiating the STOP will immediately break the circuit and the motor will remain stopped.

[2] Verify that the motor stops.

7.6 **Emergency Stop Procedure.** If the steps in Section 7.5 failed to stop the pump, notify the electricians. Only the electricians are qualified to perform an emergency stop procedure. The motor and pump can run safely until the qualified electricians shut down the motor.

7.7 **Post Operation Activities.** When the dock electric fire water pump SJTP-3 is no longer needed, return the system to its READY mode. To put this pump in the READY mode:

[1] Complete the items in Section 3.1.

[2] Push the RESET button in LFCP-500 in the Dock No. 1 control room. The RESET button location is shown in Appendix C, Sheet 14.

8. DOCK DIESEL FIRE WATER PUMP SJTP-4.

The dock diesel fire water pump SJTP-4 is on local "hard wire" control through P-4 Controller. Signals from the local controller, P-4 Controller (refer to Appendix C, Sheet 13), are transferred to the Dock No. 1 control room panel LFCP-500 (refer to Appendix C, Sheet 14) and from there to the main site control room panel RFAP-100 (refer to Appendix C, Sheet 15).

The following subsections provide instructions for starting, monitoring, and stopping the dock diesel fire water pump SJTP-4.

NOTE

If there are enough site personnel when the dock diesel fire water pump SJTP-2 is running, an operator should monitor its functioning. The only automatic shutdown of the dock diesel fire water pump SJTP-4 is the governor over-speed trip.

8.1 **Operational Ready Mode.** The dock diesel fire water pump SJTP-4 is designed to start automatically from the READY mode. In this mode the pump will start after receiving a start signal. In AUTOMATIC operation, this signal comes from the pressure switch PSL-2041 on P-4 Controller. In MANUAL operation, this signal comes from the MANUAL/OFF/AUTO switch and either MANUAL CRANK 1 or MANUAL CRANK 2 pushbutton inside the P-4 Controller cabinet door.

[1] To put SJTP-4 in the READY mode open the door on P-4 Controller cabinet and place the MANUAL/OFF/AUTO switch in the AUTO position. (Refer to Appendix C, Sheet 13.)

8.2 **Pump Manual Start Procedure.** Perform the following steps to start the dock diesel fire water pump SJTP-4 manually:

[1] On the P-4 Controller cabinet, put the selector switch in the MANUAL position. (Refer to Appendix C, Sheet 13.)

[2] Verify that the "P-4 Not In Automatic" light illuminates on the LFCP 500 on the Dock No. 1 control room panel and alarm received at the main site control room RFAP panel. (Refer to Appendix C, Sheets 14 and 15, respectively.)

CAUTION

If the red OVERCRANK light illuminates during starting, release the button or lever. The light indicates that the starting motor has run too long and will overheat and burn its windings. Wait for motor to cool and push the RESET button. (Refer to Appendix C, Sheet 13.)

NOTE

The manufacturer recommends cranking for approximately 15 seconds. If the engine does not start in this interval, wait 15 seconds. Repeat the above on alternating MANUAL CRANK buttons until the engine starts.

[3] On the front of P-4 Controller compartment, push the MANUAL CRANK 1 pushbutton and hold it in until the engine starts. (Refer to Appendix C, Sheet 13.)

CAUTION

Do not hold a start button after the engine has started. This will cause damage to the starter motor, pinion, ring gear, and will cause the OVER CRANK light to indicate that the starter motor has run too long.

[4] If the engine does not crank when MANUAL CRANK 1 is pushed, push MANUAL CRANK 2.

[5] If the engine does not crank when MANUAL CRANK 2 is pushed, push in the MANUAL START 1 lever . (Refer to Appendix B, Sheet 8.)

[6] If the engine still does not crank, push in the MANUAL START 2 lever.

[7] Verify that the "P-4 ENGINE RUNNING" light on the Dock No. 1 control room panel LFCP-500 illuminates when the engine starts and the main site control room panel RFAP-100 receives an alarm.

8.3 **Pump Monitoring.** The dock diesel fire water pump SJTP-4 is designed to start and run automatically without monitoring. Once started, the engine should be monitored at least once (continually if personnel are available). The following should be observed:

[1] Coolant flow coming from the discharge by-pass of SJTP-4 to:

[a] The engine coolant heat exchanger. Indication will be by coolant flow spilling back into the Mississippi River. If the jacket coolant temperature exceeds 200°F (refer to engine temperature listed on Appendix A, Sheet 2), open the bypass line around the regulator and adjust the flow until the engine temperature is within operating range. Notify the control room operator.

[b] The engine oil cooler. This has no direct sensor reading. Lube oil return temperature should be approximately 250°F. Adequate cooling may be assumed if the lube oil pressure gauge indicates normal range. (Refer to Appendix A, Sheet 2.)

[2] Engine RPM. The normal range is 1575 to 1925 RPM.

[3] Lube oil pressure. The normal lube oil pressure is 20 psig to 80 psig.

[4] Verify locally that PI-1(P4), on the fire water discharge line, reads above the set pressure for PSL-2041. (Refer to Appendix B, Sheet 7.) Also, observe the pressure gauge in the control room.

[a] If the local discharge pressure indicator PI-1(P4) does not show adequate pressure, if there is no flow through the cooler spill lines back through the drain hub, and if there is no water spewing out of the shaft seal packing, the pump is not moving fluid. Immediately shut the engine off and notify the control room and shift supervisor as to what action to take.

[b] If the pump is pumping and the indicator does not show adequate pressure, notify the control room that pressure remains low. This may be because of unusually large usage (a large fire) or may indicate a broken line and severe leakage.

[5] Once the diesel fire water pump is started, the system will give an audible alarm and common trouble light will illuminate both in the Dock No. 1 control room LFCP-500 and in the main site control room RFAP-100 if additional corrections are needed. (Refer to Appendix C, Sheets 14 and 15, respectively.)

[6] Fuel level. Refuel when the level goes below 75% full as indicated on the sight glass level indicator LG-2457.

8.4 **Pump Stop Procedure.** Perform the following steps to stop the dock diesel fire water pump SJTP-4:

[1] If the pump started from an AUTOMATIC mode start signal, stop the pump by pushing the STOP pushbutton on the P-4 Controller panel. This should shut off fuel and stop the engine.

[2] If the pump was started in the MANUAL start procedure, put the selector switch on the front of P-4 Controller panel in the AUTO or OFF position and push the STOP button on the P4 Controller panel. (Refer to Appendix C, Sheet 13.)

8.5 **Emergency Stop Procedure.** If the steps in Section 8.4 failed to stop the pump, manually disengage the overspeed trip by pulling the lever down. This is located on the top of the engine. It does not have a manual remote actuator.

CAUTION

If the engine was stopped with the overspeed trip, check the supercharger seals for inverted lips. Inverted lip on seals can cause a run-away trip.

8.6 **Post Operation Activities.** When the dock diesel fire water pump SJTP-4 is no longer needed, return the system to its READY mode. To put this pump in the READY mode:

[1] Complete the items in Section 8.1.

[2] Push the reset button in the Dock No. 1 control room panel LFCP-500. (Refer to Appendix C, Sheets 14.)

APPENDIX A

OPERATING PARAMETERS
DOCK FIRE WATER PUMP SYSTEM
(Sheet 1 of 2)

PUMP	PRESSURE (PSIG) START	STOP	HIGH
SJTP-1	110[c]	a	165[b]
SJTP-2	105[d]	a	165[b]
SJTP-3	100[e]	a	165[b]
SJTP-4	95[e]	a	165[b]
SJTP-5	135	145	150

a. Must be stopped manually.
b. Relief PSV set to by-pass minimum continuous flow at 150 psig.
c. The pressure must be below the value for 20 seconds to cause a start.
d. This pressure must be below the value for 30 seconds to cause a start.
e. The pressure must be below the value for 40 seconds to cause a start.

APPENDIX A

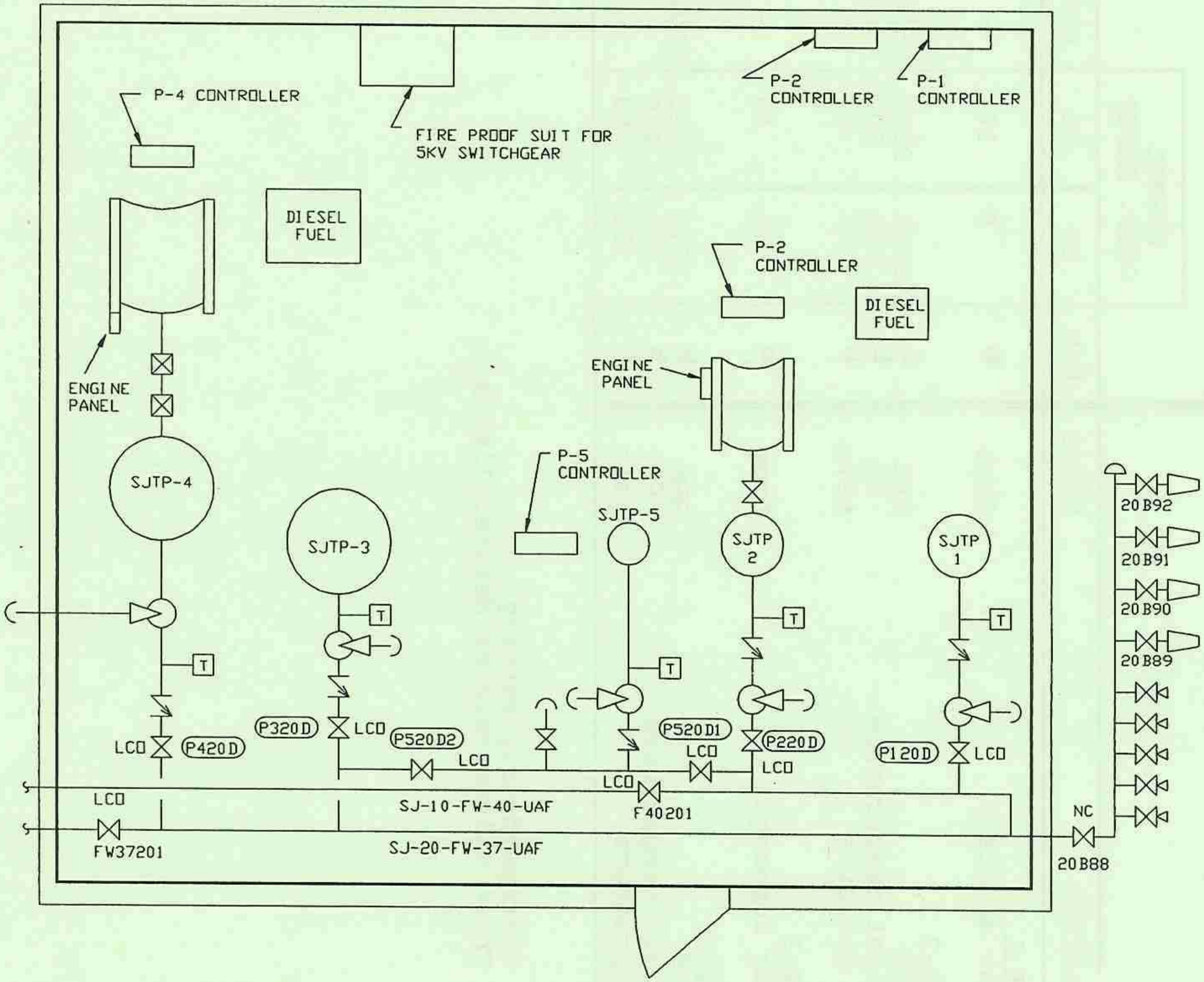
OPERATING ENVELOPE
DOCK FIRE WATER PUMP SYSTEMS
(Sheet 2)

			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
<u>SJTP-1</u> Motor amperage	Amps	**b**	8	16	–
<u>SJTP-2</u> Speed	RPM	**b**	1890	2310	2520[a]
Coolant temperature	^{o}F	**b**	150	200	–
Oil pressure	psig	**b**	20	80	–
<u>SJTP-3</u> Motor amperage	Amps	**b**	40	85	–
<u>SJTP-4</u> Speed	RPM	**b**	1575	1925	2100[a]
Coolant temperature	^{o}F	**b**	150	200	–
Oil pressure	psig	**b**	20	80	–

a Overspeed trip setting.
b These values have no defined limits.

APPENDIX B

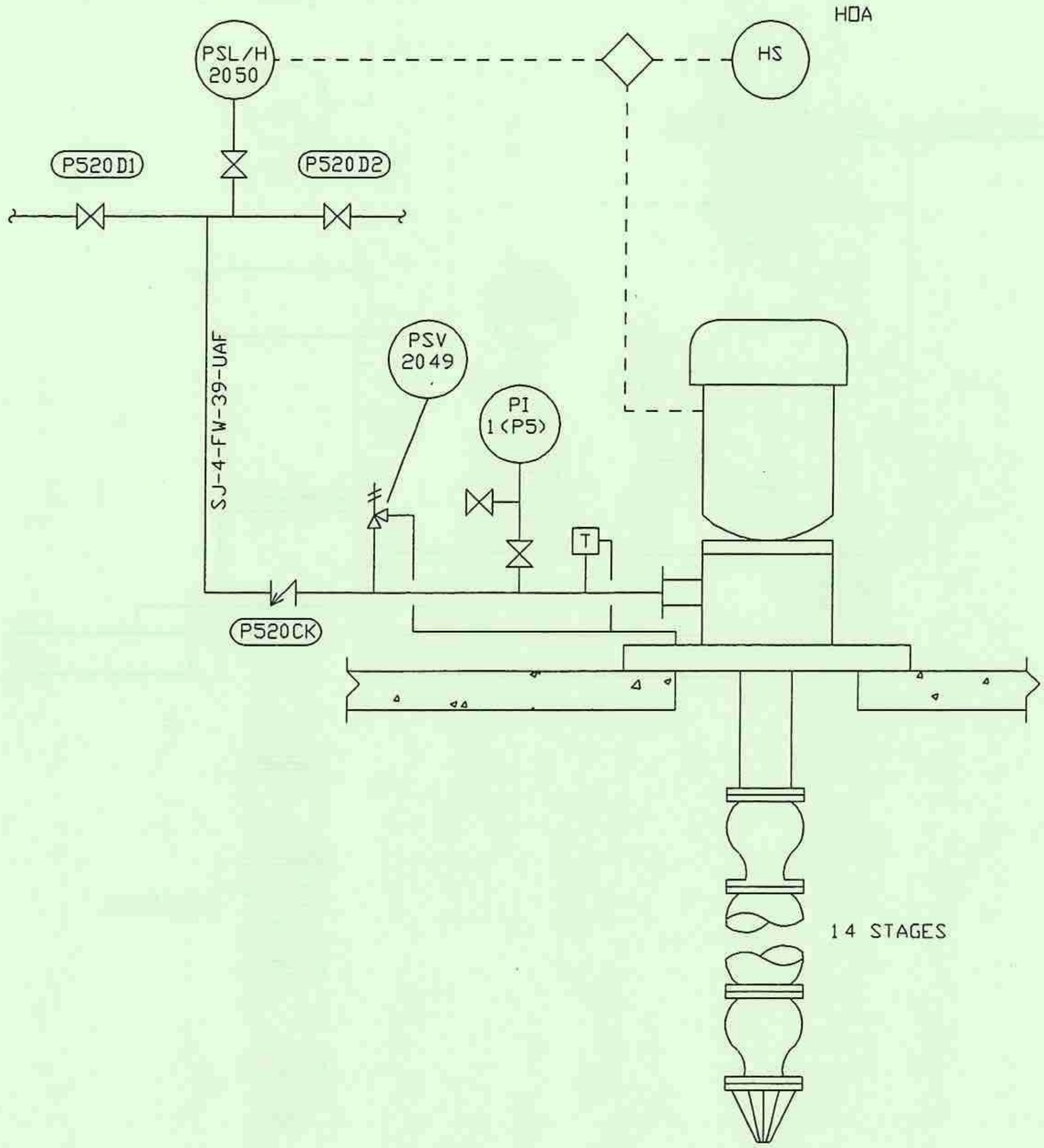
SCHEMATIC DIAGRAM
DOCK FIRE WATER PUMP SYSTEM
BUILDING 720
(Sheet 1 of 8)



APPENDIX B

SCHEMATIC DIAGRAM
DOCK FIRE WATER PUMP SYSTEM

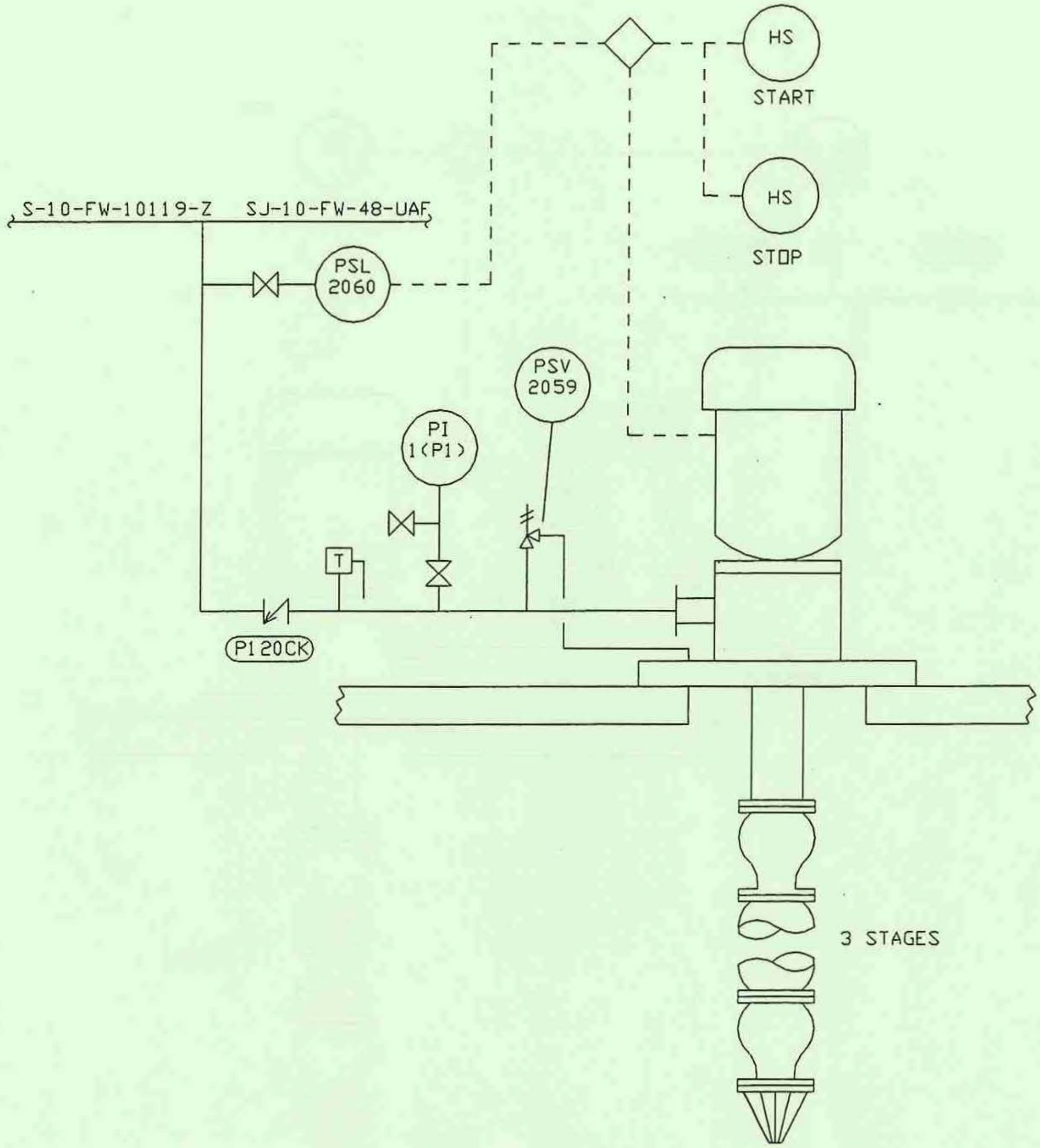
DOCK FIRE WATER JOCKEY PUMP SJTP-5
CONTROL FUNCTION DIAGRAM
(Sheet 2)



APPENDIX B

SCHEMATIC DIAGRAM
DOCK FIRE WATER PUMP SYSTEM

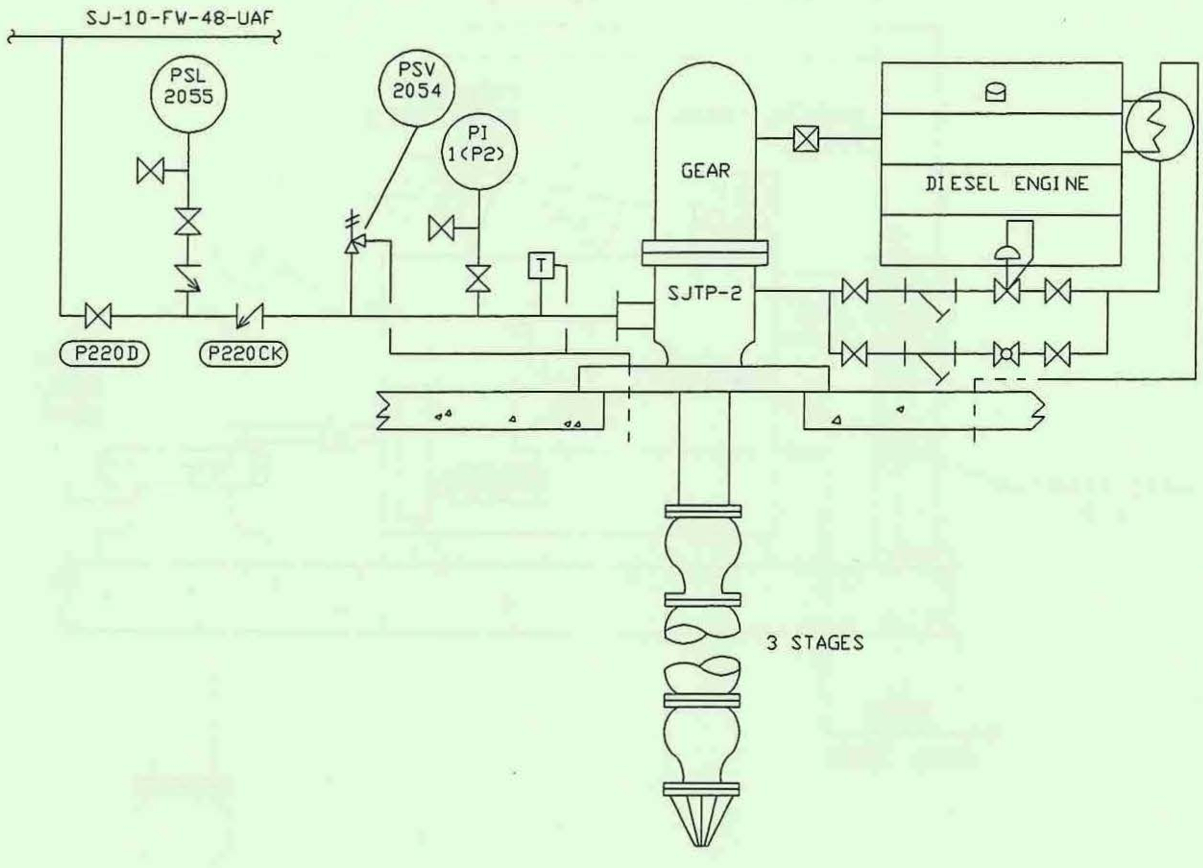
DOCK ELECTRIC FIRE WATER PUMP SJTP-1
CONTROL FUNCTION DIAGRAM
(Sheet 3)



APPENDIX B

SCHEMATIC DIAGRAM
DOCK FIRE WATER PUMP SYSTEM

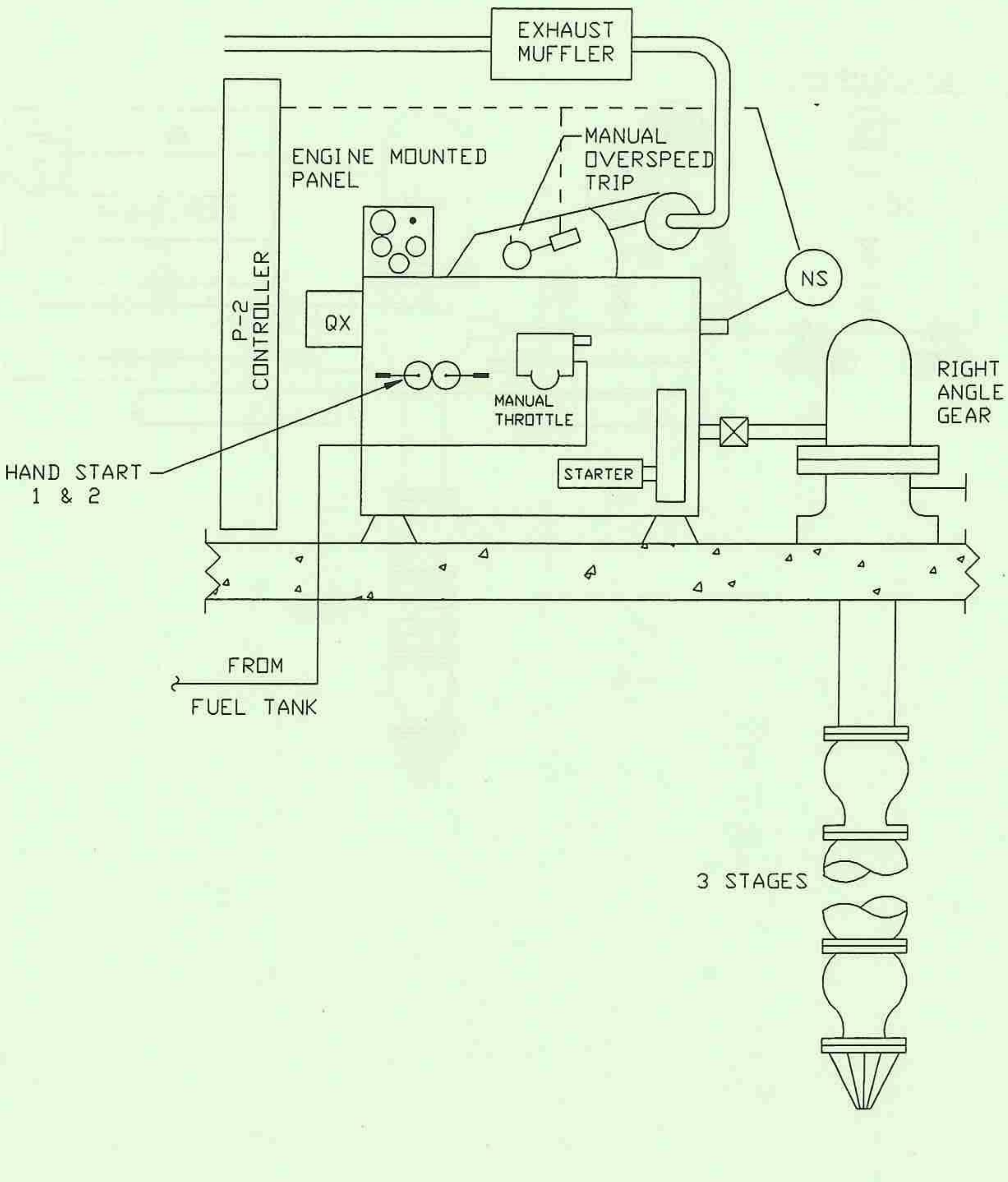
DOCK DIESEL FIRE WATER PUMP SJTP-2
CONTROL FUNCTION DIAGRAM
(Sheet 4)



APPENDIX B

SCHEMATIC DIAGRAM
DOCK FIRE WATER PUMP SYSTEM

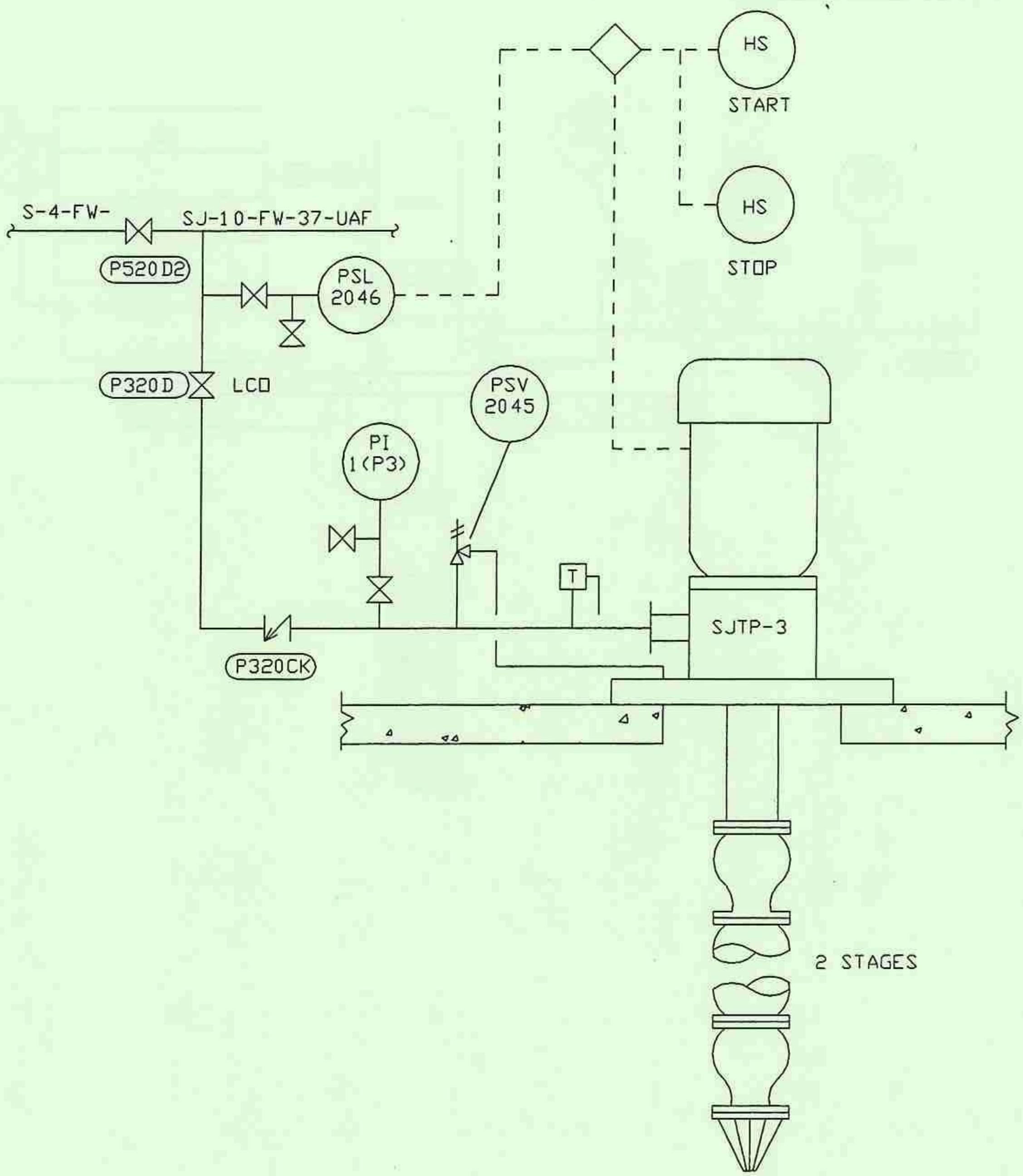
DOCK DIESEL FIRE WATER PUMP SJTP-2
EQUIPMENT LAYOUT
(Sheet 5)



APPENDIX B

SCHEMATIC DIAGRAM
DOCK FIRE WATER PUMP SYSTEM

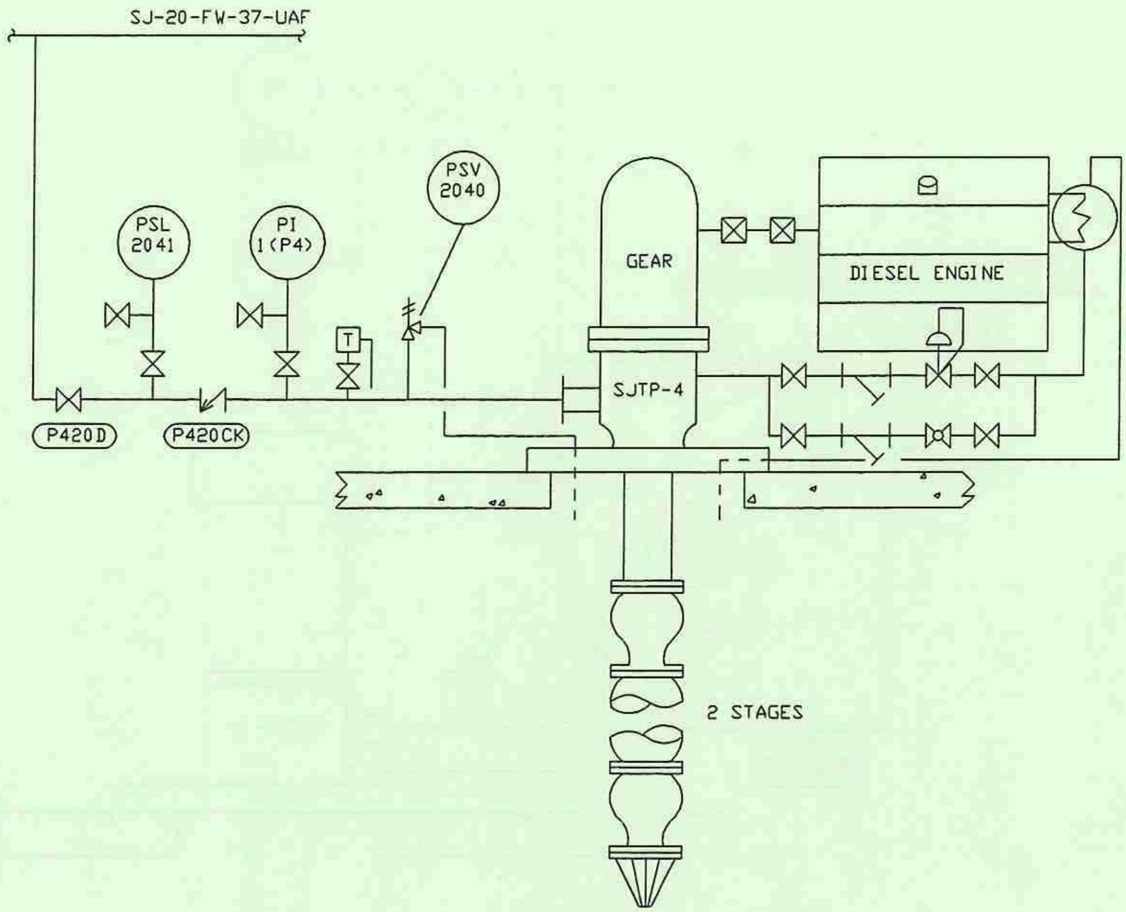
DOCK ELECTRIC FIRE WATER PUMP SJTP-3
CONTROL FUNCTION DIAGRAM
(Sheet 6)



APPENDIX B

SCHEMATIC DIAGRAM
DOCK FIRE WATER PUMP SYSTEM

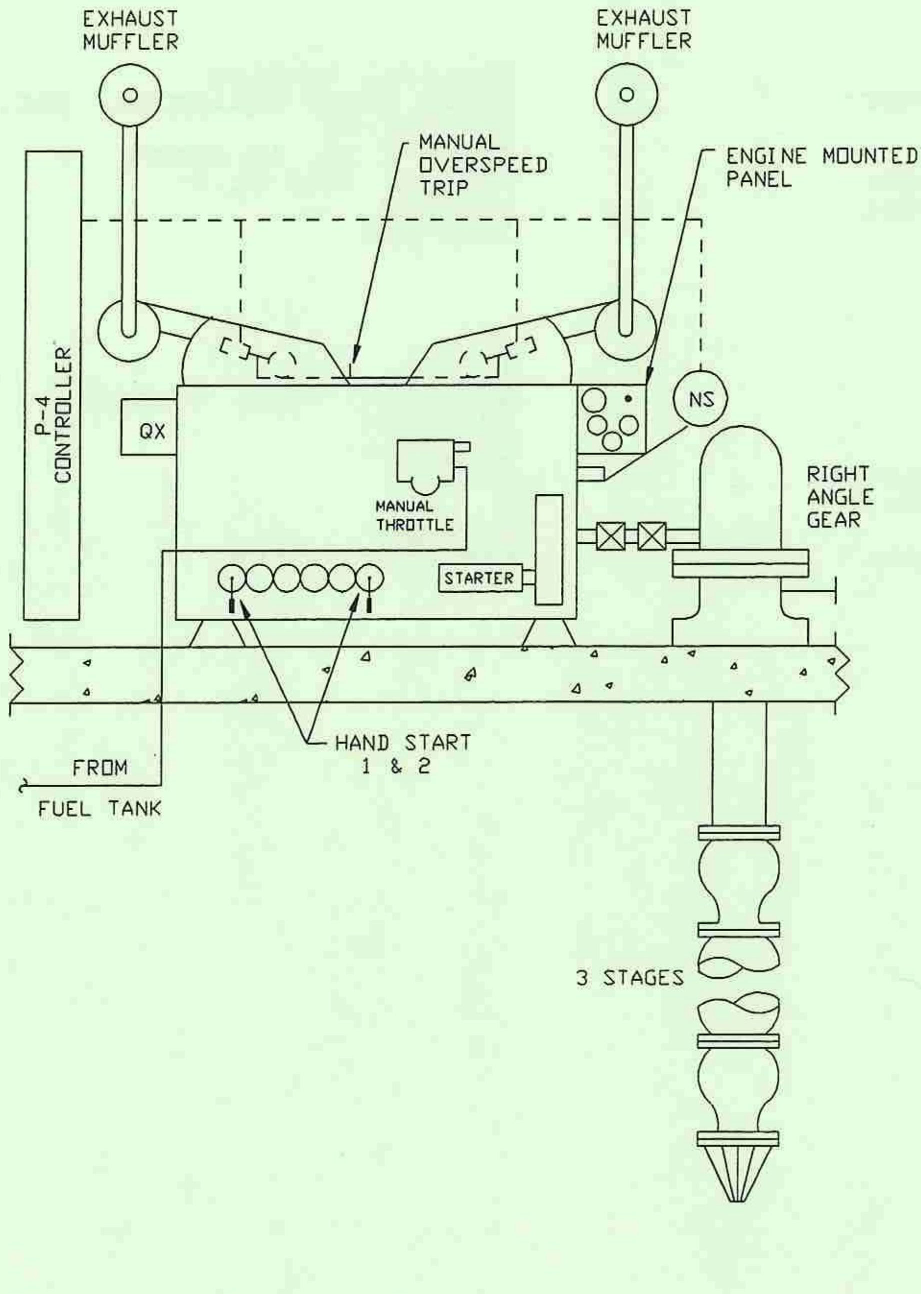
DOCK DIESEL FIRE WATER PUMP SJTP-4
CONTROL FUNCTION DIAGRAM
(Sheet 7)



APPENDIX B

SCHEMATIC DIAGRAM
DOCK FIRE WATER PUMP SYSTEM

DOCK DIESEL FIRE WATER PUMP SJTP-4
EQUIPMENT LAYOUT
(Sheet 8)



APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

DOCK FIRE WATER JOCKEY PUMP SJTP-5
(Sheet 1 of 15)

Pump

Type:	Vertical turbine
Manufacturer:	Fluid Power Equipment, Inc. (FMC)
Model:	78-7392-P5
Size:	4 x 4 x 10, 14 stage
TDH, Design:	140 psi (340 ft.)
Flow design:	100 GPM
Speed:	1760 RPM

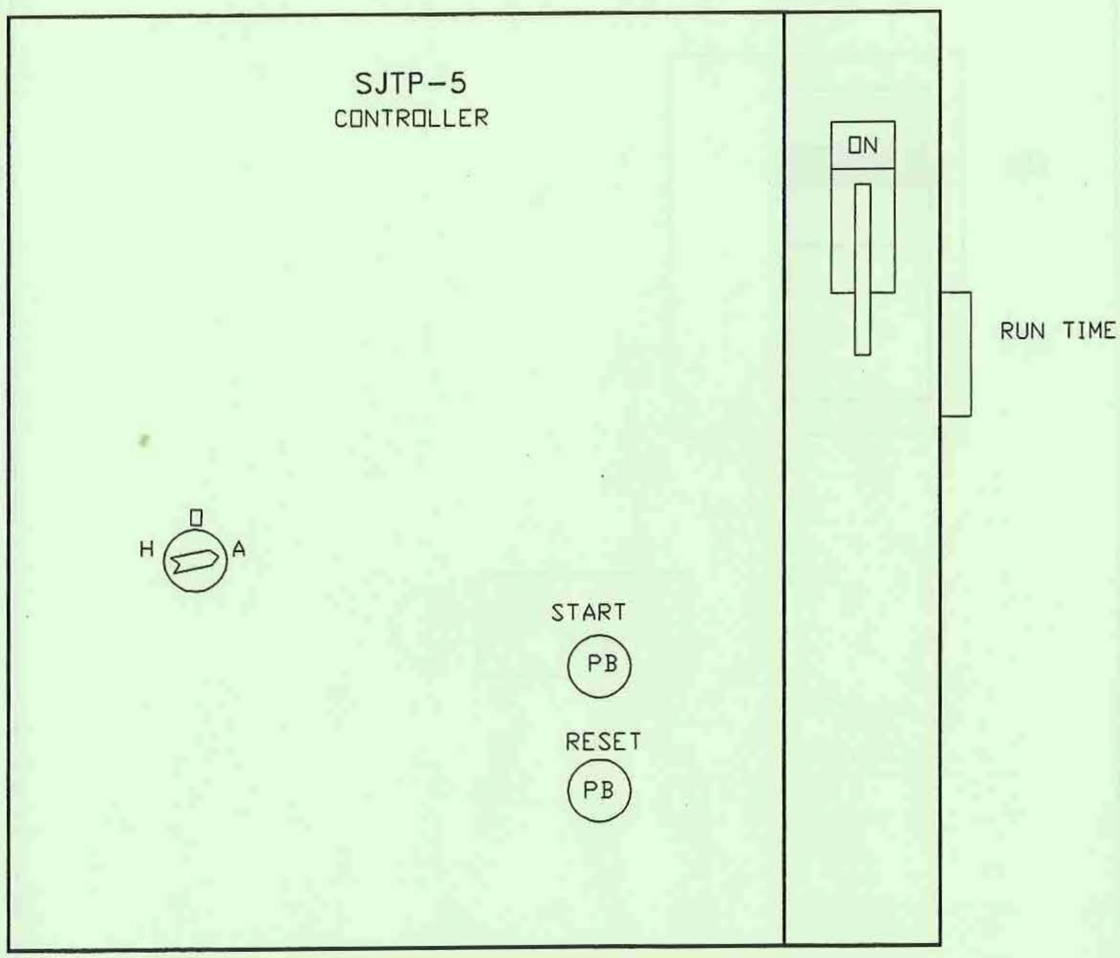
Motor

Size:	15 HP
Power:	480-Volt, 60Hz, 3 phase
Speed:	1755 RPM
Frame:	L254TP10
Service Factor:	1.15
Insulation:	F
F.L.A.:	21 Amps
Accessories:	Heater 40 watts

APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

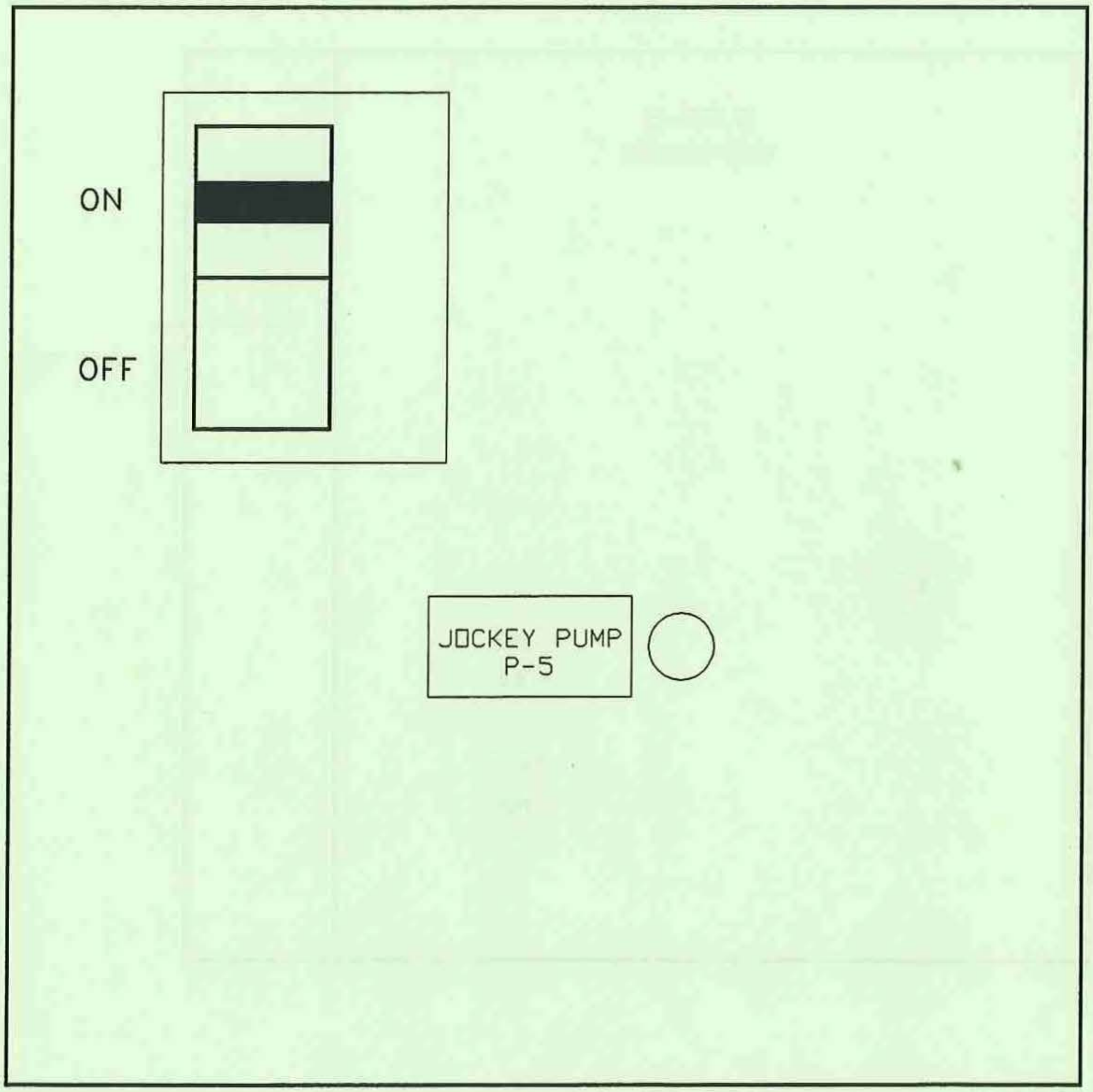
DOCK FIRE WATER JOCKEY PUMP SJTP-5
LOCAL PANEL
(Sheet 2)



APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

DOCK FIRE WATER JOCKEY PUMP SJTP-5
MCC-D1, CABINET 1FB
(Sheet 3)



APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

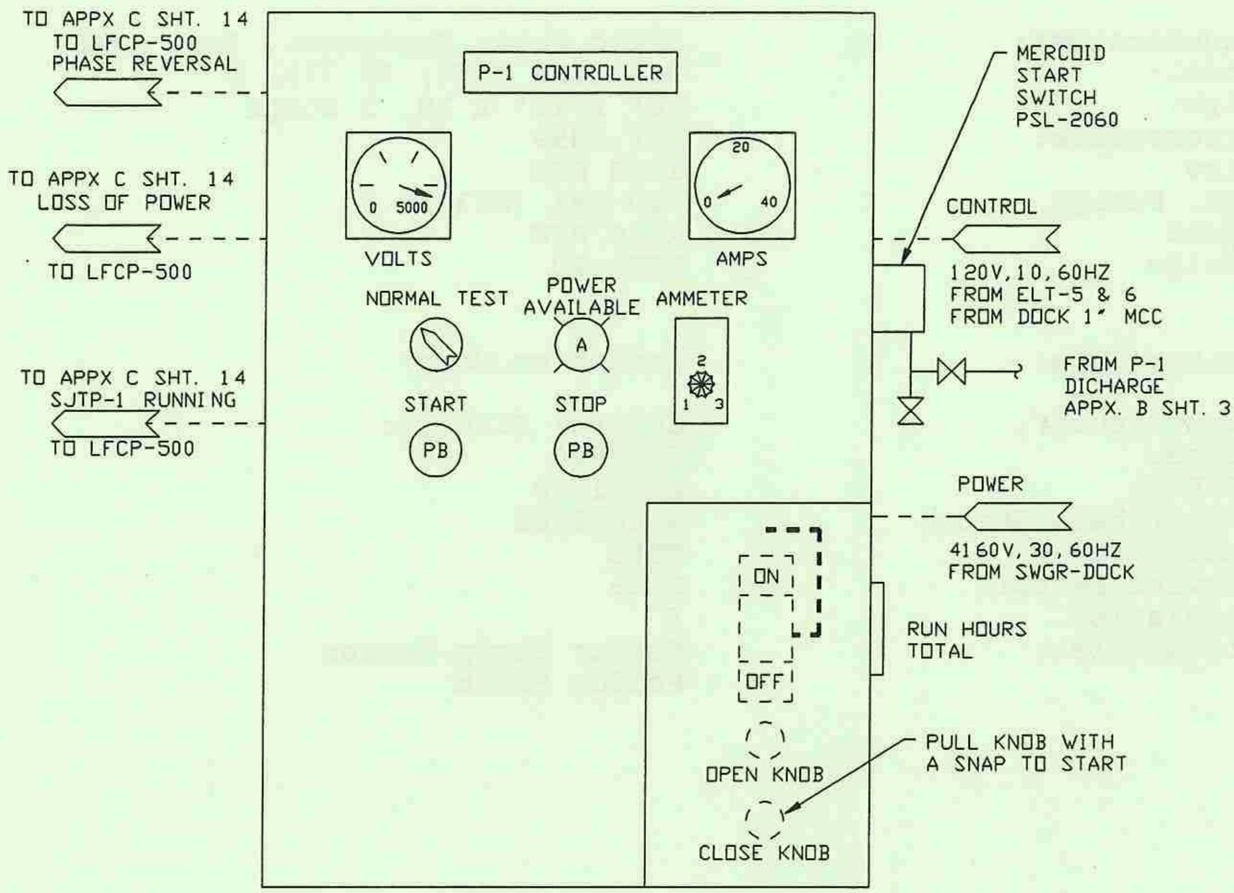
DOCK ELECTRIC FIRE WATER PUMP SJTP-1
(Sheet 4)

Pump Type:	Vertical turbine
Manufacturer:	Fluid Power Equipment, Inc. (FMC)
Model:	Peerless 14MC, 78-7392-B
Size:	10" x 10" x 20, 3 stage
Accessories:	PSV-2059
Flow	1300 GPM
TDH, Design	120 psi (293 ft.)
Speed	1760 RPM
Design	NFPA-20
Driver Type:	Induction Motor
Manufacturer:	General Electric
Frame:	6319P20
HP/RPM:	200/1760
Volts/Phase/Hertz:	4160/3/60
Enclosure:	TEFC
Service Factor:	1.15
Insulation	F
Accessories:	Stator Strip Heater Hollow Shaft

APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

DOCK ELECTRIC FIRE WATER PUMP SJTP-1
LOCAL CONTROL PANEL
(Sheet 5)



APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

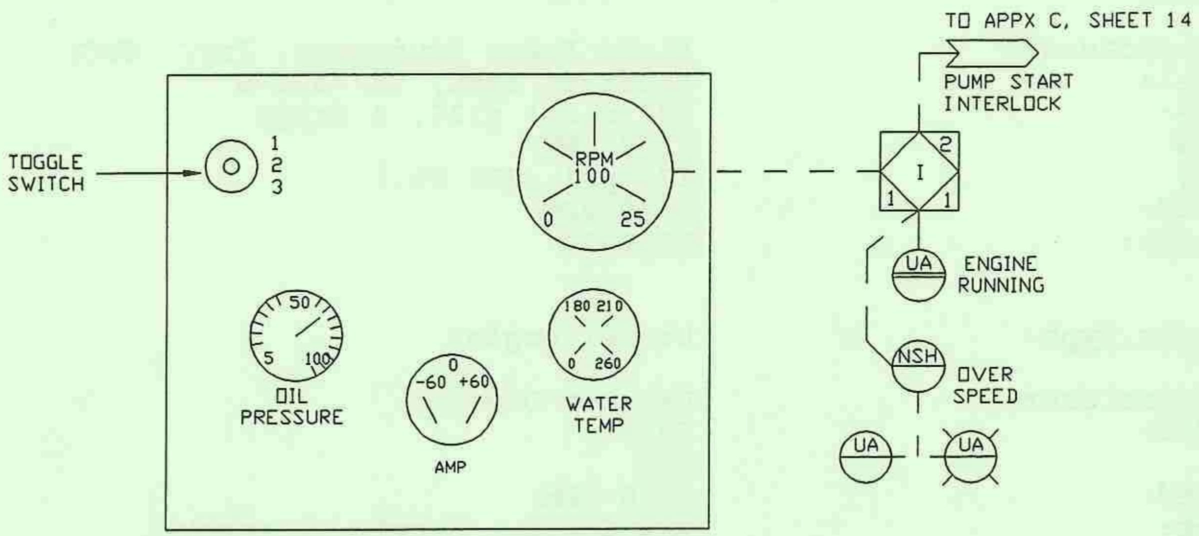
DOCK DIESEL FIRE WATER PUMP SJTP-2
(Sheet 6)

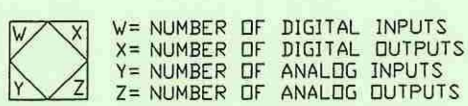
SJTP-2:	Vertical turbine
Manufacturer:	Fluid Power Equipment, Inc. (FMC)
Model:	Peerless 14MC, 78-7392-B
Size:	10" x 10" x 20, 3 stage
Flow	1300 GPM
TDH:	120 psi (293 ft.)
Speed:	1760 RPM
Design:	NFPA-20
Driver Type:	Diesel engine
Manufacturer:	Detroit Diesel
Model:	671T
HP:	238
Speed:	2100 RPM
Size:	xxx C.I.D., 8 cyl., 2 stroke, supercharged and turbocharged
Accessories	Oil heater Coolant heater exchanger Jacket water heater Pressure relief valve PSV-2054 Over speed governor
Fuel Tank:	
Capacity	125 gal.
Gear:	
Manufacturer	XXX
Model	XXX
Type	Right Angle
Ratio	1.19:1
HP @ RPM	200 @ 2100

APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

DOCK DIESEL FIRE WATER PUMP SJTP-2
ENGINE MOUNTED PANEL
(Sheet 7)

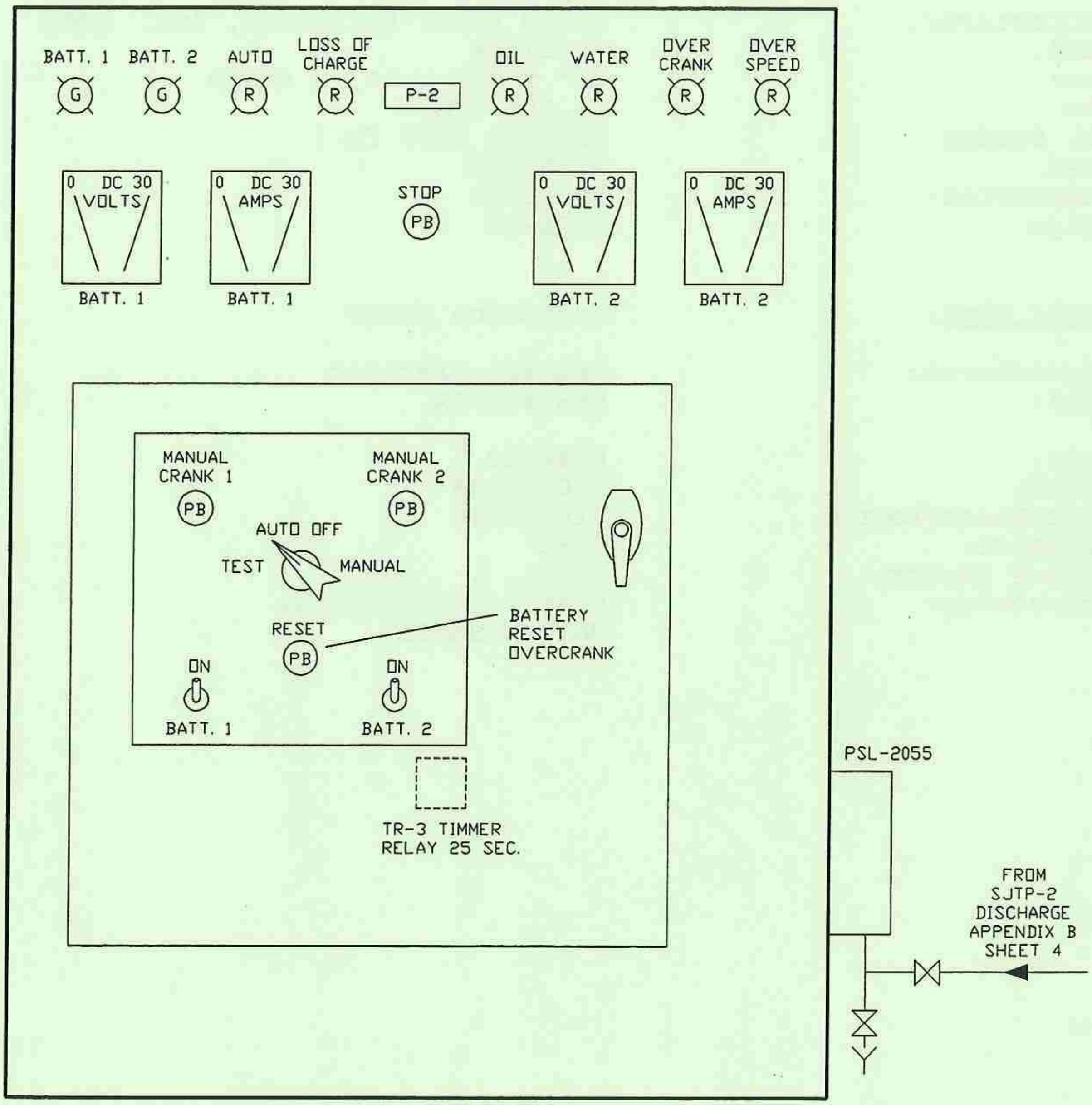




APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

DOCK DIESEL FIRE WATER PUMP SJTP-2
CONTROL PANEL
(Sheet 8)



APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

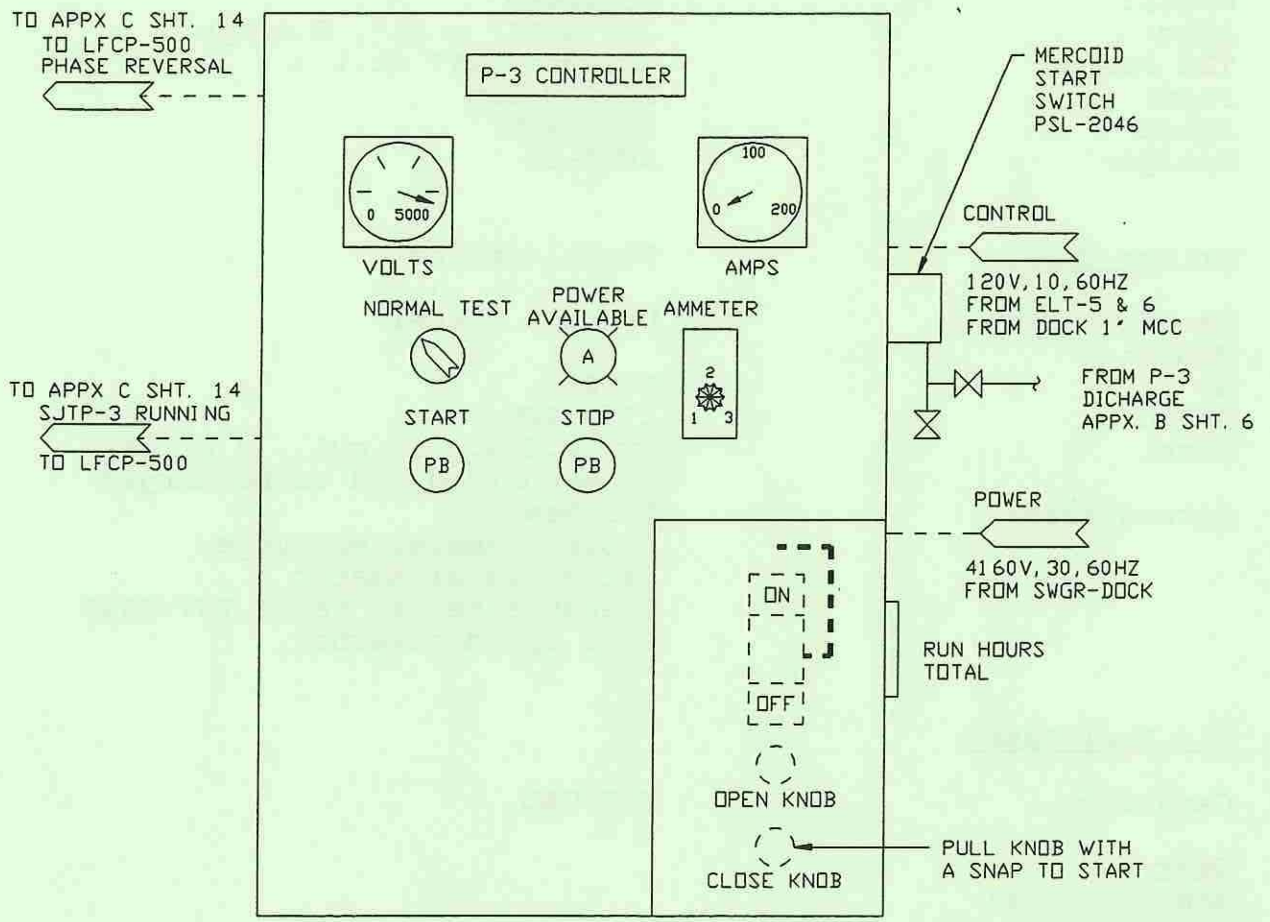
DOCK ELECTRIC FIRE WATER PUMP SJTP-3
(Sheet 9)

Pump Type:	Vertical turbine
Manufacturer:	Fluid Power Equipment, Inc. (FMC)
Model:	Peerless
Size:	28" x 11" x 11, 2 stage
Flow	10,000 GPM
TDH, Design	122 psi (297 ft.)
Speed	1180 RPM
Accessories:	PSV-2049
Design	NFPA-20
Driver Type:	Induction Motor
Manufacturer:	General Electric
Model:	5K6346X55A
Frame:	6346P42
HP/RPM:	1000/1185
Volts/Phase/Hertz:	4160/3/60
Enclosure:	TEFC
Service Factor:	1.15
Accessories:	Stator Strip Heater Hollow Shaft

APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

DOCK ELECTRIC FIRE WATER PUMP SJTP-3
LOCAL CONTROL PANEL
(Sheet 10)



APPENDIX C

SCHEMATIC DIAGRAM
DOCK FIRE WATER PUMP SYSTEM

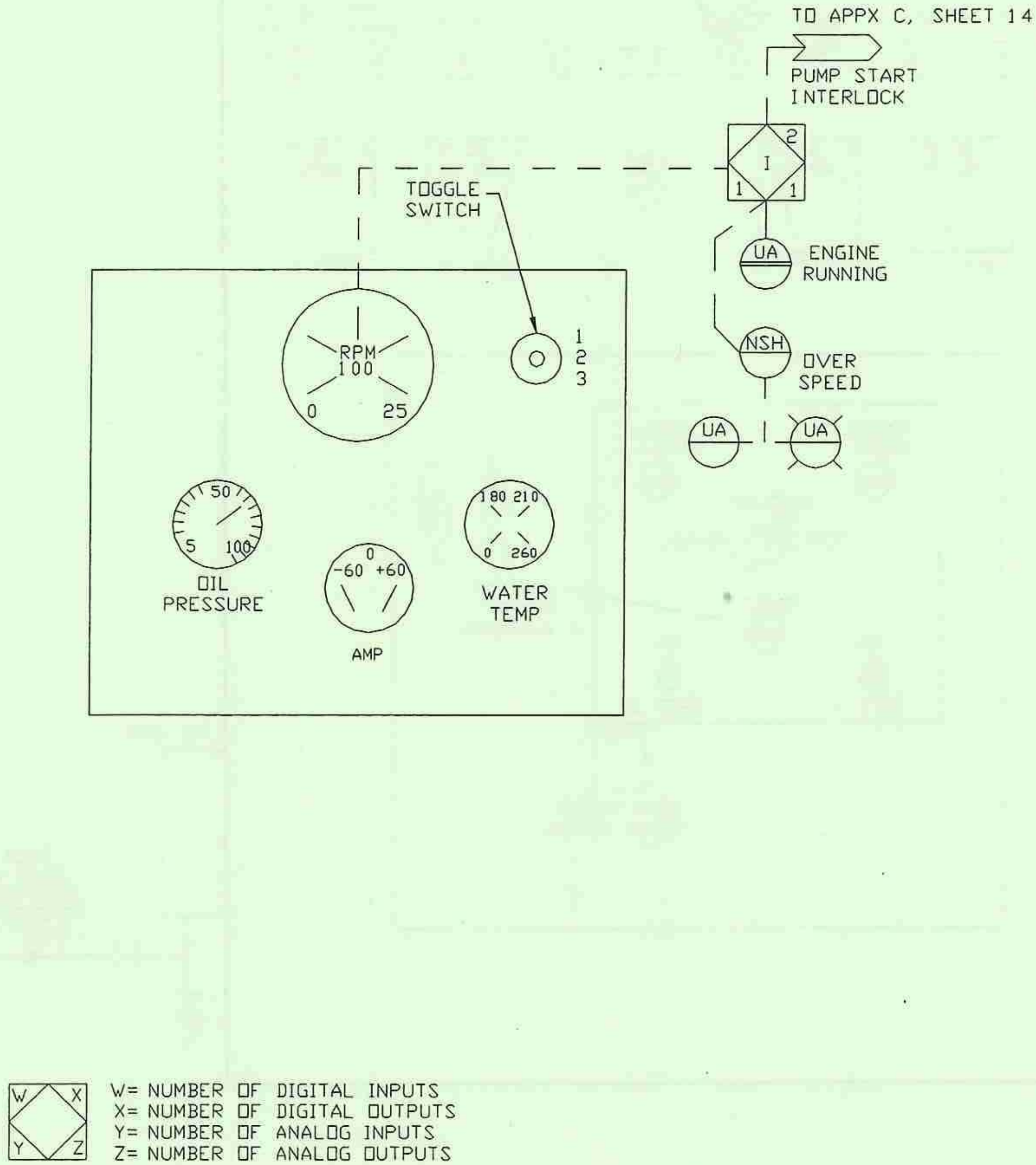
DOCK DIESEL FIRE WATER PUMP SJTP-4
(Sheet 11)

<u>SJTP-4</u>	Vertical turbine
Manufacturer:	Fluid Power Equipment, Inc. (FMC)
Model:	Peerless
Size:	25" x 11" x 11", 2 stage
TDH Design	122 psi (297 ft.)
Flow:	10,000 GPM
Speed	1180 RPM
Design:	NFPA-20
<u>Driver Type:</u>	Diesel engine
Manufacturer:	Detroit Diesel
Model:	
HP	1,020
Speed:	1750 RPM
Size:	xxx C.I.D., 12 cyl., 2 stroke, supercharged and turbocharged
Accessories:	Oil heater Coolant heater exchanger Jacket water heater Pressure relief valve PSV-2040 Over speed governor
<u>V-4 Fuel Tank:</u>	
Capacity:	567 GAL.
<u>Gear</u>:	
Manufacturer:	
Model:	
Type:	Right angle
Ratio:	1.48:1

APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

DOCK DIESEL FIRE WATER PUMP SJTP-4
ENGINE MOUNTED PANEL
(Sheet 12)

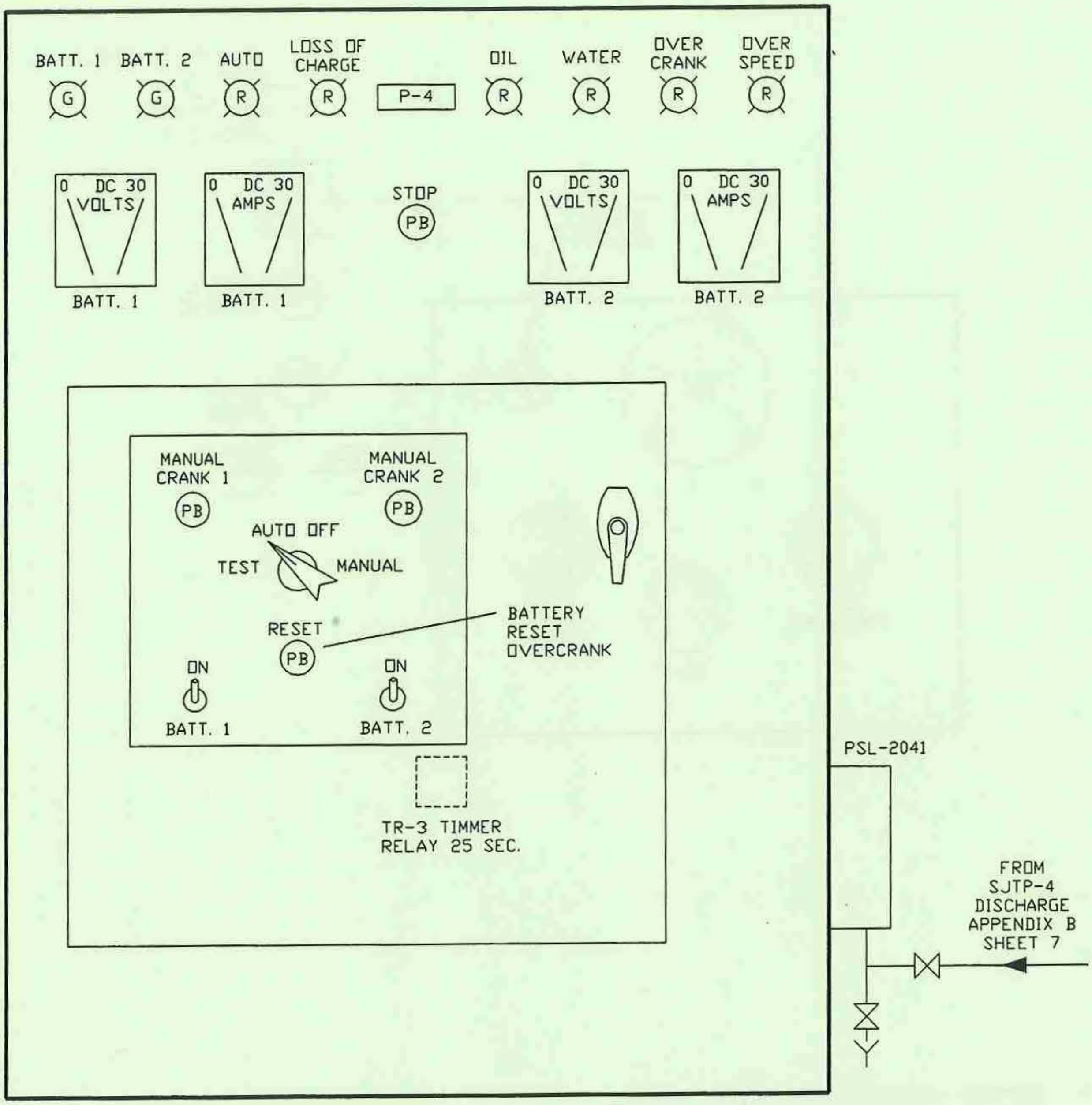


W= NUMBER OF DIGITAL INPUTS
X= NUMBER OF DIGITAL OUTPUTS
Y= NUMBER OF ANALOG INPUTS
Z= NUMBER OF ANALOG OUTPUTS

APPENDIX C

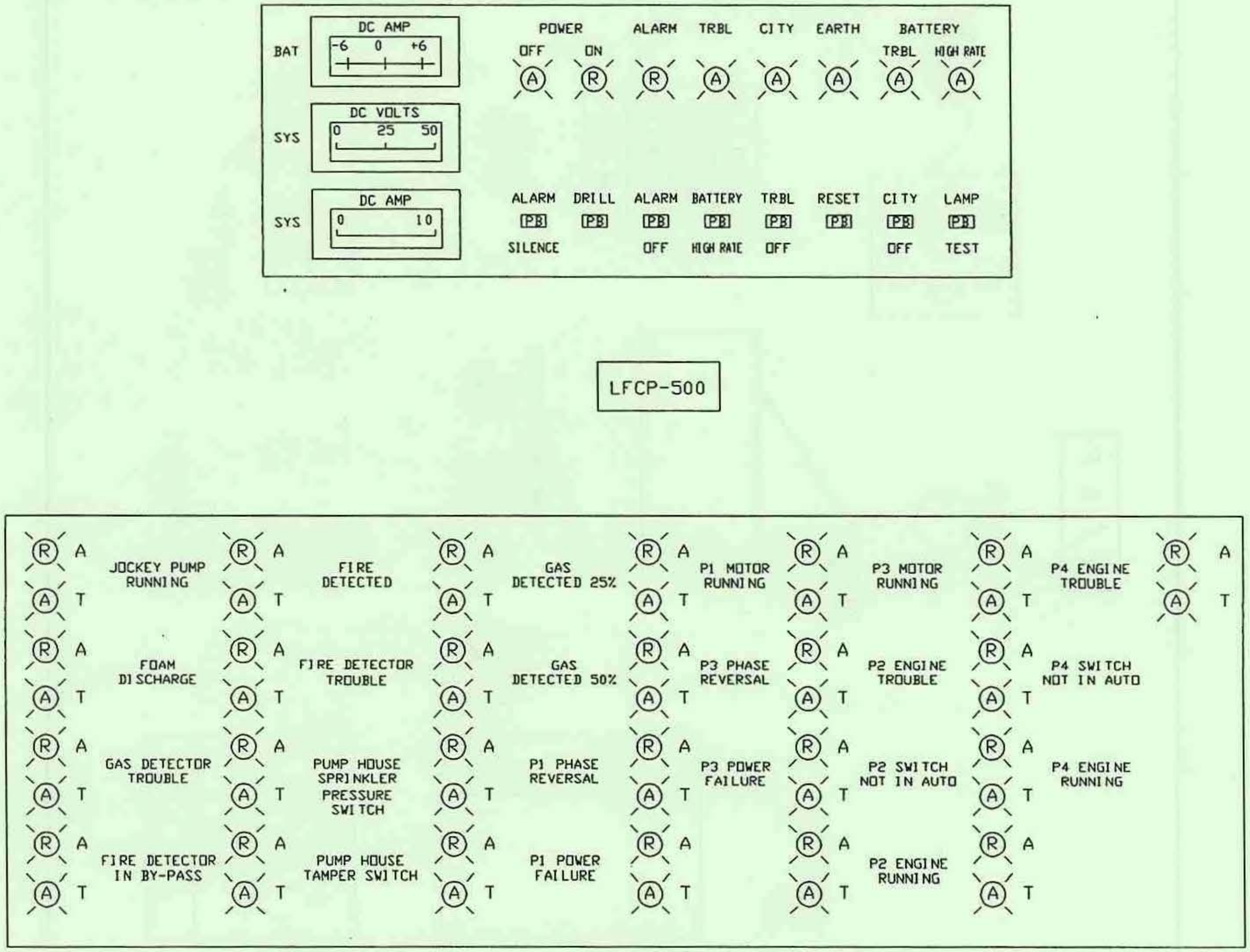
TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

DOCK DIESEL FIRE WATER PUMP SJTP-4
CONTROL PANEL
(Sheet 13)



APPENDIX C
TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

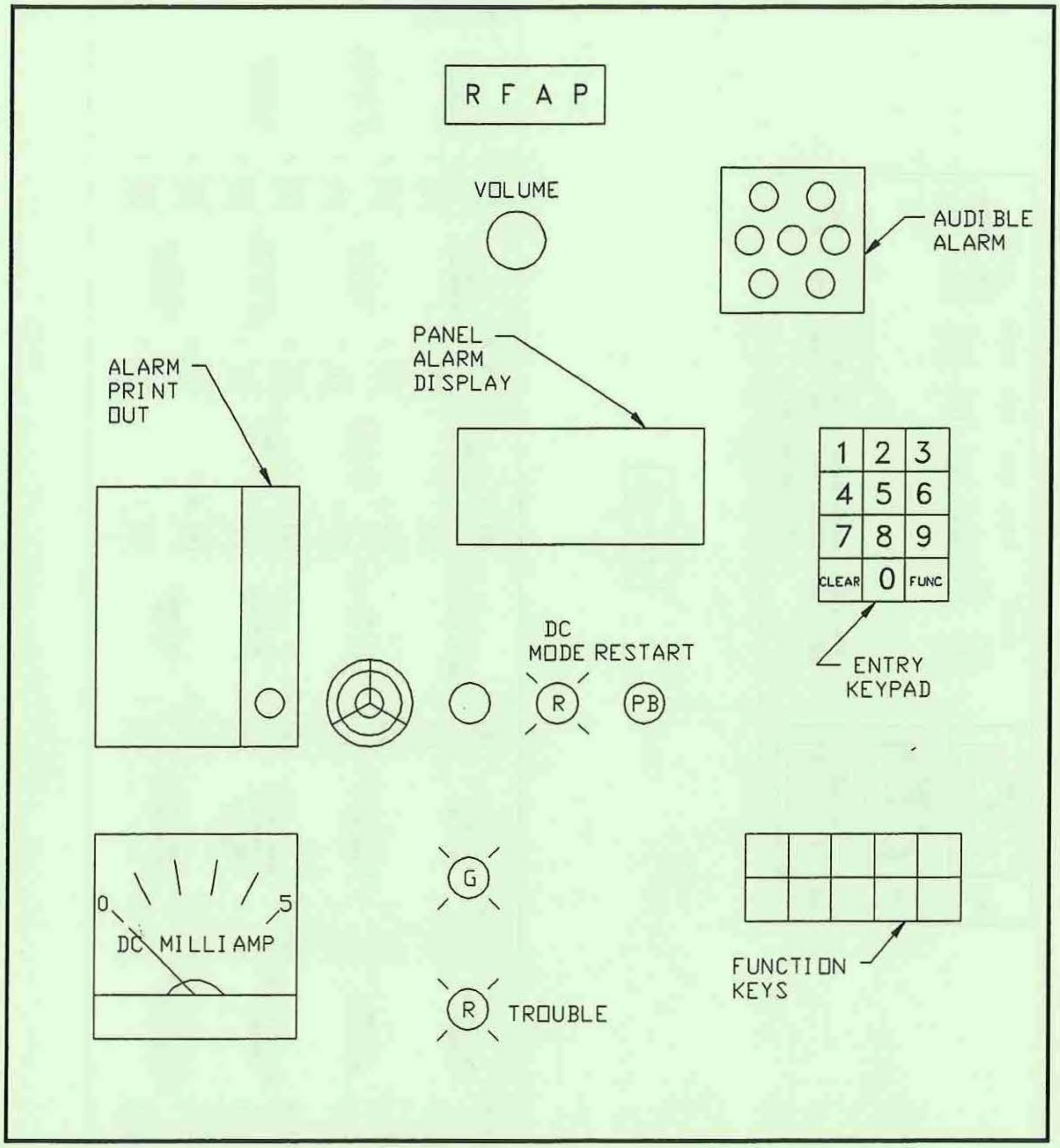
DOCK PANEL LFCP-500
(Sheet 14)



APPENDIX C

TECHNICAL DATA
DOCK FIRE WATER PUMP SYSTEM

DOCK DIESEL FIRE WATER PUMP SJTP-4
CONTROL ROOM PANEL RFAP-100
(Sheet 15)



APPENDIX D

READY MODE VALVE AND SWITCH POSITIONS
DOCK FIRE WATER PUMP SYSTEM

DOCK FIRE WATER JOCKEY PUMP SJTP-5
(Sheet 1 of 5)

	ITEM	POSITION
1.	Local panel selector switch (HOA)	OFF[1]
2.	Local panel door disconnect switch	ON
3.	Discharge valve, P520D	Open
	P520D1	Open
	P520D2	Open
4.	Valve on impulse line to: PSL/H-2050	Open
	PI-1(P5)	Open
5.	Isolation valve to air bleed trap	Open

1 SJTP-5 is used when SJTP-23 is out of service or when the main site and dock fire water systems are isolated from each other.

APPENDIX D

READY MODE VALVE AND SWITCH POSITIONS
DOCK FIRE WATER PUMP SYSTEM

DOCK ELECTRIC FIRE WATER PUMP SJTP-1
(Sheet 2)

1.	Hand valve on impulse line to PSL-2060	Open
2.	Hand valve on impulse line to PI-1(P1)	Open
3.	P-1 Controller panel disconnect	ON
4.	Emergency start lever position	CLOSE KNOB
5.	Dock No. 1 SWGR	ON
6.	Test line valve, 20B88	Closed LCC
7.	SJTP-1 discharge isolation valve P120D	Open LCO
8.	Dock site fire water header valve FW40201	Open LCO
9.	Isolation valve in air bleed trap	Open
10.	LFCP-500 reset button	Pushed

APPENDIX D

READY MODE VALVE AND SWITCH POSITIONS
DOCK FIRE WATER PUMP SYSTEM

DOCK DIESEL FIRE WATER PUMP SJTP-2
(Sheet 3)

1.	P-2 Controller cabinet HOA	AUTO
2.	Hand valve on impulse line to pressure switch PSL-2055	Open
3.	Battery charger #1	On
4.	Battery charger #2	On
5.	Lighting panel No. 6LP	On
6.	Coolant supply by-pass	Closed
7.	Engine fuel pump shut off valve	Open
8.	Test line valve, 20B88	Closed LCC
9.	SJTP-2 discharge isolation valve, P220D	Open LCO
10.	LFCP-500 reset button	Pushed
11.	Hand valve on impulse lines to PI-1(P2)	Open
12.	Isolation valve on air bleed trap	Open

APPENDIX D

READY MODE VALVE AND SWITCH POSITIONS
DOCK FIRE WATER PUMP SYSTEM

DOCK ELECTRIC FIRE WATER PUMP SJTP-3
(Sheet 4)

1.	Hand valve on impulse line to PSL-2046	Open
2.	Hand valve on impulse line to PI-1(P3)	Open
3.	P-3 Controller panel disconnect	ON
4.	Emergency start lever position	CLOSED KNOB
5.	Dock #1 SWGR	ON
6.	Test line valve, 20B88	Closed LCC
7.	SJTP-3 discharge isolation valve P320D	Open LCO
8.	Dock fire water header valve FW37201	Open LCO
9.	LFCP-500 reset button	Pushed
10.	Isolation valve on air bleed trap	Open

APPENDIX D

READY MODE VALVE AND SWITCH POSITIONS
DOCK FIRE WATER PUMP SYSTEM

DOCK DIESEL FIRE WATER PUMP SJTP-4
(Sheet 5)

1.	P-4 Controller cabinet HOA	AUTO
2.	Hand valve on impulse line to pressure switch PSL-2041	Open
3.	Batter charger #1	ON
4.	Battery charger #2	ON
5.	Lighting panel No. 6LP	ON
6.	Coolant supply by-pass	Closed
7.	Engine fuel pump shut off valve	Open
8.	Test line valve, 20B88	Closed LCC
9.	SJTP-4 discharge isolation valve P420D	Open LCO
10.	LFCP-500 reset button	Pushed
11.	Hand valve on impulse lines to PI-1(P4)	Open
12.	Isolation valve on air bleed trap	Open

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

FIRE WATER SYSTEMS - MEDIA

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

FIRE WATER SYSTEMS - MEDIA

List of Effective Work Package Pages

Page No.	Chg. No.	Page No.	Chg. No.	Page No.	Chg. No.
1 thru 2	0				

Record of Applicable Technical Directives

None

NOTE
The fire water media work package is currently being rewritten from a procedure written at the site. The media package will be forwarded by August 1, 1994.

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CORROSION INHIBITOR SYSTEM

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

CORROSION INHIBITOR SYSTEM

List of Effective Work Package Pages

Page No.	Chg. No.	Page No.	Chg. No.	Page No.	Chg. No.
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Record of Applicable Technical Directives

None

TABLE OF CONTENTS

1. INTRODUCTION.

The corrosion inhibitor system is used to reduce the corrosion that occurs in the crude oil pipelines. Corrosion inhibitor solution is injected into the crude oil during operations. The solution forms a protective molecular film on the metal surfaces that is impervious to H_2S, CO_2, and organic acid corrodants. The amount of inhibitor to inject is determined for each fluid movement in accordance with Corrosion Control Procedure D506-01182-09.

The corrosion inhibitor systems are located in three areas: four tanks and one pump adjacent to the Bayou Choctaw and Weeks Island launcher receivers, and one tank and one pump at Dock No. 1 and Dock No. 2.

The corrosion inhibitor solution is injected into the crude oil lines on the terminal site during transfer to Bayou Choctaw, Weeks Island, and CAPLINE. The solution is also injected into the crude oil lines, on Dock No. 1 and Dock No. 2, during receiving.

The table in Appendix A describes the corrosion inhibitor system operating and safety envelope. Appendix B shows schematic diagrams of the system. Appendix C contains technical information on the pumps, motor, tank, electrical switches and panels.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the corrosion inhibitor system under normal conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instruction for the following activities:

- **A.** Starting, monitoring and stopping the Corrosion inhibitor pumps.
- **B.** Emergency stopping procedures for the corrosion inhibitor pumps.
- **C.** Performing required operation actions on the Corrosion inhibitor pumps.

1.3 **Applicability.** This procedure applies under normal operating conditions. Under these conditions there is one authorized operating mode, LOCAL. (Refer to Section 4.)

1.4 **Reference Documents.**

A. D506-01182-09, Corrosion Control Procedures.

B. Bulletin No. 410, Operation Maintenance, Pulsa Series Diaphragm Metering Pump.

C. Material Safety Data Sheet (MSDS), NALCO 4952 (formerly 1152) BIOCIDE.

D. Operating Procedure, ASR6400.16, Pipeline Pigging Procedures.

E. Piping and Instrumentation Diagram, Pig Launcher/Receiver Weeks Island & Bayou Choctaw, drawing no. SJ-M-103-018.

F. Piping and Instrumentation Diagram, Crude Oil Loading/Unloading Dock No. 1, drawing no. SJ-M-103-026.

G. Piping and Instrumentation Diagram, Crude Oil Loading/Unloading Dock No. 2, drawing no. SJ-M-103-027.

2. PRECAUTIONS AND LIMITATIONS.

The following precautions and limitations apply to the operations of the corrosion inhibitor system in the LOCAL operating mode.

NALCO 4592 (formerly 1152) Biocide is flammable. Keep away from heat and open flames. Causes severe eye and skin damage. May be harmful if swallowed or absorbed through skin. Do not get in eyes, on skin or on clothing. Do not take internally. Keep container closed when not in use. Wear goggles, a face shield and rubber gloves during equipment start-up or when handling solution or contaminated equipment. Empty containers may contain residual product. Do not use container unless properly reconditioned. Personnel should be familiar with information contained in the material safety data sheet (MSDS) before working with this chemical.

3. PREREQUISITE ACTIONS FOR PREPARING THE CORROSION INHIBITOR SYSTEM FOR OPERATION.

The following actions shall be taken prior to operating the corrosion inhibitor system. These actions apply to operation in the LOCAL mode.

3.1 **Special Tools and Equipment.**

A. Eye protection.

B. Rubber gloves.

C. Face shield.

3.2 **Field Preparations.** The following steps shall be performed before starting the terminal, and Dock No. 1 and Dock No. 2 metering pumps.

[1] Verify that the system is in general readiness. This shall include checking that no SPR Report of Repair tags are present and piping is properly configured with vent and drain valves closed.

[2] Verify that the support equipment shown in Appendix A is fully functional and available for service, prior to starting the system.

[3] Prior to operating pumps, ensure that all preventive maintenance has been performed and the pumps are functioning properly.

[4] Verify that all of the valves and switches are in the standby position, as shown in Appendix D.

[5] Ensure that applicable steps in the Pipeline Pigging Procedure (ASR6400.16) have been compiled with prior to injecting corrosion inhibitor.

[6] Verify that the local (non-DCS) instrumentation on the systems to be operated have current calibration stickers. (Refer to Appendix B, Sheets 2, 3, and 4.)

[a] Pressure indicators.

[b] Level indicators.

[7] Verify that there is sufficient corrosion inhibitor in the tank for the particular fluid movement.

3.3 **Approvals and Notifications.** All pump and valve opreations shall be in accordance with an approved fluid movement procedure.

4. **STARTING, MONITORING, AND STOPPING THE CORROSION INHIBITOR SYSTEMS IN THE LOCAL OPERATING MODE.**

The following subsections provide step-by-step instructions for operating in the LOCAL mode. The corrosion inhibitor pumps shall be started and stopped from the local STOP/START station next to the pumps

Corrosion inhibitor pumps can be started and stopped only in the LOCAL MANUAL mode.

WARNING

The pumps are positive displacement pumps and do not have a means of limiting discharge pressure, such as PSVs. Restricted flow may burst pipes causing dangerous release of chemicals.

4.1 **Pump Start Procedure.** Perform the following steps to start the corrosion inhibitor system manually in the LOCAL mode.

WARNING

NALCO 4952 (formerly 1152) Biocide is flammable. A biocide controls corrosion by forming a protective film on metal surfaces. Keep away from heat and open lames. Causes severe eye and skin damage. May be harmful if swallowed or absorbed through skin. Do not get in eyes, on skin or on clothing. Do not take internally. Wear goggles and face shield and rubber gloves during equipment start-up or when handling solution or contaminated equipment.

[1] Verify that the appropriate power switch is in the ON position at the lighting panel for the corrosion inhibitor system to be used in the fluid movement. (Refer to Appendix C, Sheets 3, 4, and 5.)

[2] Verify that the area around the system is clear of any hazards.

[3] Open pump suction, pump discharge, and pipeline isolation valves. (Refer to Appendix B, Sheets 2, 3, and 4.)

[a] Close Weeks Island pipeline valves when using corrosion inhibitor for Bayou Choctaw pipeline only. (Refer to Appendix B, Sheet 2.)

[b] Close Bayou Choctaw pipeline valve when using corrosion inhibitor for Weeks Island pipeline only. (Refer to Appendix B, Sheet 2.)

[4] Place the local switch (2) to the ON position. (Refer to Appendix C, Sheet 2.)

[5] Verify that the pump starts.

[6] Adjust the output on the pumps to the flow rate as determined by the fluid movement procedure by use of the control knob micrometer dial on the pump. (Refer to Appendix B, Sheet 1.)

NOTE
Each head can be adjusted from 0 to 13.2 GPH (adjust heads accordingly).

[7] Verify that the pressure on the local pressure indicator is less than 350 psig. (Refer to Appendix B, Sheets 2, 3, and 4.)

4.2 **Performance Monitoring.** The field operator shall perform the following as required by the operations shift supervisor:

[1] Record the tank level.

[2] Record the pressure.

4.3 **Pump Stop Procedure.** To shut down the corrosion inhibitor system, perform the following steps:

[1] Place the local switch (2) to OFF. (Refer to Appendix C, Sheet 2.)

[2] Close the pump discharge and pipeline isolation valves. (Refer to Appendix B, Sheets 2, 3, and 4.)

5. **EMERGENCY STOPPING PROCEDURES.**

The following subsections address emergency stopping of the pump from the LOCAL MODE. If the pump has not stopped from the LOCAL mode, begin with step **[2]**.

[1] Place the local switch (2) to the OFF position. If this fails to stop the motor, then the motor shall be stopped from the lighting panel according to the following steps.

[2] Notify the control room operator that an emergency stop is required.

[3] Go to the lighting panel shown in Appendix C, Sheet 3, 4, or 5.

[4] Turn the circuit breaker to the OFF position.

6. POST OPERATION ACTIVITIES.

When the corrosion inhibitor pumps are no longer needed for the fluid movement, set all valves and selector switches associated with the systems as shown in Appendix D.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
CORROSION INHIBITOR SYSTEM

CAUTION

The corrosion inhibitor system shall be operated within the following safety envelope at all times. Failure to do so could result in damage to the equipment.

		SAFETY ENVELOPE			
			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
Pump flow rate[b]	gph	0	3	26.5	26.5
Discharge pressure[a]	psig	c	c	c	350

a This must be monitored by an operator and maintained below 350 psig. There are internal PSV's in all three systems. Each PSV is set at 400 psi.

b This cannot be measured directly. This setting on the micrometer dial determines flow rate.

c These valves have no defined limits.

Support Equipment List

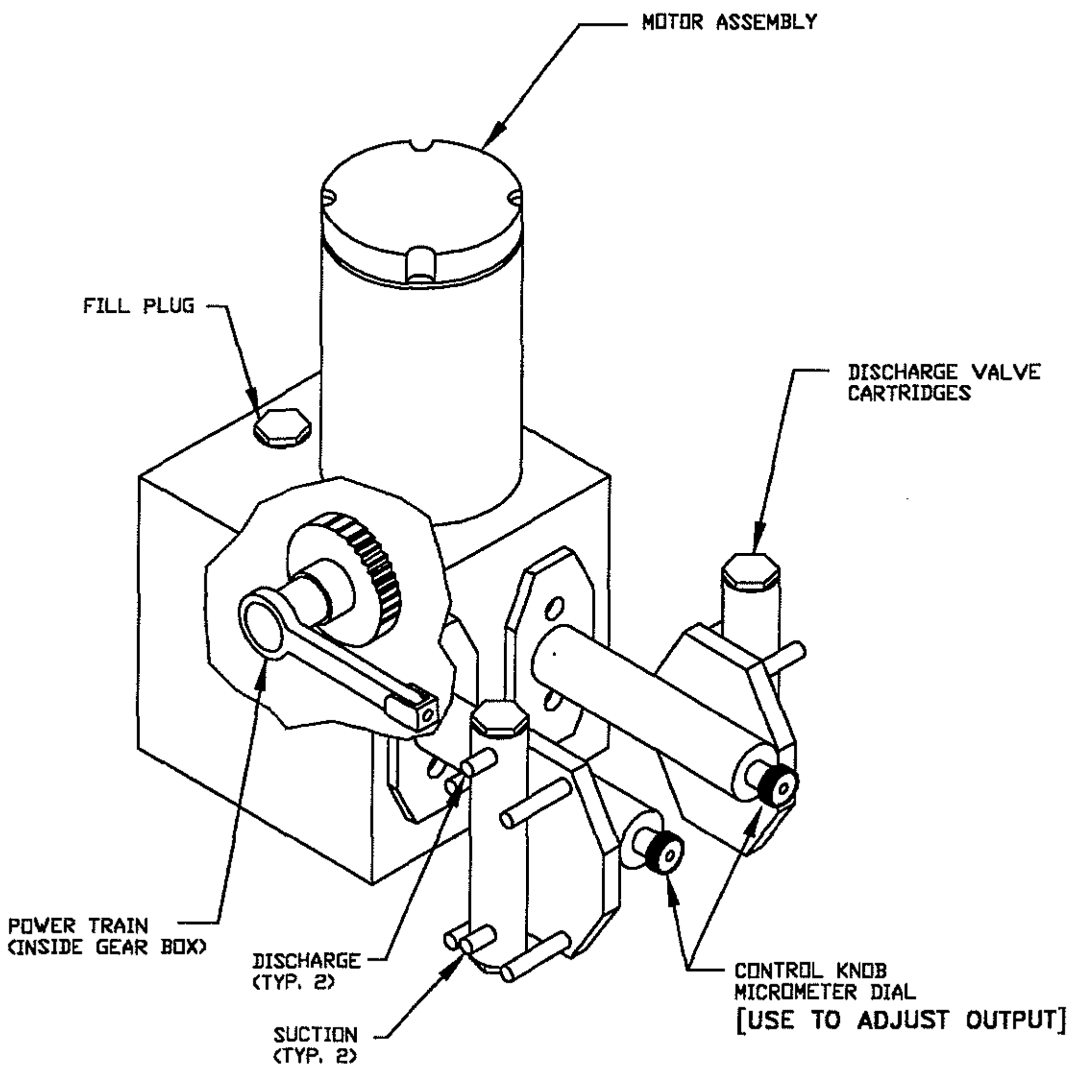
The following list of support equipment shall be operational if required for the fluid movement before the corrosion inhibitor systems are started:

A. Crude oil booster pump.
B. Dock no. 1 and 2 loading arm system.
C. Pig launcher/receiver.

APPENDIX B

SCHEMATIC DIAGRAM
CORROSION INHIBITOR SYSTEM

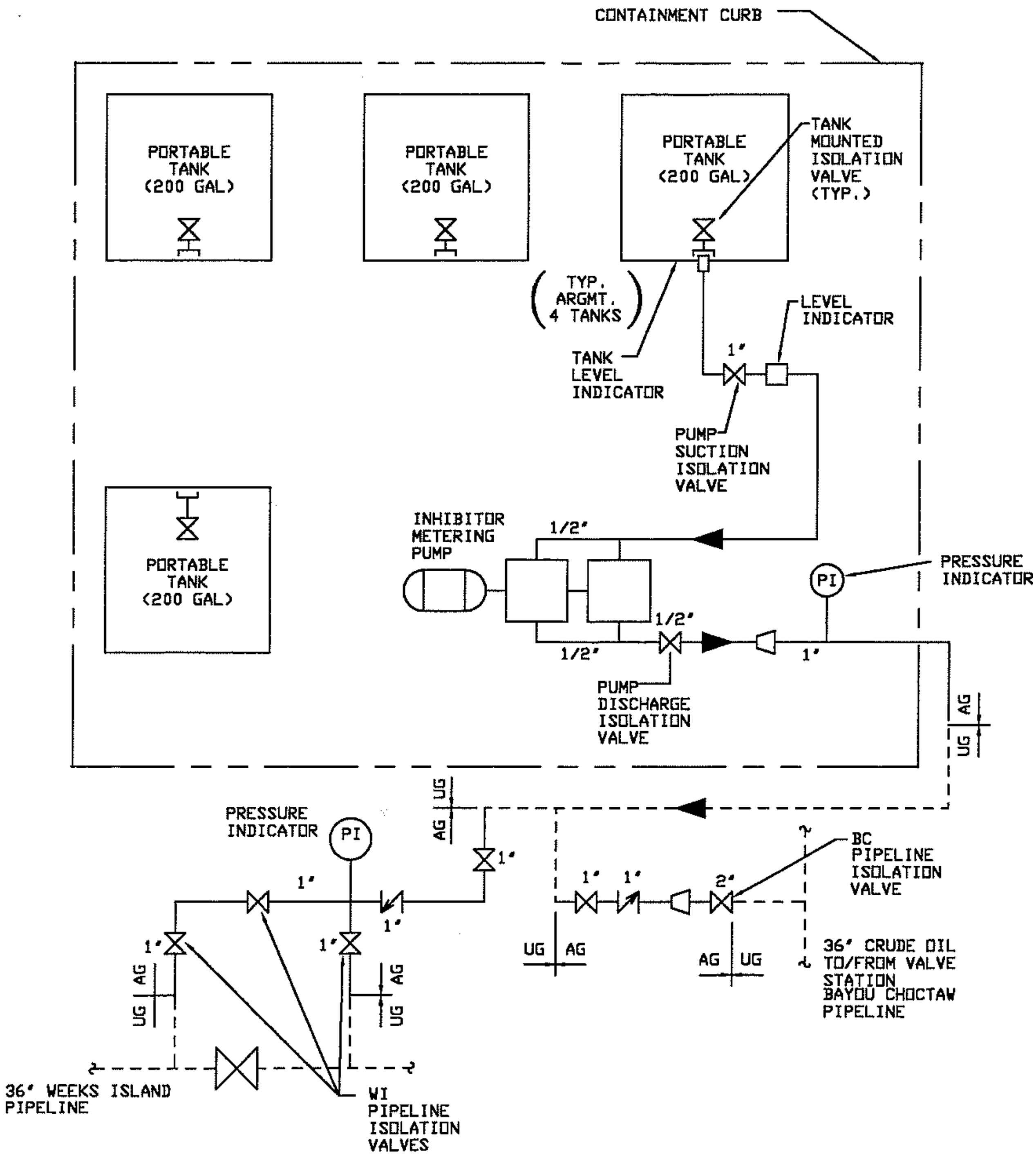
TYPICAL METERING PUMP
(Sheet 1 of 4)



APPENDIX B

SCHEMATIC DIAGRAM
CORROSION INHIBITOR SYSTEM

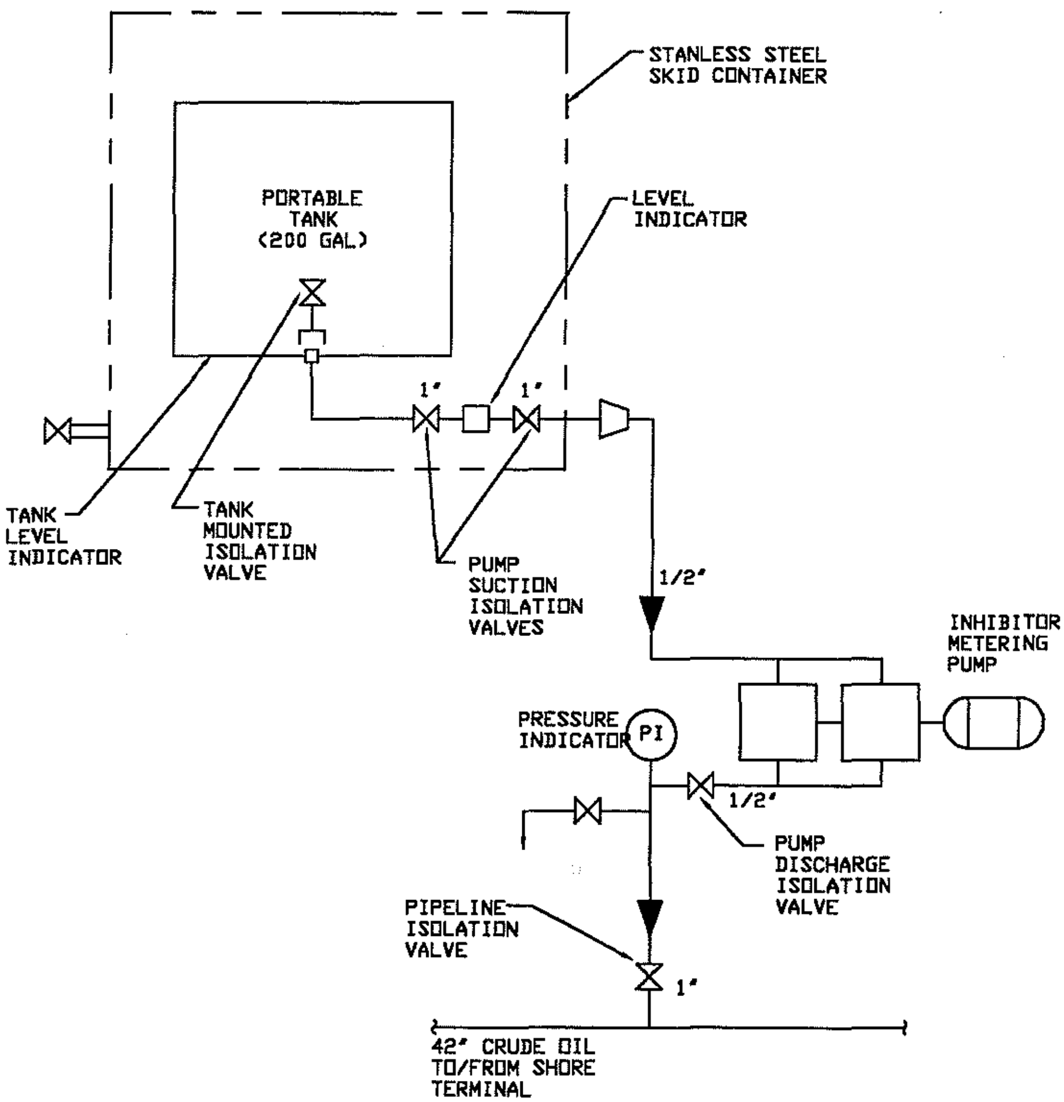
TERMINAL
(Sheet 2)



APPENDIX B

SCHEMATIC DIAGRAM
CORROSION INHIBITOR SYSTEM

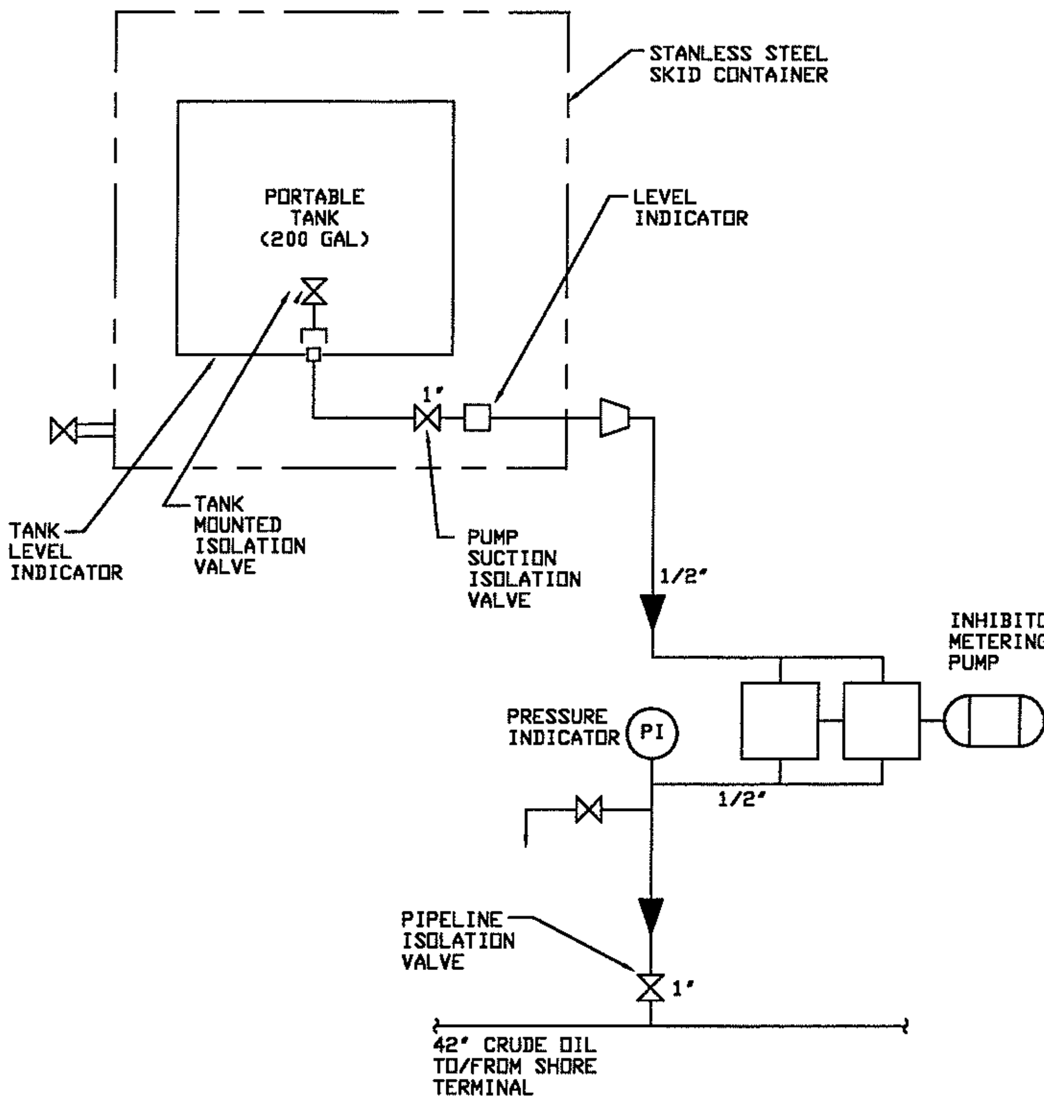
DOCK NO. 1
(Sheet 3)



APPENDIX B

SCHEMATIC DIAGRAM
CORROSION INHIBITOR SYSTEM

DOCK NO. 2
(Sheet 4)



APPENDIX C

TECHNICAL DATA
CORROSION INHIBITOR SYSTEM

TERMINAL AND DOCKS 1 & 2
(Sheet 1 of 5)

Pump:

Tag No.:	Terminal, Dock No. 1 and Dock No. 2
Manufacturer:	Neptune
Type:	Metering
Model:	Duplex
Maximum Flow Rate:	26.5 GPH @ 350 psi

Motor:

Manufacturer:	General Electric
Horsepower:	1/3
Phase:	Single
Volts:	110
RPM:	1725

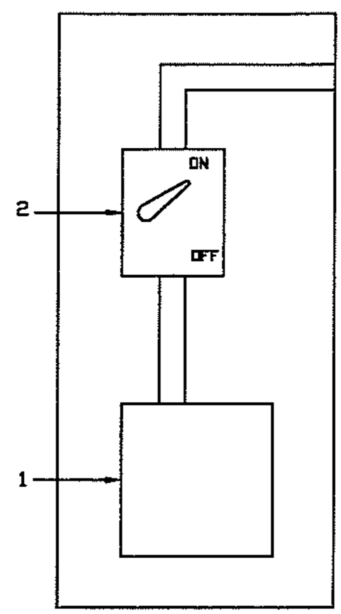
Tank:

NALCO PORTA FEED	DOT Approved
Material:	SS/Polyethylene
Size:	200 GAL.

APPENDIX C

TECHNICAL DIAGRAM
CORROSION INHIBITOR SYSTEM

TERMINAL AND DOCKS 1 & 2
LOCAL START/STOP PANEL
(Sheet 2)

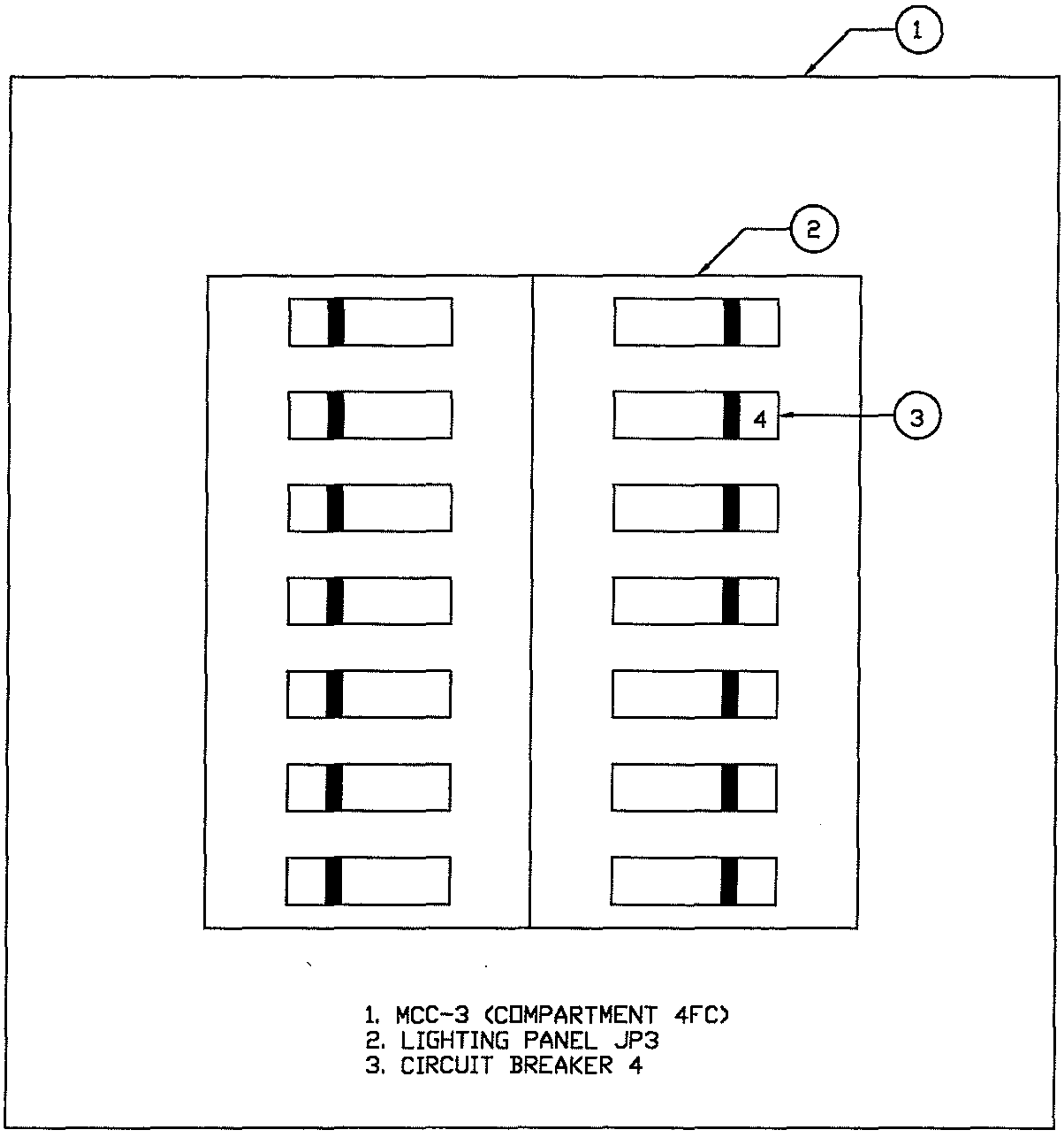


1. JUNCTION BOX
2. MAIN POWERS SWITCH

APPENDIX C

TECHNICAL DIAGRAM
CORROSION INHIBITOR SYSTEM

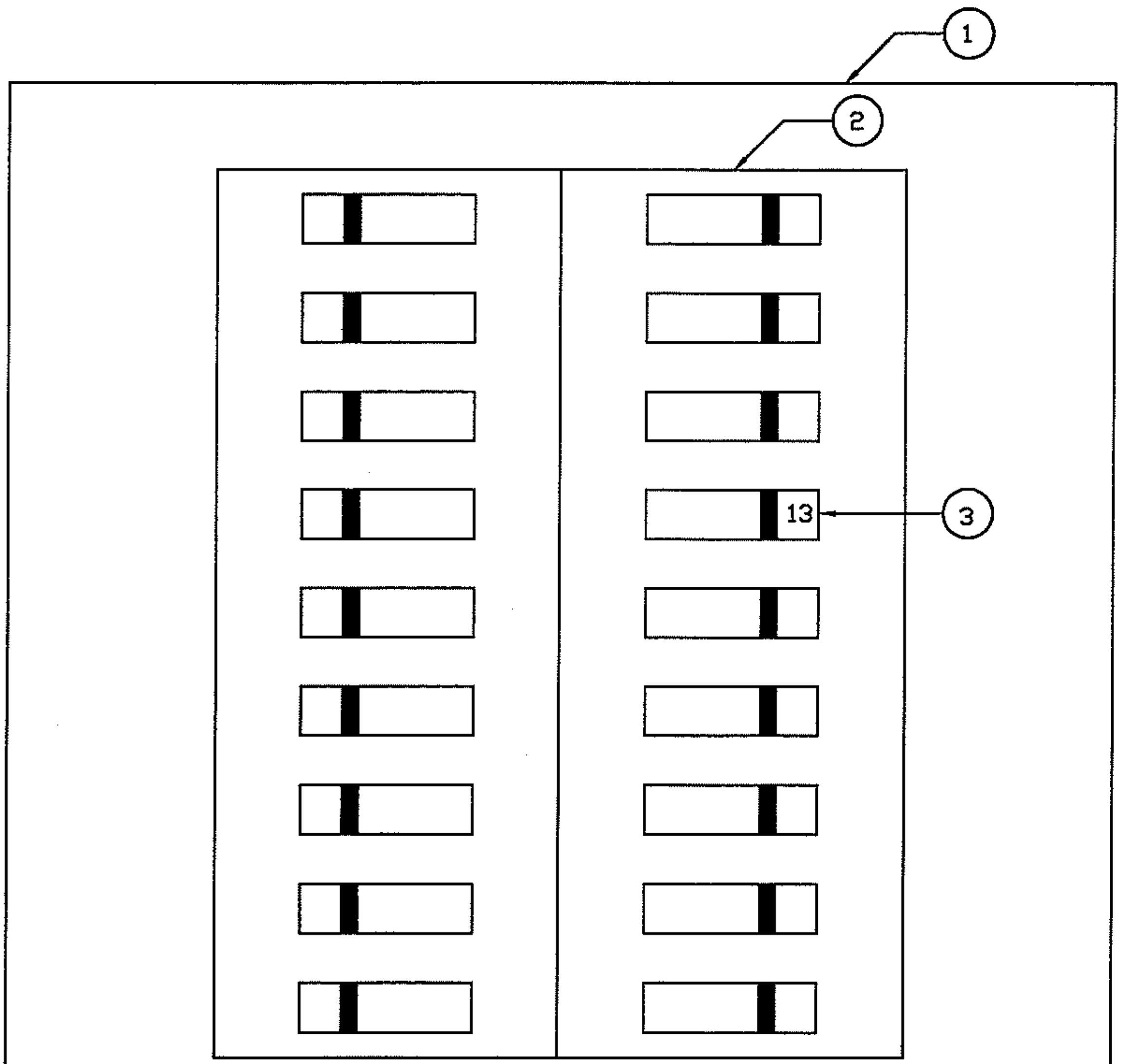
TERMINAL
JP3 LIGHTING PANEL (TERMINAL)
(Sheet 3)



APPENDIX C

TECHNICAL DIAGRAM
CORROSION INHIBITOR SYSTEM

DOCK 1
LP-1 LIGHTING PANEL
(Sheet 4)

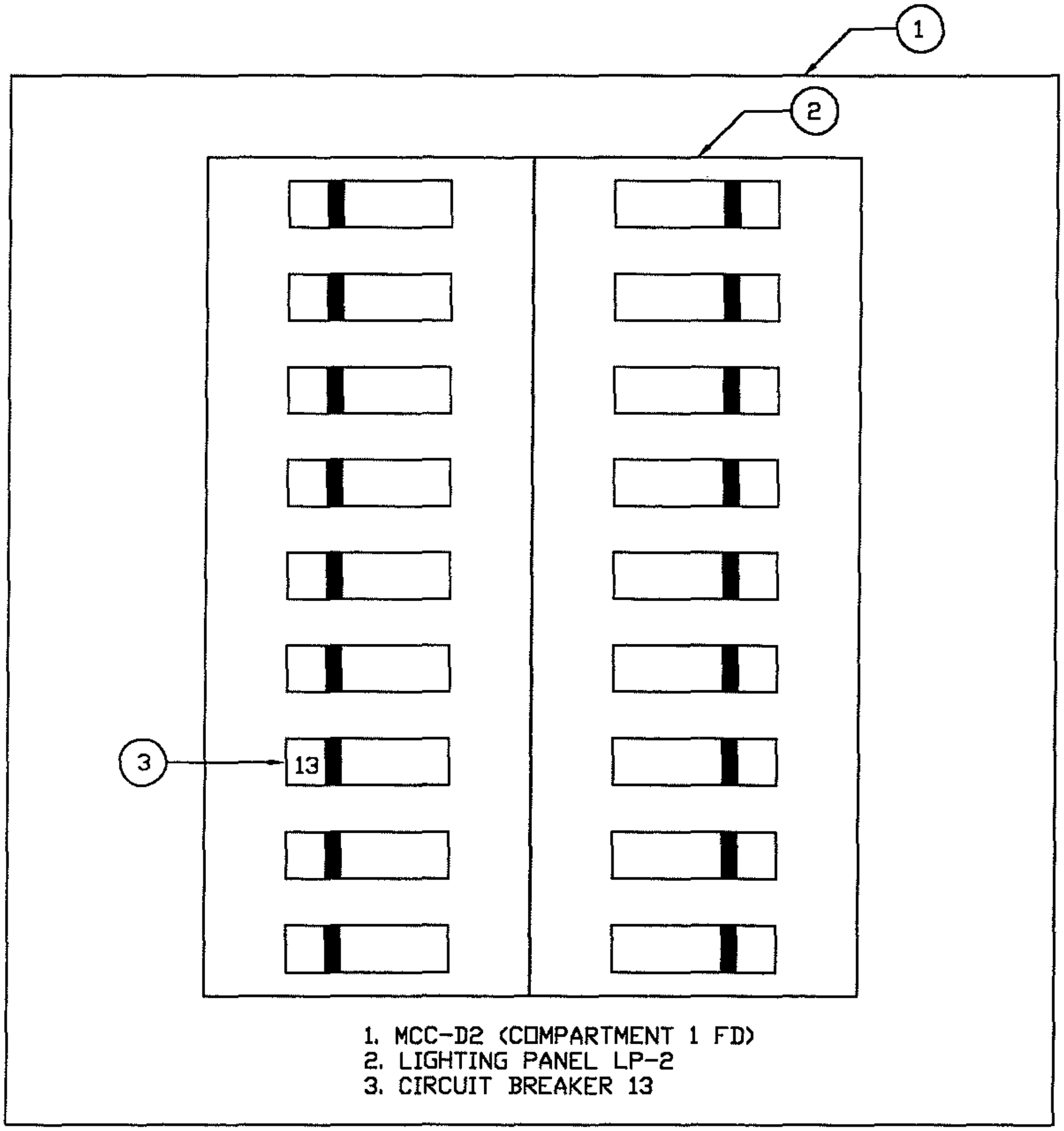


1. MCC-D1 (COMPARTMENT 4 FEL)
2. LIGHTING PANEL LP-1
3. CIRCUIT BREAKER 13

APPENDIX C

TECHNICAL DIAGRAM
CORROSION INHIBITOR SYSTEM

DOCK 2
LP-2 LIGHTING PANEL
(Sheet 5)



APPENDIX D

STANDBY VALVE AND SWITCH POSITIONS
CORROSION INHIBITOR SYSTEM

Item		Position
1.	Tank mounted isolation valve	Open
2.	Pump suction insolation valves	Closed
3.	Pump discharge isolation valve	Closed
4.	Pipeline isolation valves	Closed
5.	Pump ON/OFF switch	OFF
6.	Pump stroke adjustment (both heads)	Zero

APPENDIX E

PUMP START/STOP CAPABILITIES
CORROSION INHIBITOR SYSTEM

PUMP NO.	LOCAL CONTROL	PUMP MCC NO.	
	START/STOP HS	HOA	MCC/COMPARTMENT LIGHTING PANEL
TERMINAL	Y	H	MCC-3/4FC JP3 BREAKER 4
DOCK NO. 1	Y	NA	MCC-D1/4EL LP-1 BREAKER 13
DOCK NO. 2	Y	NA	MCC-D2/1FD LP-2 BREAKER 13

LEGEND:

<u>Item</u>	<u>Description</u>
Local Control:	Control at the pump
DCS Control:	Pump control from the Distributed Control System (DCS) control panel at the main control room.
MCC Control:	Pump control at the pump's MCC panel.
HS:	Hand switch.
HOA:	Hand-Off-Automatic selector switch.
NA:	Not applicable

Y - Indicates that hand switch operation is possible.
N - Indicates that hand switch operation is not possible.

NOTE: These pumps operate in LOCAL manual mode only.

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

SURGE RELIEF CONTROL SYSTEM

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

SURGE RELIEF CONTROL SYSTEM

List of Effective Work Package Pages

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Record of Applicable Technical Directives

None

WARNING

Crude oil is a flammable liquid. The vapors given off by crude oil are far more susceptible to ignition than the crude oil liquid. "Gassy" crude oil with a vapor pressure of >14.7 psia has a significantly increased vapor flash risk (and, therefore, ignition risk) during depressurization. Crude oil contains petroleum hydrocarbons which may cause eye, skin, and lung irritation. Crude oil may contain significant quantities of hydrogen sulfide which is irritating to the eyes, skin, and lungs at low concentrations. At higher hydrogen sulfide concentrations, loss of ability to smell, respiratory paralysis or death may occur. Crude oil also contains benzene, a known carcinogen.

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1. **INTRODUCTION.**

Oil movement at the St. James terminal is subject to a surge in the crude oil pipelines during an emergency shutdown or inadvertent closing of pipeline valves.

The surge relief control system is operable during crude oil movement when transferring and receiving oil to the CAPLINE (KOCH) and when intra-tank circulating oil, and when transferring oil to/from Docks No. 1 and No. 2.

The surge relief control system is also used to transfer oil to LOCAP as described in the fluid movement procedure.

The surge relief control system consists of five sets of pressure surge relief valves and five banks of nitrogen bottles located as follows:

A. At Weeks Island 30-inch line downstream and northwest of the Weeks Island meter. (PSV-WI-120, 220, 320 and N_2 bottles.)

B. At Bayou Choctaw 30-inch line downstream and northwest of the Weeks Island meter (PSV-BC-120, 220, and N_2 bottles).

C. At Bayou Choctaw 36-inch line downstream and west of the launcher/receiver. (PSV-2502A [20-E-110], PSV-2502B [20-E-111] and N_2 bottles.)

D. At CAPLINE (KOCH) 30-inch discharge header northwest of the Weeks Island meter. (PSV-K-120, 220, and N_2 bottles.)

E. At the 24-inch discharge lines for crude oil booster pumps SJT-4 and SJT-5. (PSV-P-420, 520, and N_2 bottles.)

The pressure surge relief valves, except for PSV-P-420 and PSV-P-520, discharge into a common header (SJ-24-SO-4002-A) connected to the 42-inch tank T-1 header (SJ-42-CR-1005-A). Relief valves PSV-P-420 and PSV-P-520 discharge into the pumps' suction header no. 1 (SJ-42-CR-1005-A) via (SJ-12-CR-1038-A) and (SJ-12-CR-1039-A), respectively.

The system surge relief valves operate utilizing dry nitrogen pressure. When the crude oil pressure exceeds the nitrogen pressure the systems surge relief valves will open relieving the pressure in the line by allowing crude oil to flow through the relief valves. The pressure surge relief valves close when the oil pressure drops below the nitrogen pressure.

The table in Appendix A describes the system's operating and safety envelope. Appendix B shows typical schematic diagrams of the surge relief control system and nitrogen field control set up. Appendix C contains technical data on the system. Appendix D describes the standby valve and switch positions.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the surge relief control system under normal conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instruction for the following activities:

A. Prerequisite actions for the surge relief control system.

B. Starting, monitoring, and stopping the surge relief control systems.

C. Performing required post surge relief control system operation activities.

1.3 **Applicability.** This procedure applies under normal operating conditions when the distributed control system (DCS) is operational. Under these conditions, there is one authorized operating mode, AUTOMATIC with DCS Monitoring.

1.4 **Reference Documents.**

A. Operating Procedure ASR4330.5, Interim Repair/Mitigation Procedure.

B. Piping and Instrumentation Diagram, Pig Launcher/Receiver Weeks Island & Bayou Choctaw, drawing no. SJ-M-103-018.

C. Piping and Instrumentation Diagram, Pipeline Surge Control and Weeks Island Accelerated Fill Pumps SJT-6, -7, and -8, drawing no. SJ-M-103-019.

D. Piping and Instrumentation Diagram, Crude Oil Booster Pumps SJT-1 through -5, drawing no. SJ-M-103-024.

E. Piping and Instrumentation Diagram Nitrogen Operated Valves and Pump Auxiliaries Detail, drawing no. SJ-M-103-036.

F. Work packages 008 00, Crude Oil Booster Pumps, and 009 00, Crude Oil Storage Tanks.

G. Grove Valve & Regulator Company, Surge Relief Control System Instruction Guide Manual No. K-010-06 (M.A. Baheth Construction Co.).

2. PRECAUTIONS AND LIMITATIONS.

The following precautions and limitations apply to the operation of the surge relief control system in the LOCAL with DCS Monitoring mode.

A. All DCS instrumentation associated with the surge relief control system shall have current calibration stickers. The loss of one or more safety device alarms requires the authorization of a work around. Refer to Operating Procedure ASR4330.5, Interim Repair/Mitigation Procedure.

B. All local instrumentation relating to the surge relief control system shall have current calibration stickers.

C. Safety devices, including the N_2 pressure relief valves, shall be in place and operational.

D. Valve alignment shall be in accordance with the valve line-up sheet for the particular fluid movement procedure.

3. PREREQUISITE ACTIONS FOR SURGE RELIEF CONTROL SYSTEM.

The following actions shall be taken prior to operating the surge relief control system. These actions apply to operation in the LOCAL with DCS Monitoring mode.

3.1 **Field Preparations.** The following steps shall be performed before starting the surge relief control system after it has been shut down:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present and piping is properly configured with vent and drain valves closed.

[2] Verify that all valves and switches are in the standby position, as shown in Appendix D.

[3] Verify that the DCS monitored devices for the surge relief system have current calibration stickers. Refer to Appendix B for specific tag numbers (ELNs).

[a] Flow switch high.

[4] Verify that the local (non-DCS) instrumentation at the surge relief control system has current calibration stickers. Refer to Appendix B for locations of instrumentation.

[a] Pressure indicator N_2 supply.

[b] Pressure indicator relief jacket.

[5] Verify that all drain and vent valves in the piping system are closed.

[6] Verify that the nitrogen supply pressure is above the low nitrogen supply pressure required. (Refer to Appendix A.)

[7] Verify that the nitrogen supply valves to the pressure surge relief valve are open.

[8] Observe the local pipeline pressure gauge to verify a nitrogen system set pressure (200 or 275 psig).

NOTE
The set pressure correlates to the surge valve's opening when crude oil line pressure reaches (200 or 275 psig).

[9] Look for leaks on the nitrogen valves, fittings, and pipings.

3.2 **Approvals and Notifications.** All pump operations shall be in accordance with an approved fluid movement procedure.

4. STARTING, MONITORING, AND STOPPING THE SURGE RELIEF CONTROL SYSTEM FOR THE BAYOU CHOCTAW 36-INCH LINE AT LAUNCHER/RECEIVER (BCSTLR-2).

The system, once set up to operate, works automatically.

4.1 **Start Procedure.** To start the system, refer to Appendix B, Sheet 1 and perform the following steps.

[1] Open the nitrogen bottle valve, manifold valve, and supply valve for one bottle.

[2] Open valve (V6).

[3] Turn hand wheel of the nitrogen regulator (R2) until the desired pressure (200 psig) is reached on the relief jacket pressure gauge (G2).

[4] Close valve (V6).

[5] Turn hand wheel of the oil sense regulator (R1) until the desired pressure (200 psig) is reached on the relief jacket pressure gage (G2).

[6] Open valve (V6).

[7] Open valve (V8) and verify that the pressure on the relief pressure indicator (G3) has returned to the previously adjusted set pressure as the jackets finish filling.

4.2 **Performance Monitoring.** The field operator shall perform the following operations.

[1] Record the following pressures as required by the operations shift supervisor:

[a] On the nitrogen supply pressure gauge (G1).

[b] On the jacket pressure gauge (G2).

[c] On the relief pressure gauge (G3).

[d] On the pipeline pressure gauge (G4).

[2] If the nitrogen (bottle) supply pressure drops below the minimum shown in Appendix A, switch the nitrogen bottles as follows:

[a] Close bottle valve on empty bottle.

[b] Open bottle valve on full bottle.

[c] Close manifold valve for empty bottle.

[d] Open manifold valve for full bottle.

[3] If an alarm for is presenta pipeline surge, verify the alarm, notify the shift supervisor, and take corrective actions as required.

4.3 **Stop Procedure.** To take a pressure surge relief valve out of service (surge relief control system), proceed as follows.

[1] Shut off the nitrogen supply to the pressure surge relief valve by closing valve (V16). (Refer to Appendix B, Sheet 1.)

[2] Bleed off the nitrogen pressure on the pressure surge relief valve by opening valve (V15). (Refer to Appendix B, Sheet 1.)

5. STARTING, MONITORING, AND STOPPING THE SURGE RELIEF CONTROL SYSTEM FOR THE WI AND BC 30-INCH LINES, CAPLINE (KOCH) 30-INCH DISCHARGE HEADER, AND PUMPS SJT-4 AND SJT-5 DISCHARGE LINES.

The system, once set up to operate, works automatically.

5.1 **Start Procedure.** To start the system, refer to Appendix B, Sheets 2, 3, 4, and 5 and perform the following steps.

[1] Open the nitrogen bottle valve, manifold valve, and supply valve for one bottle.

NOTE
These surge relief control systems are split internally into two redundant systems. Either regulator R1 or R2 can be used to set relief pressure

[2] Turn hand wheel of the nitrogen regulator (R1 or R2) until the desired pressure (275 psig) is reached on the relief jacket pressure gauge (G1).

5.2 **Performance Monitoring.** The field operator shall perform the following operations.

[1] Record the following pressure as required by the operations shift supervisor.

[a] On the nitrogen supply pressures indicator (G2).

[b] On the relief jacket pressure indicator (G1).

[2] If the nitrogen supply pressure drops below the minimum shown in Appendix A, switch the nitrogen bottles as follows:

[a] Close bottle valve on empty bottle.

[b] Open bottle valve on full bottle.

[c] Close manifold valve for empty bottle.

[d] Open manifold valve for full bottle.

[3] If an alarm for a pipeline surge, verify the alarm, notify the shift supervisor, and take corrective actions as required.

5.3 **Stop Procedure.** To take a pressure surge relief valve out of service (surge relief control system), proceed as follows:

[1] Shut off the nitrogen supply to the pressure surge relief valve by closing the isolation valve. (Refer to Appendix B, Sheets 2, 3, 4, & 5.)

NOTE

Shutting of the N_2 pressure at the pipeline will not take any other surge relief control valves out of operation. If all are to be taken out of service simultaneously or the whole system is to be taken out of service, close the manifold valve.

[2] Bleed off the nitrogen pressure on the pressure surge relief valve by opening the bleed valve. (Refer to Appendix B, Sheets 2, 3, 4, & 5.)

6. **PERFORMING REQUIRED POST SURGE RELIEF CONTROL SYSTEM OPERATING ACTIVITIES.**

When the surge relief control system is to be placed into service, the valves and switches shall be positioned as indicated in Appendix D.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
SURGE RELIEF CONTROL SYSTEM

WARNING

Exceeding these parameters could cause injury to personnel, damage equipment, or have environmental impacts.

		SAFETY ENVELOPE			
			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
Nitrogen bottle pressure	psig	600	1000	2100	2310
Surge relief set point at [c] Bayou Choctaw 36-inch line at Launcher/Receiver (BCSTLR-2)	psig	b	b	200[a]	200
Surge relief set point at [c] WI and BC 30-inch lines, CAPLINE (KOCH) 30-inch discharge header and pumps SJT-4 and SJT-5 discharge line	psig	b	b	275[a]	275
Nitrogen jacket pressure [c] set point at Bayou Choctaw 36-inch line at Launcher/ Receiver (BCSTLR-2)	psig	b	b	195	275
Nitrogen jacket pressure [c] set point at WI & BC 30-inch lines, CAPLINE (KOCH) 30-inch discharge header and pumps	psig	b	b	270	275

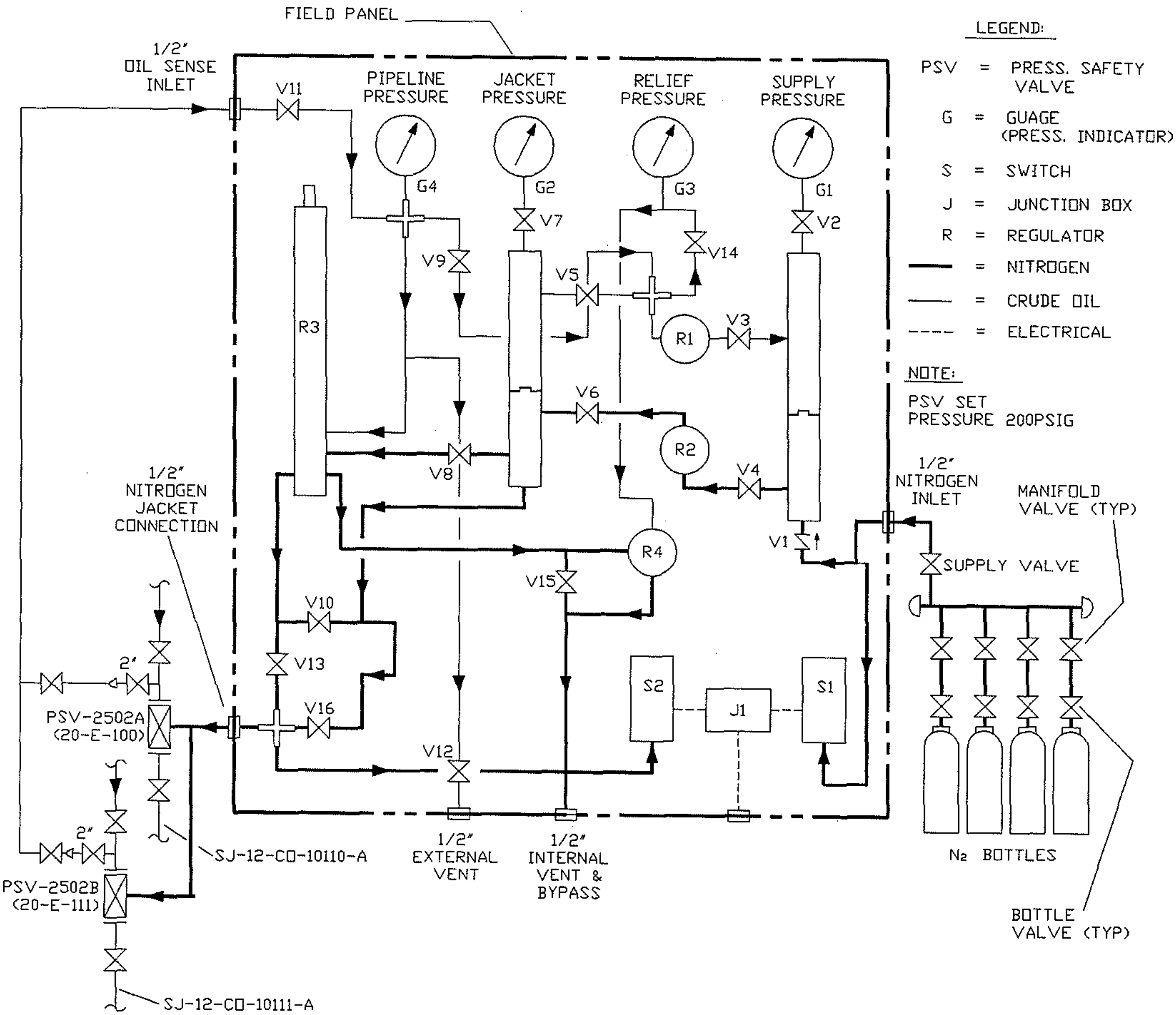
a These pressure readings to be monitored by an operator.
b These values have no defined limits.
c Refer to fluid movement procedure for specific set pressures.

Support Equipment List

None required.

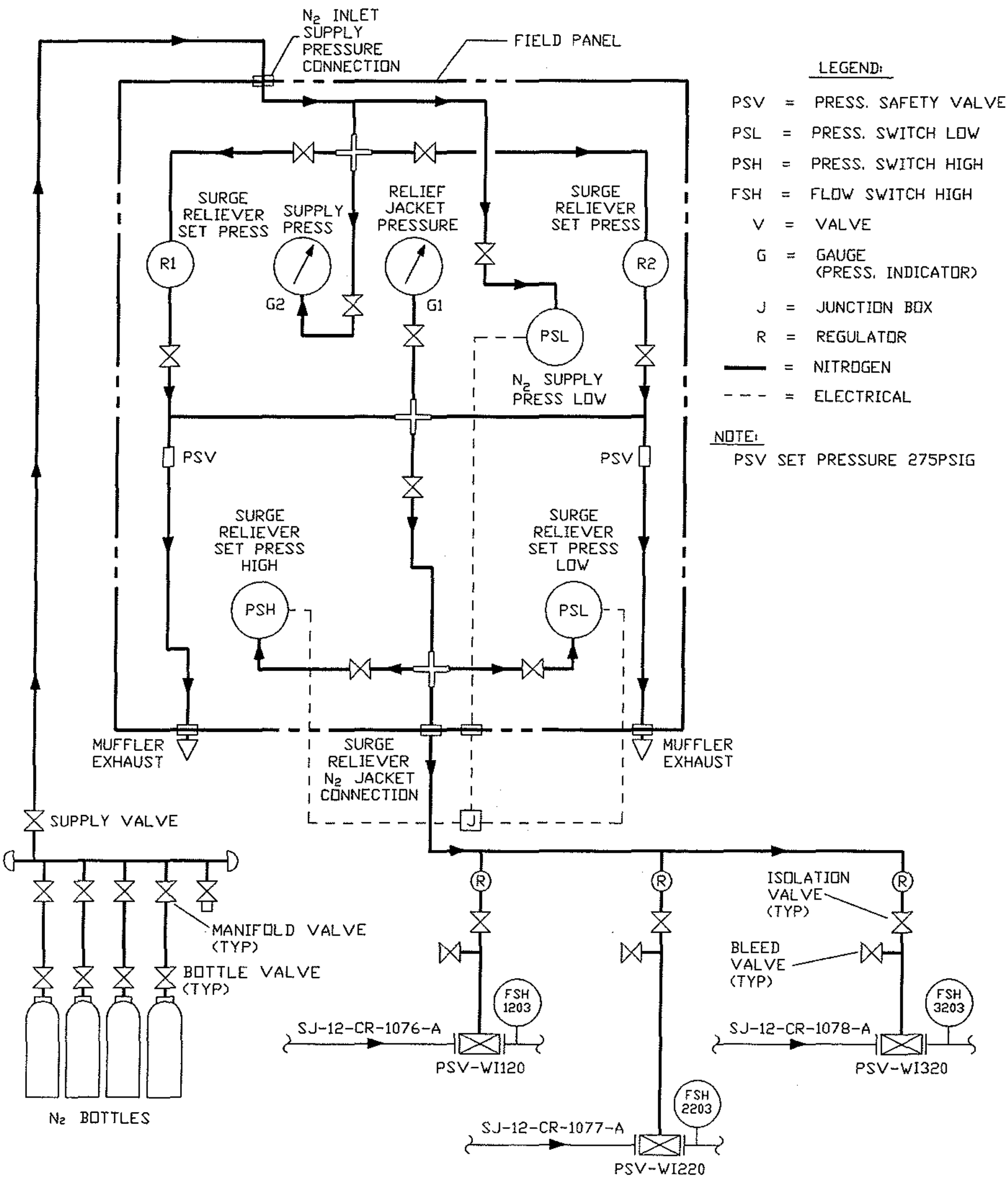
APPENDIX B

SCHEMATIC DIAGRAM
SURGE RELIEF CONTROL SYSTEM
BAYOU CHOCTAW 36-INCH LINE AT LAUNCHER/RECEIVER
(Sheet 1 of 5)



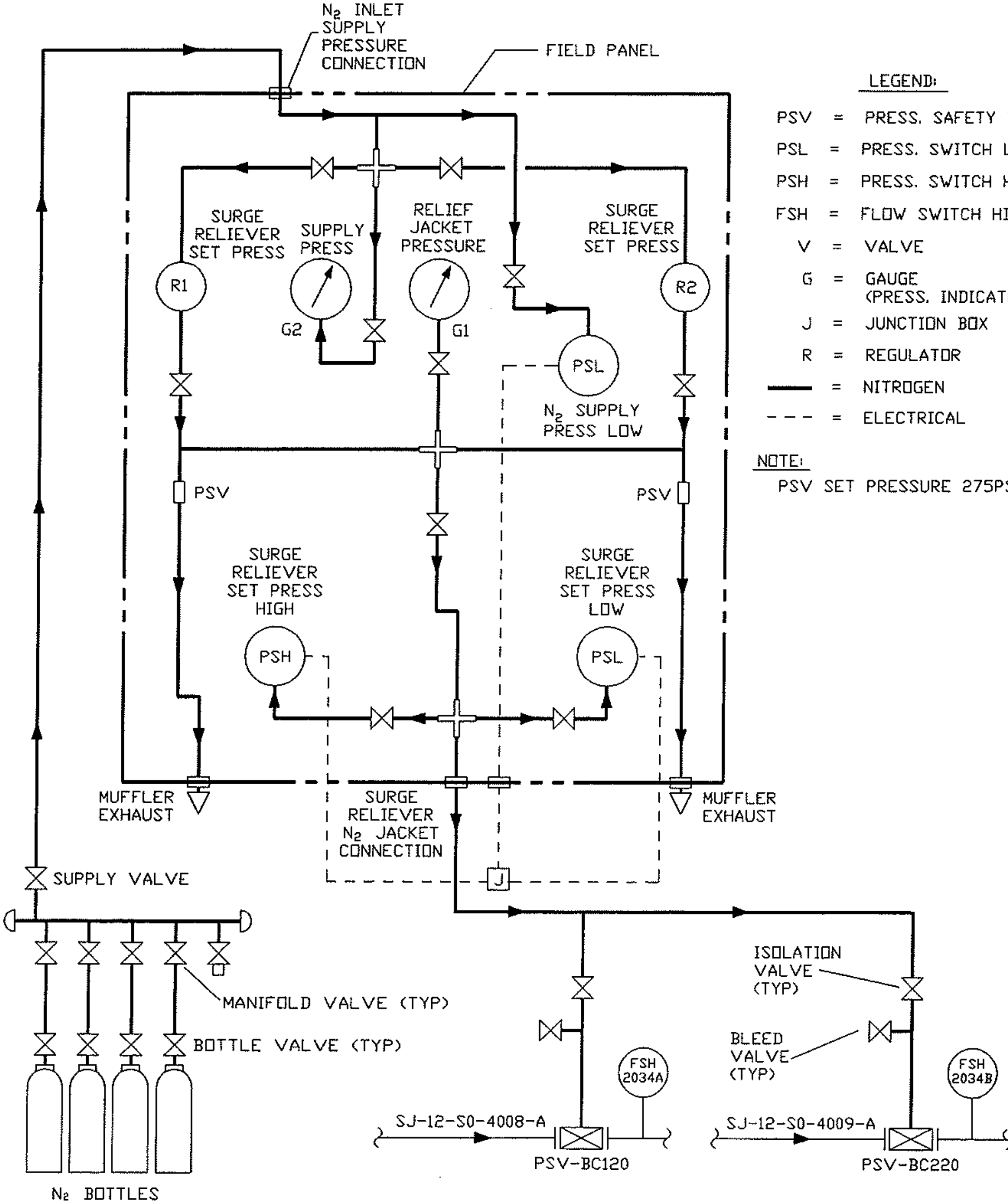
APPENDIX B

SCHEMATIC DIAGRAM
SURGE RELIEF CONTROL SYSTEM
WEEKS ISLAND 30-INCH LINE
(Sheet 2)



APPENDIX B

SCHEMATIC DIAGRAM
SURGE RELIEF CONTROL SYSTEM
BAYOU CHOCTAW 30-INCH LINE
(Sheet 3)



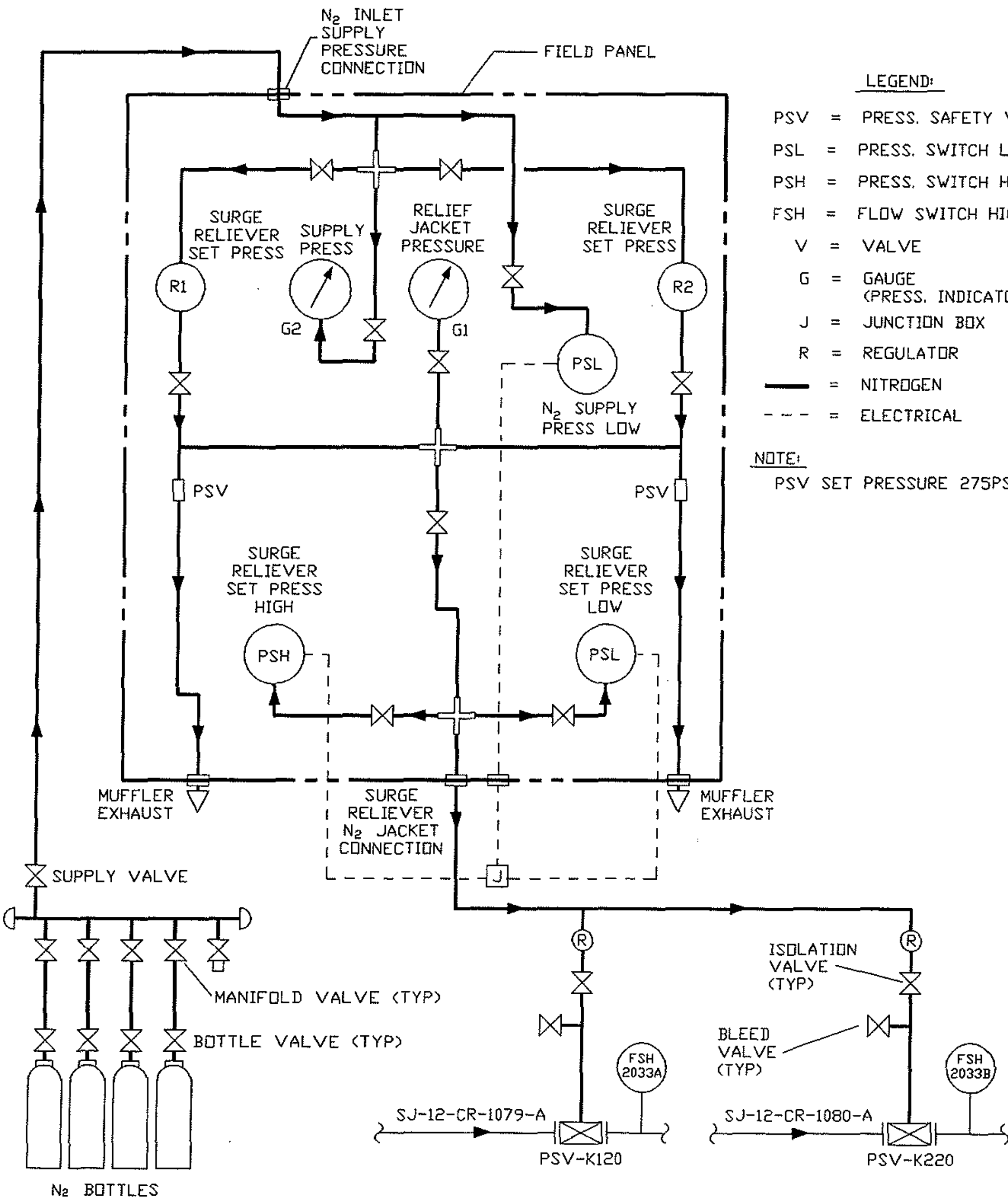
LEGEND:

PSV = PRESS. SAFETY VALVE
PSL = PRESS. SWITCH LOW
PSH = PRESS. SWITCH HIGH
FSH = FLOW SWITCH HIGH
V = VALVE
G = GAUGE (PRESS. INDICATOR)
J = JUNCTION BOX
R = REGULATOR
—— = NITROGEN
- - - = ELECTRICAL

NOTE:
PSV SET PRESSURE 275PSIG

APPENDIX B

SCHEMATIC DIAGRAM
SURGE RELIEF CONTROL SYSTEM
CAPLINE (KOCH) 30-INCH DISCHARGE HEADER
(Sheet 4)



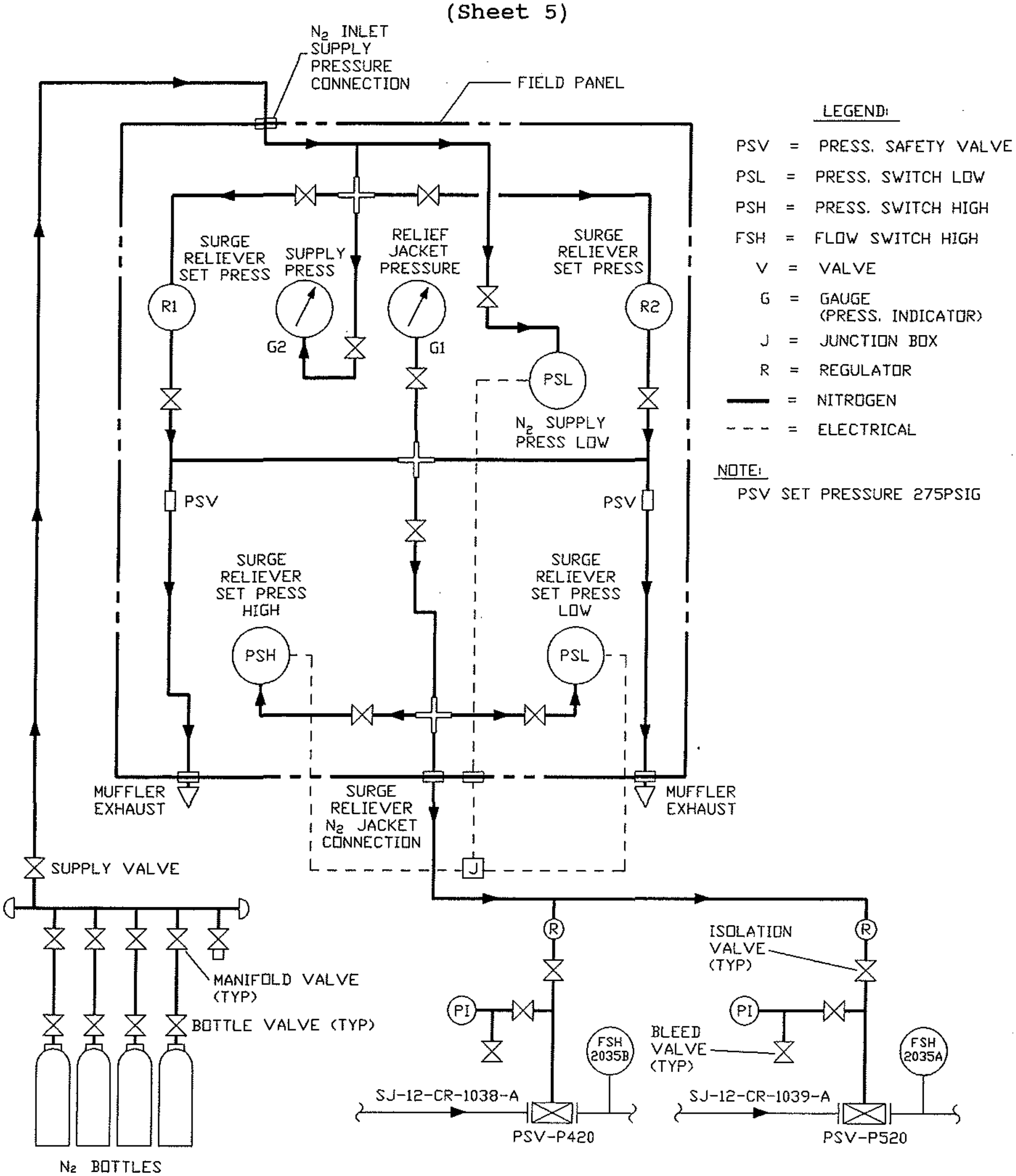
LEGEND:

PSV	=	PRESS. SAFETY VALVE
PSL	=	PRESS. SWITCH LOW
PSH	=	PRESS. SWITCH HIGH
FSH	=	FLOW SWITCH HIGH
V	=	VALVE
G	=	GAUGE (PRESS. INDICATOR)
J	=	JUNCTION BOX
R	=	REGULATOR
▬▬	=	NITROGEN
– – –	=	ELECTRICAL

NOTE:
PSV SET PRESSURE 275PSIG

APPENDIX B

SCHEMATIC DIAGRAM
SURGE RELIEF CONTROL SYSTEM
PUMPS SJT-4 & SJT-5 DISCHARGE LINES
(Sheet 5)



APPENDIX C

TECHNICAL DATA
SURGE RELIEF CONTROL SYSTEM

High pressure regulator

Model:	Groves 15LX
Diaphragm material:	Viton

APPENDIX D

STANDBY VALVE AND SWITCH POSITIONS
SURGE RELIEF CONTROL SYSTEM

	ITEM		POSITION
1.	Nitrogen supply system valves for the Bayou Choctaw 36-inch line at launcher/ receiver, WI, BC & CAPLINE (KOCH) 30-inch lines at the WI meter area, discharge lines at pumps SJT-4 and SJT-5		Open
2.	Nitrogen control panel for the Bayou Choctaw 36-inch line at the Launcher/Receiver.		
		V2	Open
		V3	Open
		V4	Open
		V5	Open
		V6	Closed
		V7	Open
		V8	Closed
		V9	Closed
		V10	Closed
		V11	Open
		V12	Closed
		V13	Open
		V14	Closed
		V15	Closed
		V16	Closed
3.	Nitrogen manifold exit valve control panel for the WI, BC &, CAPLINE (KOCH) 30-inch lines at the WI meter area and discharge lines at pumps SJT-4 and SJT-5.		Open

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

LOADING ARMS

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

LOADING ARMS

List of Effective Work Package Pages

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1 thru 21	0	22(Blank)	0		

Record of Applicable Technical Directives

None

WARNING

Crude oil is a flammable liquid. The vapors given off by crude oil are far more susceptible to ignition than the crude oil liquid. "Gassy" crude oil with a vapor pressure of >14.7 psia has a significantly increased vapor flash risk (and, therefore, ignition risk) during depressurization. Crude oil contains petroleum hydrocarbons which may cause eye, skin, and lung irritation. Crude oil may contain significant quantities of hydrogen sulfide which is irritating to the eyes, skin, and lungs at low concentrations. At higher hydrogen sulfide concentrations, loss of ability to smell, respiratory paralysis or death may occur. Crude oil also contains benzene, a known carcinogen.

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1. INTRODUCTION.

The loading arms are located on Dock No. 1 and Dock No. 2. The loading arms on Dock No. 1 are designated D1ARM 1, D1ARM 2, and D1ARM 3 from north to south. The loading arms on Dock No. 2 are designated D2ARM 3, D2ARM 2, and D2ARM 1 from north to south.

The arms function to connect the site piping to ships for on-loading and off-loading. Each arm is designed for a flow rate of 480 MBD (20MBH, 14,000 GPM). Two arms deliver the dock design flow rate of 960 MBD (40MBH). The third arm is an installed spare in standby service.

Each dock's loading arm is powered by a hydraulic unit. The hydraulic unit is powered by a pump and electric motor on a tank mounted skid. Each dock has a separate control console with three control function hydraulic proportioning valves. The proportioning valves provide transverse (right-left), inboard arm (reach), and outboard arm control (extend). When the outboard arm is extended, a weight on the back of the arm extends in the opposite direction providing a counter balancing moment. The result is a counter-balanced design. A selector switch on the control console selects the dock loading arm through which the control function operates. More than one control function can be exercised at once, but the speed will be reduced and the fastest function will be the one with the least resistance.

Appendix A describes the loading arm's operating and safety envelope. Appendix B shows typical schematic diagrams and equipment layout of the loading arms. Appendix C contains technical information on the loading arms.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the loading arms under normal conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Prerequisite actions for operating of the loading arms.

B. Starting, monitoring, and stopping the loading arms in LOCAL mode.

C. Emergency stopping of the loading arms.

D. Performing required post operation actions on the loading arms.

1.3 **Applicability.** This procedure applies under normal operating conditions. Under these conditions, there is one authorized operating mode, LOCAL (Section 4).

1.4. **Reference Documents.**

A. Piping and Instrumentation Diagrams, Crude Oil Loading/Unloading Dock No. 1, drawing no. SJ-M-103-026.

B. Piping and Instrumentation Diagrams, Crude Oil Loading/Unloading Dock No. 2, drawing no. SJ-M-193-027.

C. Work Package 007 00, Crude Oil Sampling Systems; 016 00, Corrosion Inhibitor Systems; and 019 00, Purge Pumps.

D. Continental EMSCO, Model CEMA IV Type MRHLA II Loading Arm Operating and Maintenance Manual.

2. **PRECAUTIONS AND LIMITATIONS.**

The following precautions and limitations apply to the operation of the loading arms in the LOCAL operating mode:

A. All local instrumentation relating to the loading arms to be operated shall have current calibration stickers.

B. The minimum and maximum safety envelope parameters in Appendix A shall be observed at all times.

C. Safety devices, including the hydraulic power unit pump coupling guards and pressure safety relief valves, shall be in place and operational.

D. Valve alignment shall be in accordance with the valve line-up sheet for the particular fluid movement procedure.

E. The hydraulic power unit pump, motor, and gear shafts alignment shall have been aligned according to St. James Maintenance Procedure CM-105. If the pump/gear/motor shafts are not properly aligned, damage to the pump, gear, and/or motor can occur.

3. PREREQUISITE ACTIONS FOR OPERATING THE LOADING ARMS.

The following actions shall be taken prior to operating the loading arms. These actions apply to operation in the LOCAL mode.

3.1 Special Tools and Equipment.

A. Five gallon bucket.

B. Oil absorbent rags.

3.2 Field Preparations.

Field Preparations. The following steps shall be performed before employing the loading arms.

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present, piping is properly configured with vent and drain valves closed, and motor grounding straps are in place. Consult the shift supervisor if SPR Report of Repair Tags are present.

[2] Verify that the support equipment shown in Appendix A is fully functional and available for service as required in the fluid movement procedure, prior to employing the loading arms.

[3] Verify that all valves and switches are in the standby position, as shown in Appendix D.

[4] Verify that the local (non-DCS) instrumentation at the loading arms to be operated have current calibration stickers. Refer to Appendix B, Sheet 3 for specific items.

[a] Pressure indicator on hydraulic pump power unit.

[b] Grounding/bonding circuit lights.

[c] Pressure indicator on control console.

[5] Verify that the hydraulic power unit pump/motor shafts have been properly aligned.

[6] Verify that the monthly loading arm test ORC-41S has been performed within its validation period.

[7] Verify that the monthly maintenance check MRC-431, on the hydraulic oil quality has been done within its validation period.

[8] Verify that the breaker to the loading arms is in the ON position. (Refer to Appendix C, Sheet 4.)

[9] Verify that the loading arm purging procedure has been done according to work package 019 00.

3.3 **Approvals and Notification.** All loading arm operations shall be in accordance with an approved fluid movement procedure.

4. CONNECTING, MONITORING, AND STORING THE LOADING ARMS IN THE LOCAL OPERATING MODE.

The following subsections provide step-by-step instructions for operating in the LOCAL mode. The loading arms are controlled from the local control console.

4.1 **Loading Arm Connecting Procedure - LOCAL Mode.** Perform the following steps to connect the loading arms in the LOCAL mode.

CAUTION

All vessels shall be grounded and bonded electrically to the dock platform after the ship has been tied off and before any metal to metal contact is made. This is to prevent a static spark.

4.1.1 **Grounding and Bonding.** Each dock has a primary ground cable and secondary ground (bonding) cable. The primary grounding cable is the thicker of the two cables. The primary cable is secured to the loading arm base and the secondary (bonding) cable is attached to the loading arm control console. Immediately after the dock operator has properly moored the ship:

[1] Transfer the primary grounding cable to the ship's crew to connect.

[2] Transfer the bonding (secondary grounding) cable to the ship's crew to connect to a different part of the ship.

[3] Verify that the green bonding indicator light illuminates. The light is located on the loading arm control console. (Refer to Appendix B, Sheet 2.)

[4] If the red bonding indicator light remains illuminated indicating that the bonding is not acceptable, perform the following:

[a] Scrape the teeth on the grounding and bonding clamps.

[b] Have the ship's crew scrape the areas on the ship where the clamps are connected and reconnect the clamps.

[c] Check the green bulb to verify that it is not burnt.

4.1.2 Operation of the Loading Arm.

WARNING

Unauthorized personnel must be cleared of the area immediately around the loading arms.

[1] If attached, remove the hurricane tie safety spool. The spool attaches the riser to the inboard arm.

[2] Turn the OPERATE SWITCH on the dock loading arm console to the SELECT position. (Refer to Appendix B, Sheet 2.)

[3] Allow the pump to run for several minutes to expel air from the system. Verify that the pressure indicator on the hydraulic unit indicates a pressure that is within the operating envelope in Appendix A (1300 to 1500 psig, normally.)

[4] Verify that the hydraulic power unit fluid level remains within the indicator sight glass. This level may decrease slightly as oil is moved through the lines or air is expelled from the lines.

NOTE

Always select the loading arm furthest from the dock loading arm console first. This prevents blocking the operator's view when connecting the second loading arm.

[5] Place the loading arm SELECTOR SWITCH to the arm to be used that is furthest from the dock loading arm console.

[6] With the safety turnbuckle still attached, move the loading arm function controls to traverse, inboard, and outboard positions alternately for one minute. This will purge air from the lines and verify the functions. The turnbuckle is attached to the arm's base plate and the counter weight on the back of the inboard arm.

[7] After verifying full function of the controls, remove the turnbuckle from the base of the inboard arm.

[8] Using the loading arm function controls, lower the selected arm to the ship's deck over the ship's manifold drip pan.

[9] Advise the ship's crew that there may be some oil in the outboard arm.

[10] Maintain control of the loading arm until the ship's crew has removed the protective blind flange, placed a gasket, bolts in every flange bolt hole, and the loading arm secured to the ship's manifold.

[11] Have the ship's crew secure the support legs of the outboard loading arm as follows:

  [a] Extend and pin the legs.

  [b] Use the screw to take the weight off the nozzle.

[12] Place the OPERATE SWITCH in the FLOAT position while the flange bolts are torqued.

[13] To place the other loading arm into service:

  [a] If attached, remove the hurricane tie safety spool.

  [b] Place the OPERATE SWITCH in the SELECT position.

  [c] Place the SELECTOR SWITCH to the position of the other loading arm identified in the fluid movement procedure.

  [d] Allow the pump to run for several minutes to expel air from the system. Verify that the pressure indicator on the hydraulic unit indicates a pressure that is within the operating envelope in Appendix A (1300 to 1500 psig, normally.)

  [e] Verify that the hydraulic fluid level remains within the sight glass. This level may decrease slightly as the oil is moved through the lines or air is expelled from the lines.

  [f] Repeat steps **4.1.2 [6]** through **[12]**.

CAUTION

Never connect three loading arms. If the ship moves in any direction too far, it may damage the loading arms. The third arm is an installed spare intended for use if one of the two operating arms cannot perform its function.

[14] Place the OPERATE SWITCH to the FLOAT position.

4.2 **Monitoring.** Once the loading arms are connected to the ship, proceed according to the specific fluid movement and monitor the following:

CAUTION

Transfer of non-conducting (oil) fluid can transfer electric charge and cause a dangerous electric potential difference.

[1] The green bonding light remains illuminated indicating that the ship and dock facility are at the same potential.

[2] Verify that the arms remain in the float position. The pressure indicator on the reservoir should show very nearly zero pressure at all times. The pressure is controlled by the dual relief valves in the lines.

NOTE

If the ship shifts on the moorings, the pressure indicator may show a slight indication as the hydraulic fluid flows through the system.

4.3 **Loading Arm Storing Procedure.** When the oil movement part of the fluid movement procedure is complete, perform the following steps to disconnect and store the loading arms in the LOCAL mode. The loading arms are controlled from the local control console.

CAUTION

Either or both MOVs in the crude oil line must be closed before the loading arms are purged and stored.

[1] Verify that the crude oil samplers and the corrosion inhibitor metering pump are turned off.

[2] On the loading arm closest to the control console, open the 1" vacuum breaker valves at the top of the outboard arm. This allows the fluid in the outboard arm to drain back into the ship.

NOTE

Currently, the remote operators for the vacuum breaker valves are not installed. The valves cannot be accessed when in service without the remote operators. The following steps **[2A]** and **[2B]** are an alternative method to step **[2]** until the remote operators are installed.

[2A] Warn the ship's crew that there will be spillage onto the ship's oil drip pan and that they may want to use a bucket to contain the spillage.

[2B] On the loading arm closest to the control console, open the drain valve on the end of the outboard arm to break the vacuum. There will be some spillage out of the drain because it is a low point drain. Spillage will continue until there is enough air in the arm to allow flow into the ship.

[3] When as much fluid in the outboard arm as can be drained into the ship, use the purge pump according to work package 019 00 to remove as much oil as possible from the inboard line and riser.

[4] Close the vent valve opened in step **[2]**.

[5] Have the ship's crew loosen the flange bolts on the loading arm.

[6] Place the SELECTOR SWITCH in the selected arm's position.

[7] Have the ship's crew stow the support legs as follows:

  [a] Loosen the screw to allow the hydraulic unit to take control of the support of the arm.

  [b] Remove the leg pins, raise the legs, and re-insert the pins.

[8] Have the ship's crew remove the flange bolts and gasket and replace the protective blind.

[9] Using the loading arm function controls, maneuver the arm back to its stowed position.

[10] Attach the turnbuckle to the base of the inboard arm.

[11] Repeat steps [1] through [10] on the loading arm furthest from the control console.

[12] Place the OPERATE SWITCH in the FLOAT position.

[13] Install the hurricane tie safety spool when required.

[14] When the ship is ready to unmoor and leave the dock, have the ship's crew remove and transfer the bonding cable to the dock personnel. Verify that the green light goes out and the red light illuminates. Stow the cable in the back of the control console.

[15] Have the ship's crew remove and transfer the primary grounding cable to the dock personnel. Stow the cable on the loading arm base.

5. EMERGENCY STOPPING PROCEDURE FOR THE LOADING ARMS.

The loading arms should not be stopped until the arms are attached to the ship or are in their stored position. If the hydraulic power is stopped or there is a power failure, the arms go into their float position. This would leave the arms in a an unstable condition. The arms have been balanced so that they remain in their last position, they will neither fall nor retract uncontrollably.

In an emergency, follow the procedure in the fluid movement to prevent oil loss and then place the arms in a safe position (stored or attached to a ship) before stopping hydraulic power.

6. POST LOADING ARM OPERATION PROCEDURE.

When the loading arms are no longer needed for the fluid movement, set all valves and selector switches associated with the loading arms as shown in Appendix D.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
LOADING ARMS

CAUTION

The loading arms shall be operated within the following safety envelope at all times. Failure to do so could result in damage to the equipment.

		SAFETY ENVELOPE			
			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
Arm					
Pressure	psig	-4.9	c	c	150
	in.Hg	10	NA	NA	NA
Reach Horizontal [a]	ft	15	c	c	52
Vertical [b]	ft	-31	c	c	40
Product Temperature	^{o}F	-10	40	100	120
Hydraulic System					
Pressure Supply	psig	200	c	1500	1600
Return	psig	15	c	c	c

a Measured from dock side.
b Measured from dock side.
c These values have no defined limits.

Support Equipment:

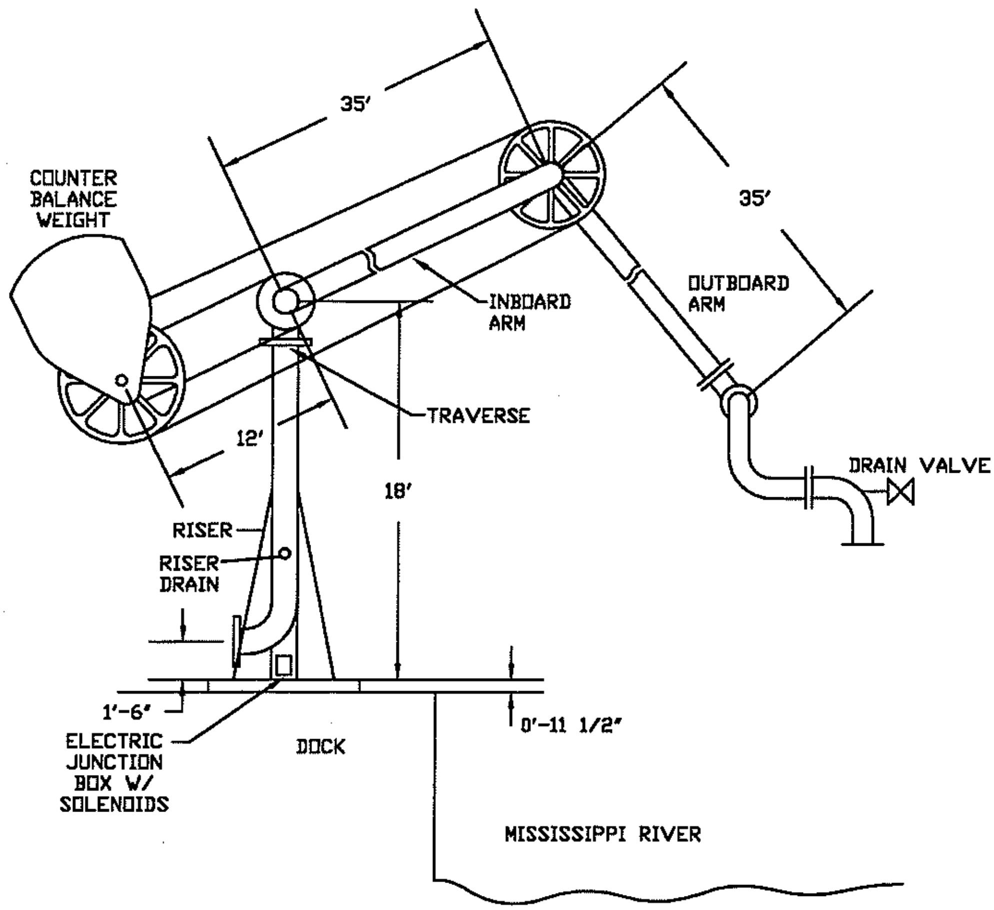
The following support equipment shall be operational if required for the fluid movement before the loading arms are employed.

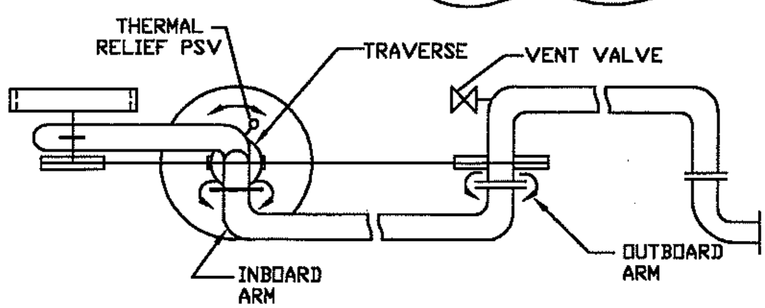
A. Purge pump(s)
B. Corrosion inhibitor(s)
C. Crude oil sampler(s).
D. Crude oil booster pumps.
E. Crude oil storage tanks.

APPENDIX B

SCHEMATIC DIAGRAM
LOADING ARMS

SYSTEM LAYOUT
(Sheet 1 of 3)

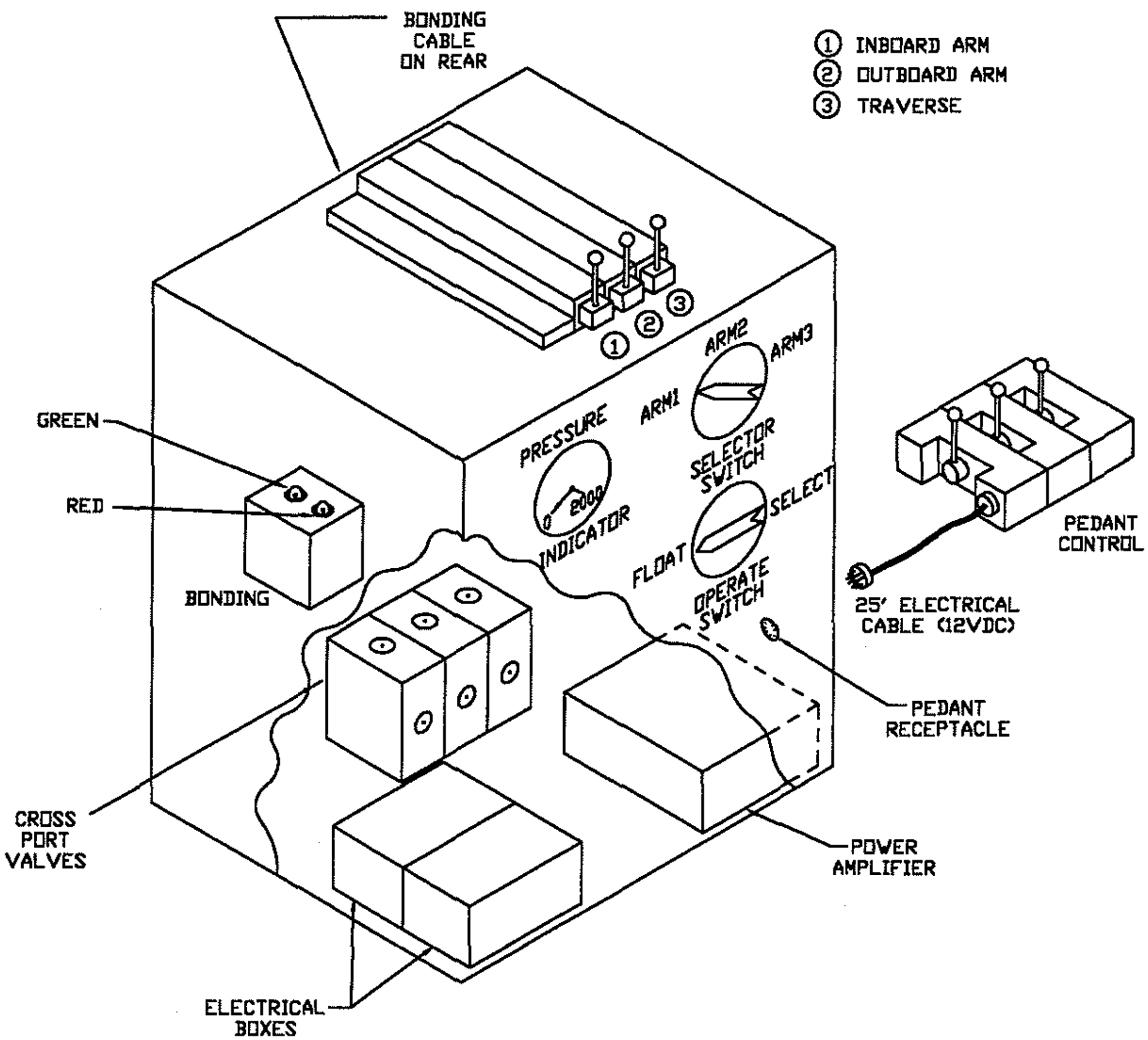


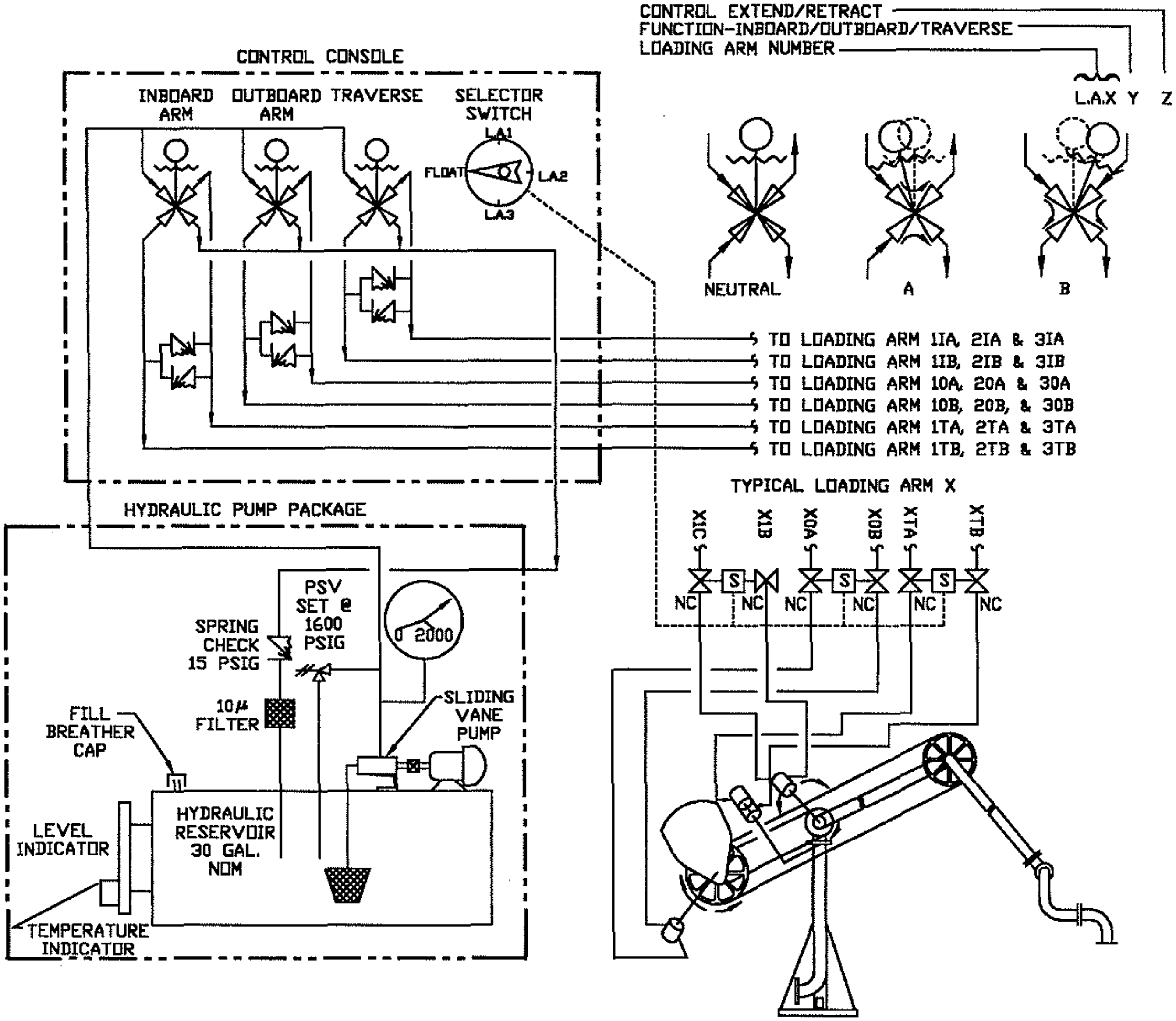


APPENDIX B

SCHEMATIC DIAGRAM
LOADING ARMS

OPERATOR CONTROL STATION
(Sheet 2)





APPENDIX B
SCHEMATIC DIAGRAM
LOADING ARMS
HYDRAULIC SYSTEM
(Sheet 3)

APPENDIX C

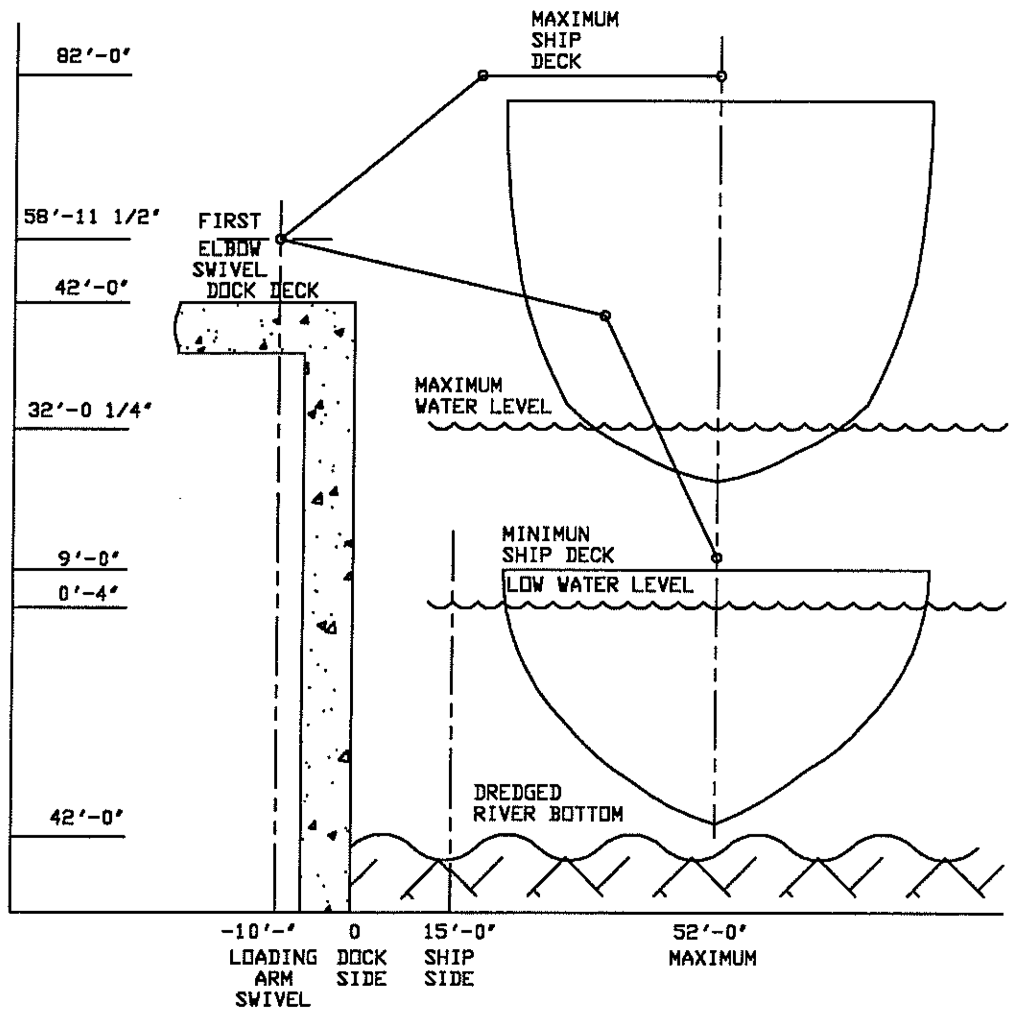
TECHNICAL DATA
LOADING ARMS
(Sheet 1 of 4)

Loading Arm:	
Manufacturer:	Continental EMSCO
Model:	CEMA IV
Type:	16" MRHLA II
Size:	16"
Dimension:	38' x 34' x 18'
Flow Rate Per Arm	480 MBD (20,000 BPH, 14,000 GPM)
Operating Pressure: Min:	10" Hg VAC (-4.90 psig/9.80 psia)
Max.	150 psig
Product:	Crude Oil
Sp. Gr.	0.802 to 0.876 (50^{o} to 30^{o} API)
Temperature Range	40^{o}F to 100^{o}F
Viscosity	15 to 50 centistokes
Arm Reach Horizontal Max.	52 ft.
ANSI Class	150#
Hydraulic Power Units:	Hydraquip Corp.
Pump:	Positive Displacement, Sliding Vane
Manufacturer:	Racine
Model:	PSV-10-30S-B105
Flow:	1.5 to 7 GPM
Pressure: Supply	2000 psig
Return	15 psig
Speed:	1800 RPM
Reservoir:	20 gal.
Relief Valve:	1600 psig
Motor:	Induction
Manufacturer:	Baldor
FRME	182
Enclosure:	TEXP
HP:	5
Power:	480V/60Hz/3 Phase
Speed	1760 RPM

APPENDIX C

TECHNICAL DATA
LOADING ARMS

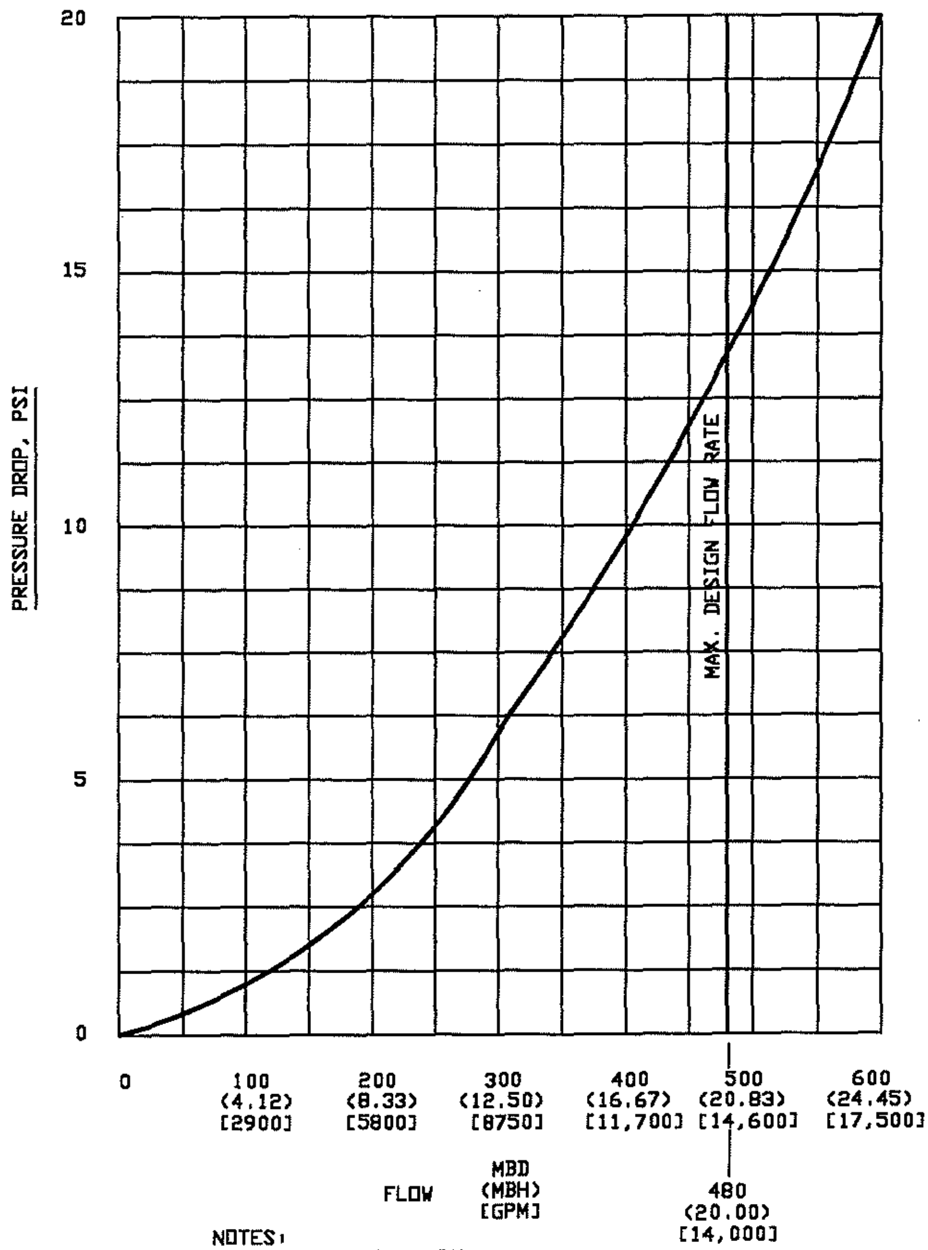
EXTENSION UNITS
(Sheet 2)



APPENDIX C

TECHNICAL DATA
LOADING ARMS

FLOW DATA
(Sheet 3)

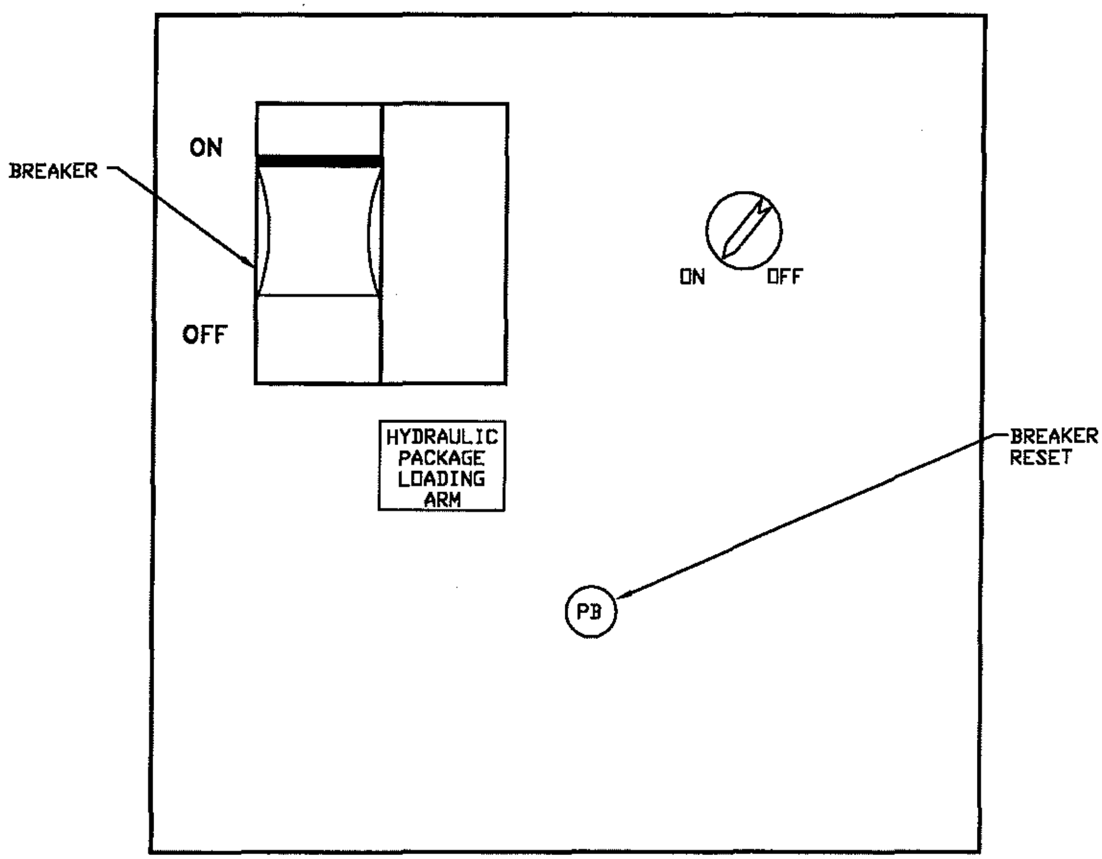


NOTES:
1) FLOW RATE PER ARM
2) PRESSURE DROP BASED ON?
SP.GR. AND?
CENTISTOKE VISCOITY

APPENDIX C

TECHNICAL DATA
LOADING ARMS

MCC-DX
COMPARTMENT 4FC
(Sheet 4)



APPENDIX D

STANDBY VALVE AND SWITCH POSITIONS
LOADING ARMS

ITEM	POSITION
1. MCC breaker MCC CONTROLLER ON/OFF	ON OFF
2. Local OPERATE SWITCH	FLOAT
3. *24" MOV Gate	Closed
4. *16" MOV Ball	Closed
5. 1" Vacuum breaker	Closed
6. 2" riser drain	Closed
7. 1" outboard arm drain	Closed
8. 2" strainer drain valves	Closed
9. Isolation valve on thermal relief PSV	Open
10. Turnbuckle	Attached
11. Hurricane safety spool	Attached between June 1 and November 30

LOADING ARM	*24" GATE VALVE	*16" BALL VALVE
D1ARM 1	MOV 102	MOV 101
D1ARM 2	MOV 104	MOV 103
D1ARM 3	MOV 106	MOV 105
D2ARM 1	MOV 202	MOV 201
D2ARM 2	MOV 204	MOV 203
D2ARM 3	MOV 206	MOV 205

APPENDIX E

START/STOP CAPABILITIES
LOADING ARMS

DOCK NO.	LOCAL CONTROL		DCS CONTROL		MCC CONTROL		PUMP MCC	
	START	STOP	START	STOP	START OFF/ON	STOP	NO.	COM-PART-MENT
NO. 1	Y	Y	NA	NA	ON[1]	OFF	MCC-D1	4FC
NO. 2	Y	Y	NA	NA	ON[1]	OFF	MCC-D2	4FC

LEGEND:

Item	Description
Local Control:	Control at the pump
DCS Control:	Pump control from the Distributed Control System (DCS) control panel at the main control room.
MCC Control:	Pump control at the pump's MCC panel.
PB:	Pushbutton switch.
HOA:	Hand-Off-Automatic selector switch.

Y - Indicates that a pushbutton operation is possible.
N - Indicates that a pushbutton operation is not possible.
H - Indicates Hand (LOCAL) position on the Hand-Off-Automatic Switch.
O - Off Position on the Hand-Off-Automatic Switch.
A - Indicates Auto (DCS) position on the Hand-Off-Automatic Switch.
NA - Indicates that this control is not available.

1 Must be ON in series with the local (console) switch to run the hydraulic power unit

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

PURGE PUMPS SJTP-11 AND SJTP-13

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

PURGE PUMPS
SJTP-11 AND SJTP-13

List of Effective Work Package Pages

Page No.	Chg. No.	Page No.	Chg. No.	Page No.	Chg. No.
1 thru 14	0				

Record of Applicable Technical Directives

None

WARNING

Crude oil is a flammable liquid. The vapors given off by crude oil are far more susceptible to ignition than the crude oil liquid. "Gassy" crude oil with a vapor pressure of >14.7 psia has a significantly increased vapor flash risk (and, therefore, ignition risk) during depressurization. Crude oil contains petroleum hydrocarbons which may cause eye, skin, and lung irritation. Crude oil may contain significant quantities of hydrogen sulfide which is irritating to the eyes, skin, and lungs at low concentrations. At higher hydrogen sulfide concentrations, loss of ability to smell, respiratory paralysis or death may occur. Crude oil also contains benzene, a known carcinogen.

TABLE OF CONTENTS

1. INTRODUCTION.

St. James Terminal has two purge pumps, SJTP-11 and SJTP-13. SJTP-11 is located at Dock No. 1 and SJTP-13 is located at Dock No. 2.

The pumps are vertical, centrifugal in-line pumps designed to ANSI B73.2. The pumps are rated for 70 GPM at 364 feet (134 psi on 0.85 sp. gr.) differential head. They are not controlled or monitored from the control room.

The pumps are used to remove residual crude oil that will not drain out of the loading arms or the dock strainer piping. They take suction from either the loading arm drain manifold or the dock strainer drain manifold. They deliver the crude oil to the main header going to/from the site. This operation removes crude oil from the portion of the line after the last MOV (refer to Appendix B) that can be operated from the main site control room has been closed.

Appendix A describes the pumps' operating and safety envelope. Appendix B shows typical schematic diagrams and equipment layout of the pumps. Appendix C contains technical information on the pumps.

1.1 **Purpose.** This procedure provides instructions for the safe operation of the purge pumps under normal conditions. Operation under abnormal conditions is not covered.

1.2 **Scope.** This procedure provides instructions for the following activities:

A. Prerequisite actions for operating of the purge pumps.

B. Starting, monitoring, and stopping the purge pumps in LOCAL mode.

C. Emergency stopping of the purge pumps.

D. Performing required post operation actions on the purge pumps.

1.3 **Applicability.** This procedure applies under normal operating conditions. Under these conditions, there is one authorized operating mode, LOCAL (Section 4).

1.4. Reference Documents.

A. Piping and Instrumentation Diagram, Crude Oil Loading/Unloading Dock No. 1, drawing no. SJ-M-103-026.

B. Piping and Instrumentation Diagram, Crude Oil Loading/Unloading Dock No. 2, drawing no. SJ-M-193-027.

C. Work Package 018 00, Loading Arms.

D. Goulds Pumps Model 3996, ANSI vertical centrifugal pump Operating and Maintenance Manual.

2. PRECAUTIONS AND LIMITATIONS.

The following precautions and limitations apply to the operation of the purge pumps in the LOCAL operating mode:

A. All local instrumentation relating to the purge pumps to be operated shall have current calibration stickers.

B. The minimum and maximum safety envelope parameters in Appendix A shall be observed at all times.

C. Safety devices, including the pump coupling guards, shall be in place and operational.

D. Valve alignment shall be in accordance with the valve line-up sheet for the particular fluid movement procedure.

E. The pump and motor alignment shall have been aligned according to St. James Maintenance Procedure. If the pump/motor shafts are not properly aligned, damage to the pump and/or motor can occur.

F. All dock operations shall be performed by a certified dock operator.

3. PREREQUISITE ACTIONS FOR PREPARING THE PURGE PUMPS FOR OPERATION.

The following actions shall be taken prior to operating the purge pumps. These actions apply to operation in the LOCAL mode.

3.1 Special Tools and Equipment.

A. Five gallon bucket.

B. Oil absorbent rags.

3.2 Field Preparations. The following steps shall be performed before starting the purge pumps:

[1] Verify that the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present, piping is properly configured with vent and drain valves closed, and motor grounding straps are in place.

[2] Verify that the support equipment shown in Appendix A is fully functional and available for service, prior to starting the pumps.

[3] Verify that the valves and switches are in the standby position, as shown in Appendix D.

[4] Verify that the discharge pressure indicator at the pumps to be operated have current calibration stickers. Refer to Appendix B for specific tag numbers (ELNs).

[5] For strainer draining, close the valve on the site side pressure indicator at the strainer and remove the pressure indicator. (Refer to Appendix B.)

3.3 Approvals and Notifications. All pump operations shall be in accordance with an approved fluid movement procedure.

4. STARTING, MONITORING, AND STOPPING THE PURGE PUMPS IN THE LOCAL OPERATING MODE.

The following subsections provide step-by-step instructions for operating in the LOCAL mode. The purge pumps shall be started and stopped from the local STOP/START pushbutton station next to the pump.

4.1 Pump Start Procedure - LOCAL mode. Perform the following steps to start the purge pumps manually in the LOCAL mode.

[1] At the MCC motor starter for the purge pump to be used in the fluid movement, verify that the breaker switch is in the ON and the RESET pushbutton has been pushed. The MCCs associated with the pumps are shown in Appendix E.

[2] Verify that the area around the pump is clear of any hazards.

NOTE

The particular fluid movement will identify the correct suction valve to open. The steps below are for draining any one of the strainers or the loading arm manifold.

[3] Open the purge pump suction valve(s) used to purge the strainers and loading arms identified in the fluid movement procedure.

[4] Verify that the main crude oil header pressure is less than 115 psig.

[5] Close the purge pump discharge valve and reopen it approximately 1/4 open (1/16 of circle on quarter turn valve or about 20^{o} to 30^{o}).

[6] For draining the loading arms only, open the vacuum breaker valve on the top of the outboard loading arm (or the drain on the end of the outboard arm). Venting on the strainer must be done after the pump start.

[7] Push the pump START button and verify that the pump motor starts. The motor will run continuously until stopped manually.

CAUTION

If the vent is not immediately opened at the strainer, the pumps will cavitate. The cavitation will cause damage to the pump.

[8] For draining the strainer basket(s) only, immediately after pump starts, open the vent valve(s) on the top to the strainer(s) identified in the fluid movement procedure. The vent valve is the valve that was closed to remove the site side pressure indicator. Refer to Appendix B.

NOTE

After an aborted motor start, wait two minutes before attempting to restart to allow the motor windings to cool down. The motor should be limited to 30 starts per hour.

[9] After the pump comes up to speed and the pump pressure has stabilized, adjust the valve until the pump discharge pressure is between 115 psig and 135 psig.

4.2 Performance Monitoring - Local Mode. The pump must be run to the point of cavitation and then shut down. When the pump cavitates, it will sound as though there is gravel going out of the discharge of the pump. The pressure indicator may show erratic pulsing readings. The most reliable indication is the sound (of gravel). The field operator shall perform the following operations.

CAUTION

Do not allow the pump to run cavitating. Cavitation will damage the pump.

[1] Listen to the pump and observe the discharge indicator. When the sound or the pressure indicator indicates that the pump is cavitating, push the STOP pushbutton.

[2] Wait for the crude oil to drain down.

[3] Push the START pushbutton.

[4] Repeat steps **[1]** and **[2]** until the run time between starting and cavitation is less than one minute or the pump starts cavitating immediately.

4.3 Pump Stop Procedure - LOCAL Mode. Perform the following steps to stop the purge pump manually in the LOCAL operating mode.

[1] Push the STOP pushbutton of the STOP/START selector switch.

[2] Verify that the pump motor stops.

5. EMERGENCY STOPPING PROCEDURE FOR THE PURGE PUMPS.

The following subsections address emergency stopping of the pump from the LOCAL mode. If the pump has not stopped in the LOCAL mode, begin with step **[2]**.

[1] Press the local STOP button at the STOP/START selector switch at the motor. If this fails to stop the motor, then the motor shall be stopped from the motor starter in the motor control center (MCC) according to the following steps:

[2] The dock operator shall go to the MCC and turn the breaker to the OFF position. MCC location is shown in Appendix E. The location of the breaker selector is shown in Appendix C, Sheet 2.

[3] The dock operator shall notify the main site control room operator that an emergency stop is necessary.

[4] The main site control room operator shall notify the operations shift supervisor of the emergency stop requirement.

6. POST PURGE PUMP OPERATION PROCEDURE.

When the purge pumps are no longer needed for the fluid movement, set all valves and selector switches associated with the pumps as shown in Appendix D.

APPENDIX A

OPERATING AND SAFETY ENVELOPE
PURGE PUMPS

CAUTION

The purge pumps shall be operated within the following safety envelope at all times. Failure to do so could result in damage to the equipment.

		SAFETY ENVELOPE			
			NORMAL OPER. RANGE		
PARAMETER	UNITS	MIN	LO	HI	MAX
Pump discharge pressure[a]	psig	b	115	135	140

a This must be monitored by an operator.
b Operating below 115 psig will cause the motor to run in its service factor range and may cause the pump to cavitate.

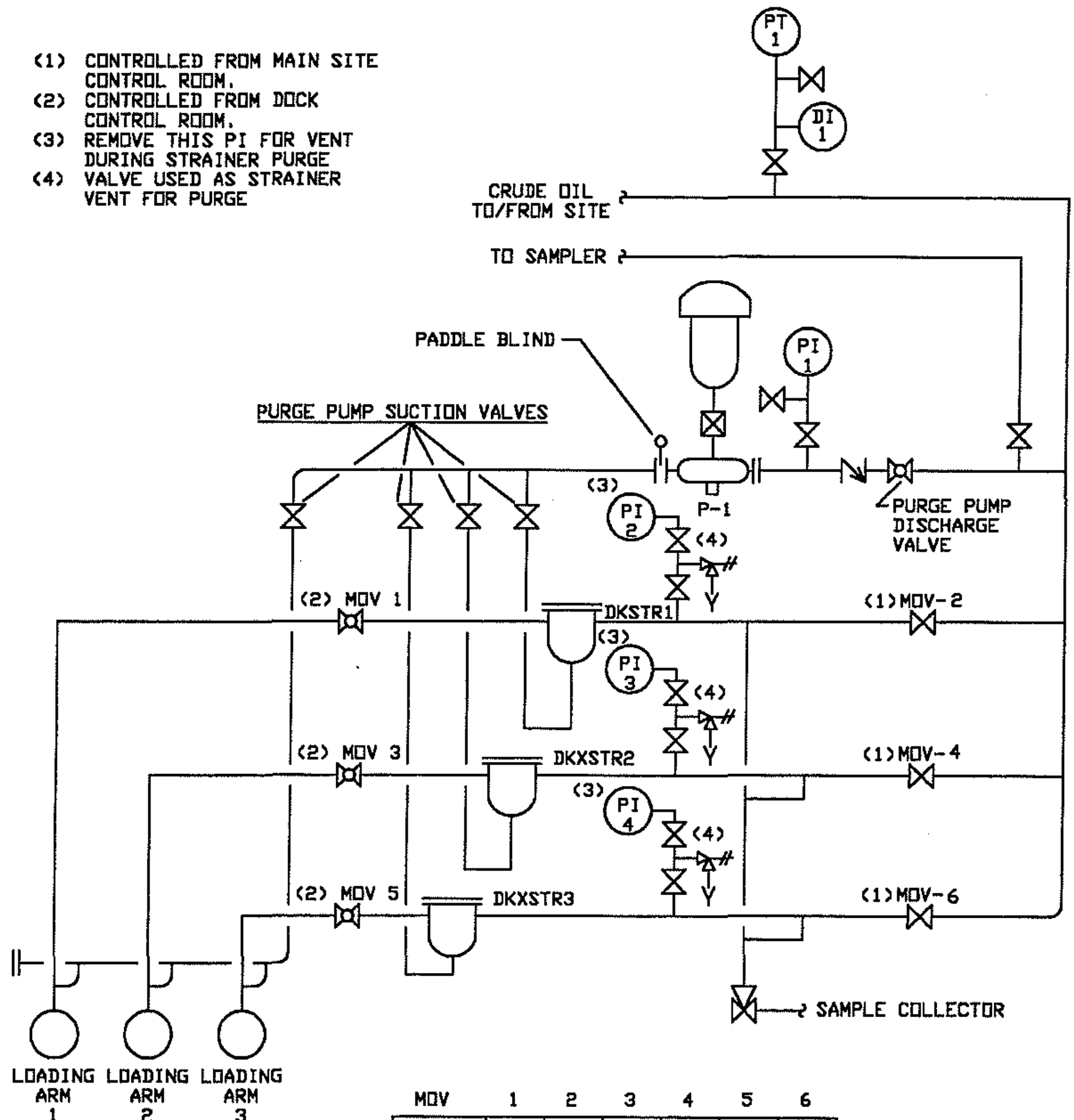
Support Equipment:

The following support equipment shall be operational if required for the fluid movement before the purge pumps are started.

A. Loading arms.

APPENDIX B

SCHEMATIC DIAGRAM
PURGE PUMPS



MOV	1	2	3	4	5	6
DOCK 1 DOCK 2	101 201	102 202	103 203	104 204	105 205	106 206

	P-1	PI-1	PI-2	PI-3	PI-4	D1-1	PT-1
DOCK1 DOCK 2	P-11 P-13	DOCK-1-PI-1 DOCK-2-PI-2	D1S1-PI-1 D2S1-PI-1	D1S2-PI-1 D2S2-PI-1	D1S3-PI-1 D2S3-PI-1	PT-1 N.A.	102 2

APPENDIX C

TECHNICAL DATA
PURGE PUMPS
(Sheet 1 of 2)

Pump:

Manufacturer:	Goulds Pumps
Model:	3996
Group:	MT
Size:	1 1/2 x 2 x 10
Capacity:	70 GPM
TDW:	364 ft. (134 psig at 0.85 sp. gr.)

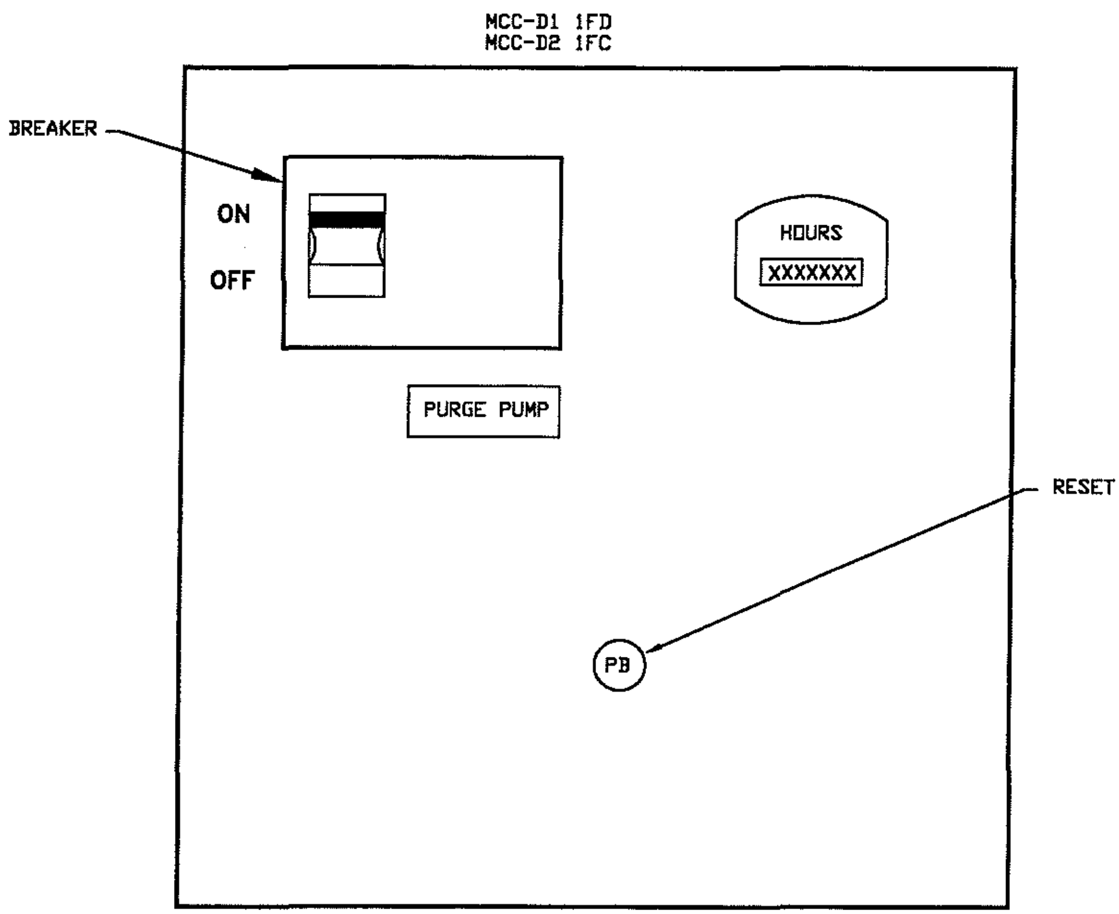
Motor:

Manufacturer:	U.S. Electric
Rated:	25 HP
Enclosure:	TEFC-XP
Frame:	284
Volts:	460
Hertz:	60
Phase:	3
Full Load Current:	30.6 Amps
Full Load RPM:	3560
Insulation:	B
Continuous Rating:	75°Rise

APPENDIX C

TECHNICAL DATA
PURGE PUMPS

TYPICAL MCC PANEL
(Sheet 2)



APPENDIX D

STANDBY VALVE AND SWITCH POSITIONS
PURGE PUMPS

ITEM	POSITION
1. MCC breaker Selector Switch	ON and RESET
2. Local STOP/START switch	Stop
3. Discharge valve	Open
4. Suction valve	Closed
on 16" headers	Closed
on strainers	Closed
5. Vent and drain valves	Closed
6. Pressure indicator	Open
7. Motor operated valves	Closed

APPENDIX E

PUMP START/STOP CAPABILITIES
PURGE PUMPS

PUMP NO.	LOCAL CONTROL		DCS CONTROL		MCC CONTROL			PUMP MCC	
	START PB	STOP PB	START HOA	STOP HOA	START HOA	START PB	STOP	NO.	COM-PART-MENT
SJTP-11	Y	Y	NA	NA	NA	N	OFF	MCC-D1	1FD
SJTP-13	Y	Y	NA	NA	NA	N	OFF	MCC-D2	1FC

LEGEND:

Item	Description
Local Control:	Control at the pump
DCS Control:	Pump control from the Distributed Control System (DCS) control panel at the main control room.
MCC Control:	Pump control at the pump's MCC panel.
PB:	Pushbutton switch.
HOA:	Hand-Off-Automatic selector switch.

Y - Indicates that a pushbutton operation is possible.
N - Indicates that a pushbutton operation is not possible.
H - Indicates Hand (LOCAL) position on the Hand-Off-Automatic Switch.
O - Off Position on the Hand-Off-Automatic Switch.
A - Indicates Auto (DCS) position on the Hand-Off-Automatic Switch.
NA - Indicates that this control is not available.
OFF - Breaker is in the OFF position.

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

DOCK FIRE SUPPRESSION SYSTEMS

NORMAL OPERATING PROCEDURE

SAINT JAMES SITE

DOCK FIRE SUPPRESSION SYSTEMS

List of Effective Work Package Pages

Page No.	Change No.	Page No.	Change No.
1 thru 17/(18 Blank)	0		

Record of Applicable Technical Directives

None

TABLE OF CONTENTS

1. INTRODUCTION.

The Saint James dock fire suppression systems in this procedure consists of ultraviolet/infrared (UV/IR), monitors, foam tanks and foam proportioners. The dock no. 1 and dock no. 2 fire suppression systems are designed to provide water or foam to the dock areas via automatically oscillating, remote controlled tower mounted fire water monitors. These systems are automatically actuated by UV/IR detectors. In addition, monitors can be manually operated by remote control from control stations located on the dock trestle.

The fire water monitors are set in the automatic WATER ONLY mode during operational readiness, where a reduced risk exists. They are set in the automatic FOAM mode during oil movement. In both automatic modes, the systems can be overridden for manual control of the monitors.

The UV/IR detection system confirms a fire by two sensors and sends a signal to begin automatic operation of the monitors. The monitor towers inlet and the foam concentrate discharge valves open. The monitors' nozzle spray oscillates in horizontal plane. The nozzle is prepositioned to oscillate in vertical direction and fixed spray pattern.

The monitors flow at 500 GPM and have hydraulically driven nozzle pattern adjustment, azimuth, and vertical control. The monitors oscillate horizontally until they engage a limit switch, then reverse direction. The hydraulic controls, pump and solenoids are located at the base of the monitor towers.

Aqueous film forming foam (AFFF) is proportioned into the flow of water to the monitors at three percent, to create a fire extinguishing foam/water mixture. Foam is injected into the water stream by use of a ratio controller (venturi) device which receives foam concentrate supplied by two 300 gallon storage tanks. Tank DFT-1 supplies the foam for dock no. 1 and tank DFT-2 supplies the foam for dock no. 2. These tanks are fixed with an internal rubber bladder which contains the AFFF concentrate. Fire water pressure is used to squeeze the concentrate from the bladder into the metering section of the ratio controller. A specified orifice allows proportioning at three percent.

The systems for dock no. 1 and dock no. 2 are identical except dock no. 1 has four tower mounted monitors, and dock no. 2 has three tower mounted monitors. See Appendix B, sheet 1 for a schematic diagram of the dock no. 1 and dock no. 2 fire suppression system.

The dock fire water system is supplied by two 1300 GPM fire pumps (SJTP-1 and SJTP-2) and two 10,000 GPM fire pumps (SJTP-3 and SJTP-4), which take suction from the Mississippi River. All four pumps are located at the fire pumphouse building on dock no. 1.

The Table in Appendix A describes the equipment's operating and safety envelope. Appendix B shows typical schematic diagrams of the dock fire suppression system. Appendix C contains technical data on the dock fire suppression system. Appendix D contains the operational ready position for the valves and switches.

1.1 **Purpose**. This procedure provides instructions for the safe operation of dock fire suppression systems under two automatic operating modes:

A. Water only mode. Used during operational readiness.

B. Foam mode. Used during oil movement.

Operation under abnormal conditions is not covered in this procedure.

1.2 **Scope**. This procedure provides instructions for the following activities:

A. Prerequisite actions.

B. Automatic system operation.

C. Monitoring the system operation.

D. Manual remote control system operation.

E. Stopping and resetting the systems.

F. Performing post operation activities.

1.3 **Applicability**. This procedure applies under normal operating conditions. Under these conditions, the AUTOMATIC mode is the normal operating mode for fire protection. Overriding AUTOMATIC operation, or MANUAL operation by use of the remote controls, is covered in this procedure. The AUTOMATIC mode is the only authorized mode. Operation in the MANUAL mode is not recommended and requires the approval of the site manager or designee.

1.4 **Reference Documents.**

A. St. James Systems Description manual, SJ-M-910-001.

B. Interim Repair/Mitigation Authorization Procedure, ASR4330.5.

C. Piping and Instrument Diagram, Fire Protection Dock No. 1 and No. 2, SJ-FP-103-049.

D. Piping and Instrument Diagram, Fire Water Pumps SJTP-1 through SJTP-5, Pump Platform-Dock No. 1, SJ-FP-103-048.

E. Dock Fire Water Pump System, St. James Mechanical Site Operations Manual, SJ-OP-930-001, work package 014 00.

F. DOE Task Package SJ-M-080.

G. Engineering Change Proposal, SJ-ECP-70115.

2. PRECAUTIONS AND LIMITATIONS

The following precautions and limitations apply to the operation of the dock fire suppressions system in both the AUTOMATIC and MANUAL modes:

A. All local instrumentation not associated with the DCS system shall be operational and have current calibration stickers.

B. The minimum and maximum safety envelope parameters in Appendix A shall be observed at all times. Exceeding these parameters could cause injury to personnel or damage to equipment.

C. Safety devices shall be properly in place and operational.

D. The support equipment listed in Appendix A shall be fully functional and available for service, as required for automatic fire suppression system operation.

3. PREREQUISITE ACTIONS.

The following actions shall be performed prior to operating the automatic fire suppression systems. These actions apply to operation in both AUTOMATIC and MANUAL modes:

[1] Verify the overall system is in general readiness. This shall include checking that no SPR Report of Repair tags are present that will prevent system operation, the piping is properly configured with vent and drain valves closed, and the motor grounding straps are in place.

[2] Verify all tower mounted monitors are set in the proper vertical orientation and nozzles adjusted to a stream/fog combination.

[3] Verify all valves and switches are in the operational ready positions for either the foam or water only modes, as determined by the oil movement status. Refer to Appendix D.

[4] Verify all support equipment is fully functional. Refer to Appendix A.

3.1 **Special Tools and Equipment.** None required.

3.2 **Approvals and Notifications.** All operations involving the fire protection system shall be approved by the site manager, emergency response team (ERT) leader, or designee. Site Fire Protection shall be notified of any fire suppression system activation.

4. DOCK NOS. 1 AND 2 FIRE SUPPRESSION SYSTEMS.

Dock nos. 1 and 2 fire suppression systems operate automatically in both the foam and water only modes from signals initiated from at least two ultraviolet/infrared (UV/IR) sensors with the sensor controllers set in the NORMAL position. Refer to Appendix C, sheet 1. With the controllers in the BYPASS position, the monitors can only be operated from the remote console. In the AUTOMATIC mode, the monitors can be overridden at the remote console panel located on the dock trestles. Refer to Appendix C, sheets 2 and 3.

4.1 **AUTOMATIC Operation.** In the AUTOMATIC operating mode, the fire suppression systems for dock nos. 1 and 2 are automatically actuated from UV/IR fire sensors. Upon detection of a fire the UV/IR sensors will actuate the tower mounted fire monitors. Foam or water only will be discharged by the monitors according to the preset mode and nozzle pattern.

NOTE

The foam supply will continue to run until exhausted, approximately 7.5 minutes for dock no. 1, and 10 minutes for dock no. 2.

4.2 **Monitoring.** After automatic initiation of the fire suppression system, the field operator shall verify all monitors are operating and the azimuth and nozzle pattern are appropriate for the required use. If adjustments are required, refer to section 4.3 MANUAL Operation.

4.3 **MANUAL Operation.** The fire suppression systems for dock no. 1 and no. 2 can be operated remotely in the MANUAL mode as an override to AUTOMATIC operation. The MANUAL mode can be used in both the water only and foam modes of operation.

4.3.1 **MANUAL Mode - FOAM Only Operation.**

[1] Obtain site manager or designee approval.

[2] At the manual override switch located on the back wall of the Foam Proportioner building, turn the switch to the FOAM position.

[3] Open the door to the monitor remote console panel located on the dock trestle immediately outside the foam proportioner building. Refer to Appendix C, sheets 2 and 3.

[4] Press the green START button. Verify the SYSTEM ON indicating light is lit. The manual lamps will also light.

[5] Select the monitors for manual control.

[6] Move the horizontal sweep toggle switch to the MANUAL position.

[7] Use the fog switch to change each turret nozzle position from full fog to straight stream.

[8] Operate the up/down/left/right control switch to adjust the position of the water monitors as desired.

4.3.2 MANUAL Mode - WATER Only Operation.

[1] Obtain site manager or designee approval.

[2] At the manual override switch located on the back wall of the foam proportioner building, turn the switch to the NORMAL position.

[3] Open the door to the monitor remote console panel located on the dock trestle immediately outside the Foam Proportioner building. Refer to Appendix C, sheets 2 and 3.

[4] Press the green START button. Verify the SYSTEM ON indicating light is lit. The manual lamps will also light.

[5] Select the monitors for manual control.

[6] Move the horizontal sweep toggle switch to the MANUAL position.

[7] Use the fog switch to change each turret nozzle position from full fog to straight stream.

5. STOP PROCEDURE - AUTOMATIC OPERATION.

After fire suppression system is no longer needed, stop the flow of water or foam from the monitors using the following steps:

WARNING

Once all foam is expelled, continuation with water will destroy the foam blanket that has been created. This may cause vaporization of the liquid and present a new hazard. The decision to shut off the system should be made by qualified emergency response team (ERT) personnel.

[1] Return the remote control console to the system standby mode. This will shut the monitor valves and the foam valve.

[2] Push the STOP button on the remote control console. Refer to Appendix C, sheets 2 and 3.

[3] Verify water flow to the monitors has stopped.

6. EMERGENCY STOP PROCEDURE.

In the event that the stop procedure in section 5 should fail, the flow of water from the monitors can be stopped manually.

[1] At the instrument cabinet located in the dock control room, push the black external RESET button (HS-2068 or HS-2078) in the back of the panel, or shut valves FW-4020-2 and FW-4020-3 for dock no. 1 or valves FW-4320-1 and FW-4320-2 for dock no. 2. Refer to Appendix B, sheets 2 and 3. This will stop the water flow to the monitors.

[2] At the remote control console push the STOP button.

[3] Verify water flow to the monitors and automatic oscillation of the monitors has stopped.

7. POST OPERATION ACTIVITIES.

To return the system to the OPERATIONAL READY mode, the following steps should be followed, whether or not the system was triggered automatically, and whether or not the system was in the water-only or foam modes.

[1] Reset the UV/IR controller by pushing the RESET button (BC2064/2074) on the front of the local fire control panel, LFCP-500 or LFCP-600, in the dock control room. Refer to Appendix C, sheet 1.

[2] Verify the UV/IR controller resets, by the illumination of the red lights for the UV/IR detectors.

[3] Reset the actuation system by pushing the black external RESET button located inside the instrument cabinet in the dock control room.

[4] Reset LFCP-500 for dock no. 1 or LFCP-600 for dock no. 2.

[5] Return the valve configuration to the WATER ONLY or FOAM ONLY mode as required for further operation. Refer to Appendix D.

[6] In the foam proportioner building open valve B, the bypass/flush valve for the foam proportioner. Refer to Appendix B, sheets 2 and 3.

[7] Verify all drains and vents on the foam proportioner are closed.

[8] Flush the system by turning the local control station in the Foam Proportioner building to the FOAM position.

[9] Flow water through the foam monitor turrets until no visible signs of foam are present and clear water is evident. Hand reels should also be flushed with clear water.

[10] Stop system in accordance with Section 5.

[11] On the foam proportioner, open the two, two-inch header drains downstream of valve A. Refer to Appendix B, sheets 2 and 3.

[12] On the foam proportioner, open the two tank shell vents and drains. Refer to Appendix B, sheets 2 and 3.

[13] When water stops draining from the foam proportioner tank, open the fill cup valve.

[14] Close the two header drains and the two tank shell drains.

[15] Read the sight glass to determine the quantity of foam concentrate present. If filling is not necessary, close the shell vents and fill cup valve, and proceed to align the system in accordance with the desired mode. If filling is necessary, leave the shell vents and fill cup valves open and proceed to step **[16]**.

[16] Commence filling the bladder with the AFFF through the fill cup. Stop filling when the site glass indicates full.

[17] Align the system in accordance with the desired mode shown in Appendix D.

APPENDIX A

OPERATING AND SAFETY ENVELOPE

FIRE WATER SYSTEM

CAUTION

The dock fire suppression system shall be operated within the following safety envelope at all times. Failure to do so could result in damage to the equipment.

PARAMETERS		SAFETY ENVELOPE			
			NORMAL OPERATING RANGE		
	UNITS	MIN	LO	HI	MAX
Diaphragm foam tank level (by sight glass)		-	-	Full [a]	-

Legend:

a Diaphragm foam tank should remain full at all times.

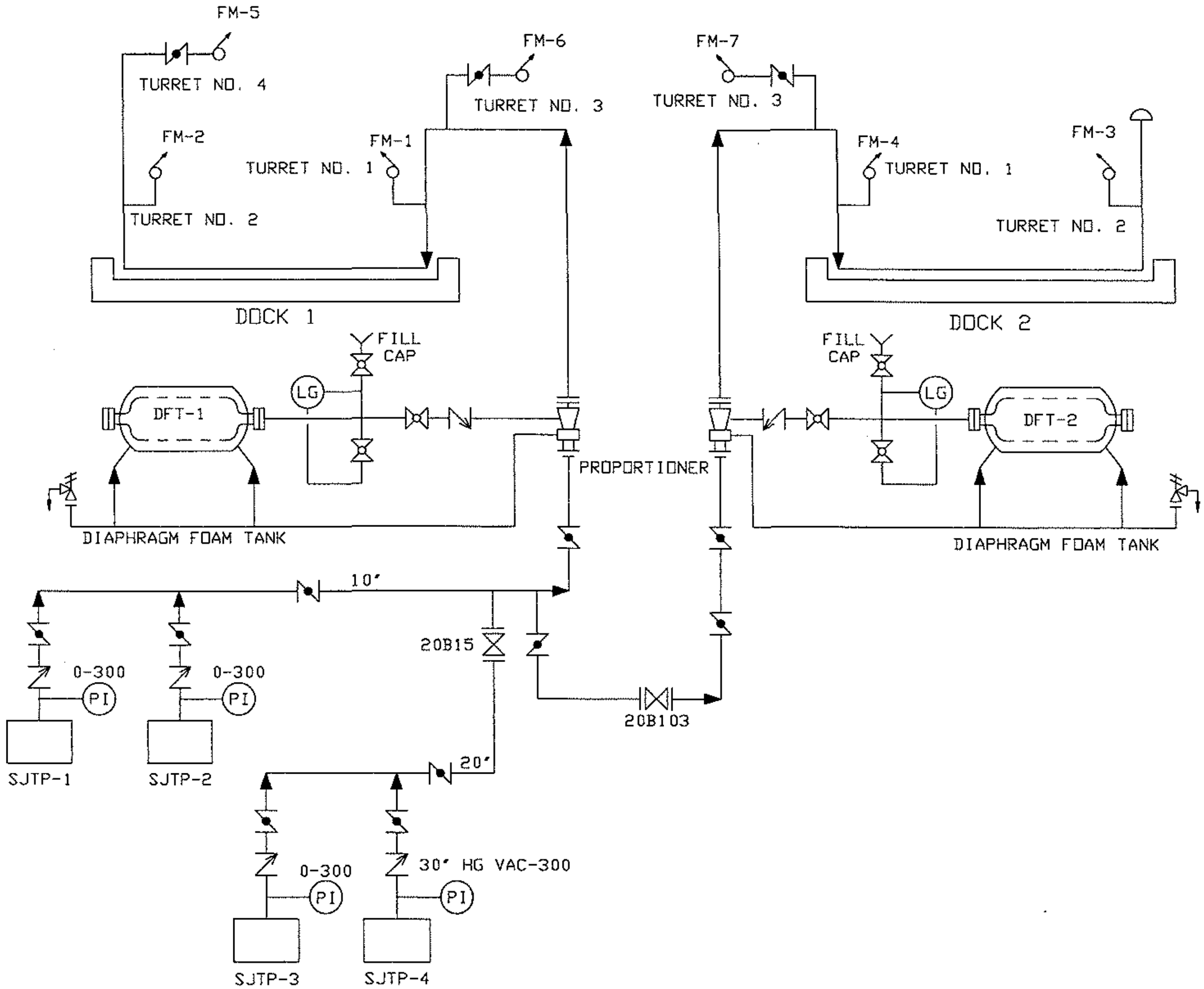
Support Equipment:

1. SJTP-1 Fire pump, 1300 GPM.
2. SJTP-2 Fire pump, 1300 GPM.
3. SJTP-3 Fire pump, 10,000 GPM.
4. SJTP-4 Fire pump, 10,000 GPM.
5. SJTP-23 Jockey Pump, 50 GPM.
6. SJTP-24 Fire Pump, 1500 GPM.
7. SJTP-25 Fire Pump, 1500 GPM.

APPENDIX B

SCHEMATIC DIAGRAMS
(Sheet 1 of 3)

DOCK NO. 1 AND NO. 2 FIRE SUPPRESSION SYSTEM

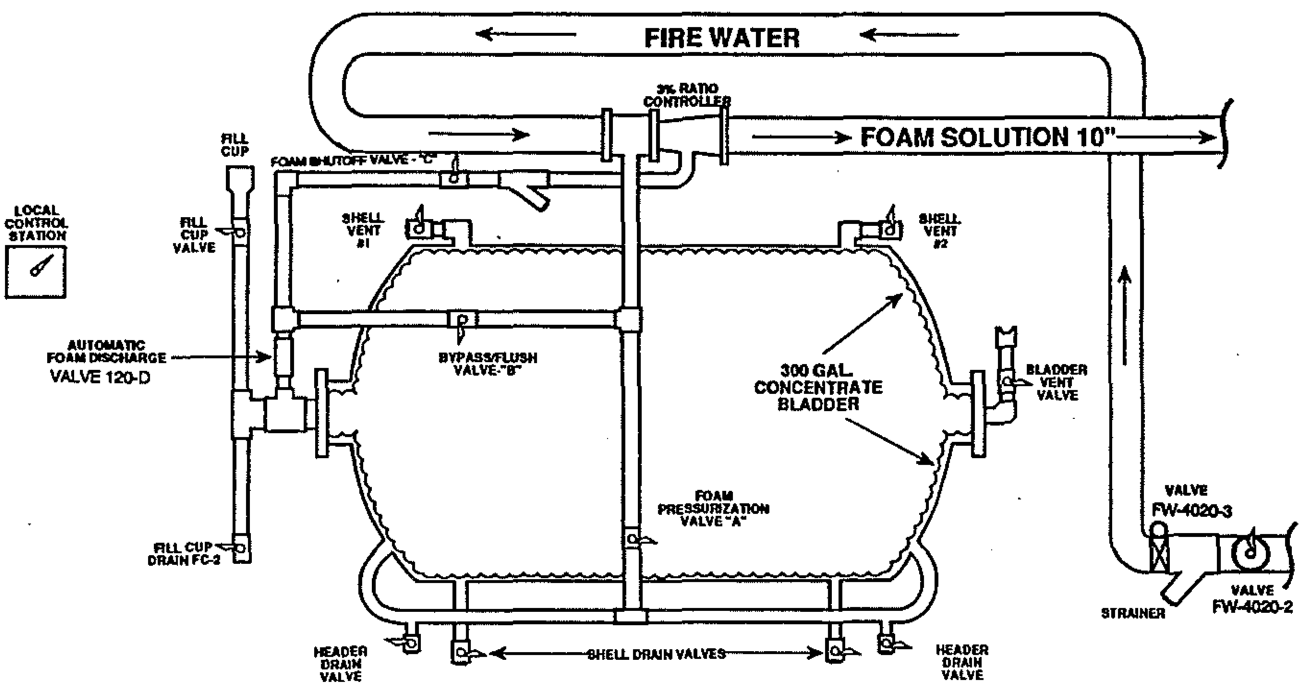


APPENDIX B

SCHEMATIC DIAGRAMS
(Sheet 2)

DOCK NO. 1 FOAM PROPORTIONING SYSTEM

DOCK 1
ST. JAMES DOCK FOAM PROPORTIONER

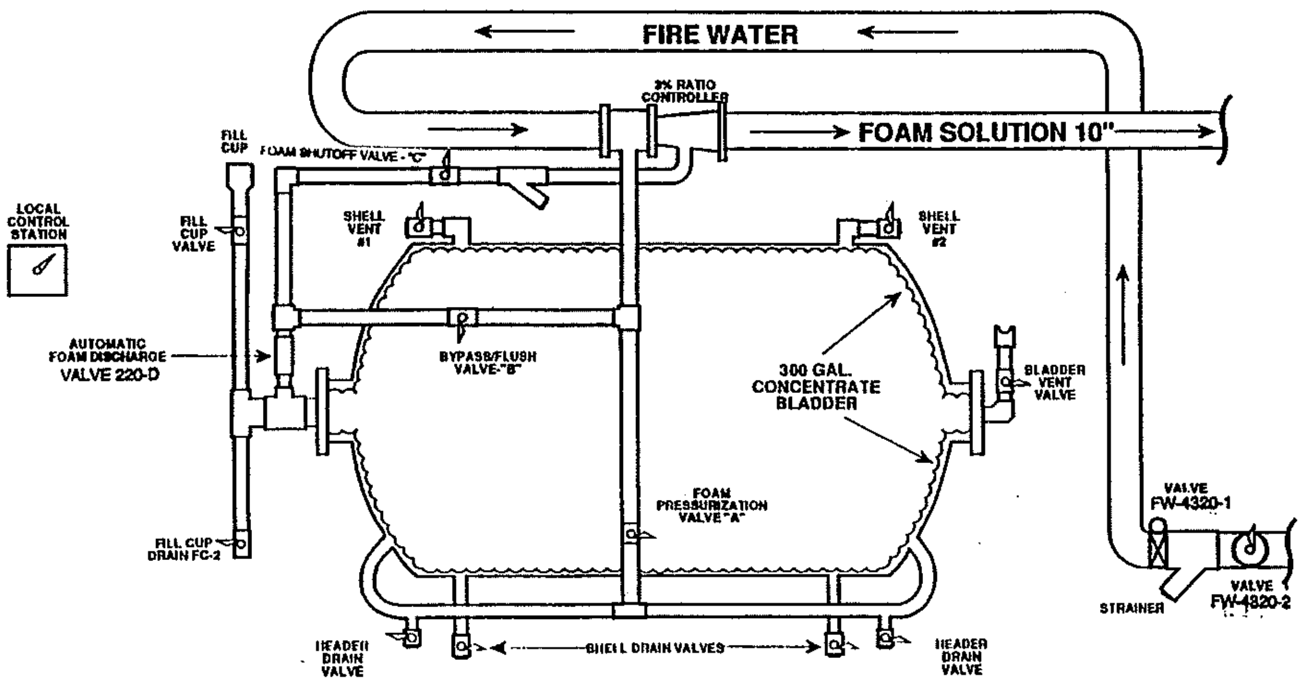


APPENDIX B

SCHEMATIC DIAGRAMS
(Sheet 3)

DOCK NO. 2 FOAM PROPORTIONING SYSTEM

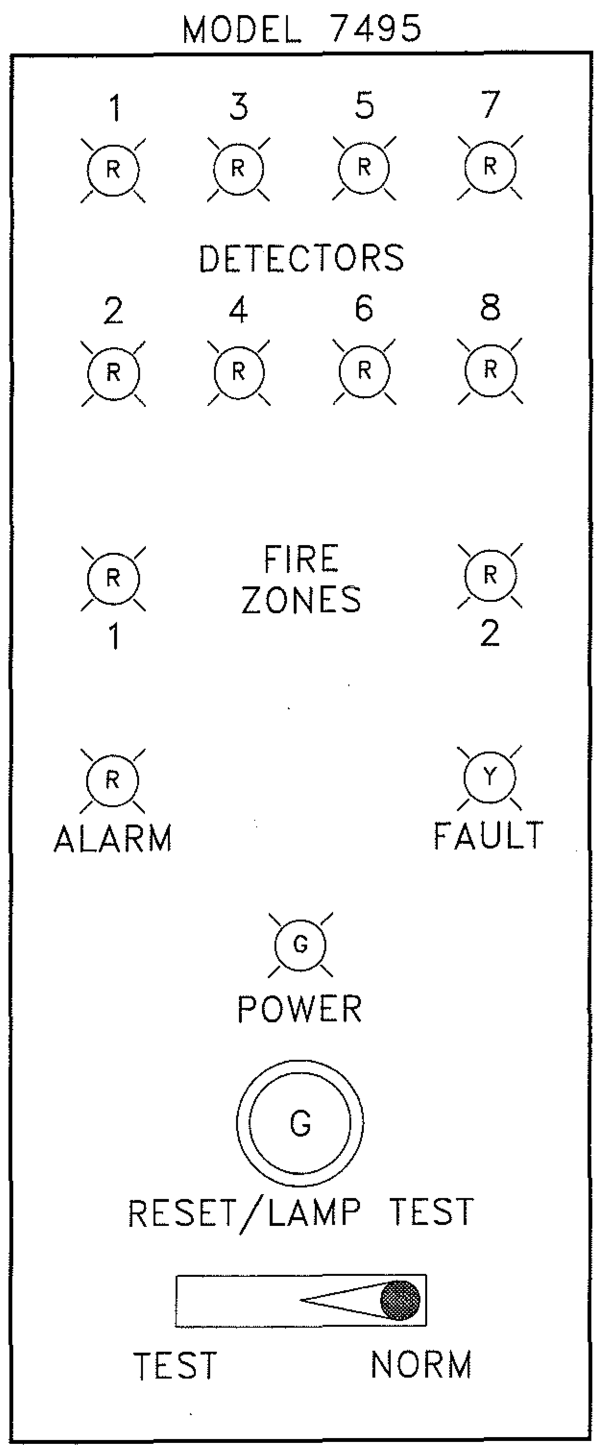
DOCK 2
ST. JAMES DOCK FOAM PROPORTIONER



APPENDIX C

TECHNICAL DATA
(Sheet 1 of 3)

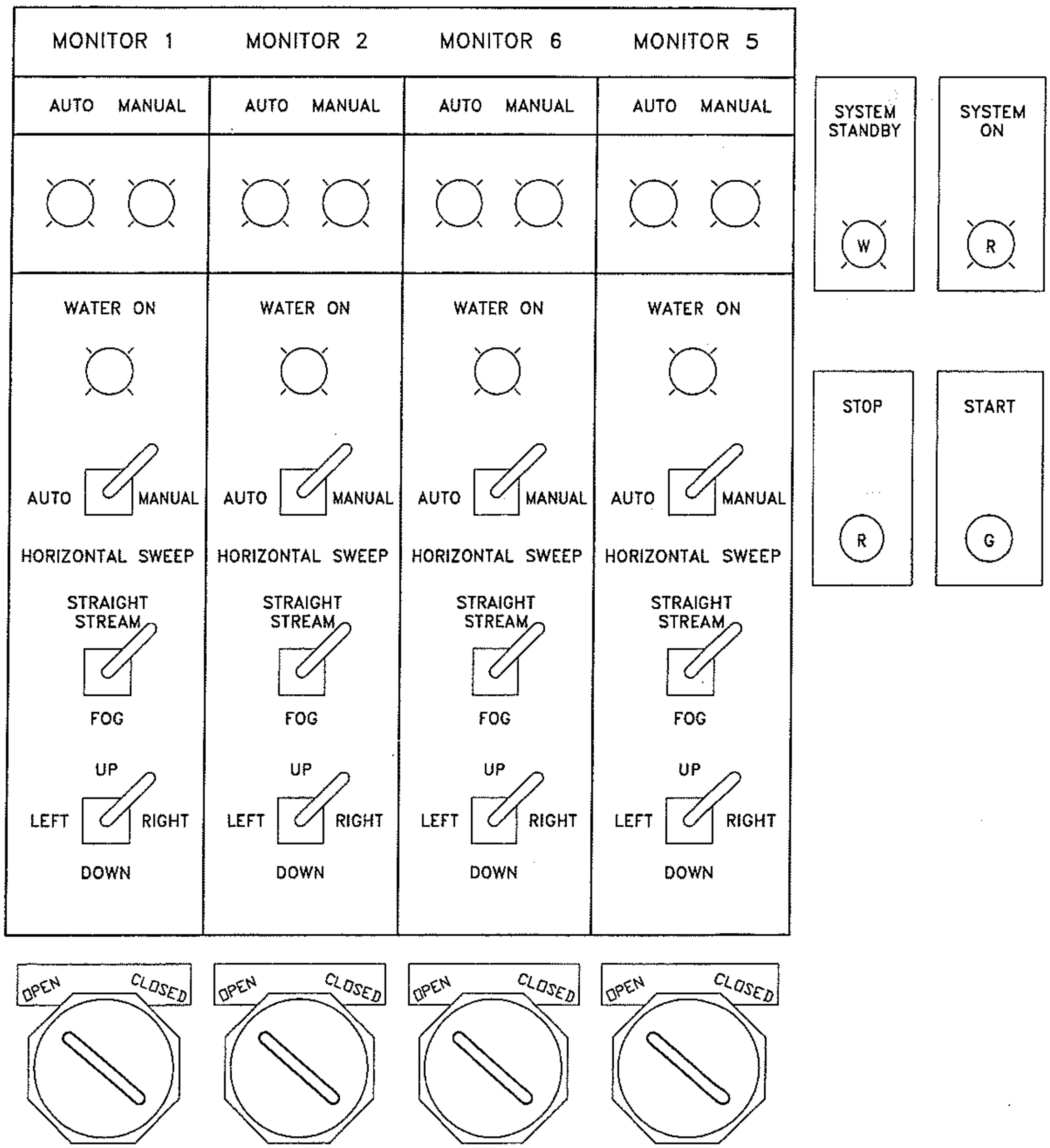
DOCK FIRE SUPPRESSION SYSTEM
ULTRAVIOLET/INFRARED CONTROLLER



APPENDIX C

TECHNICAL DATA
(Sheet 2)

DOCK FIRE SUPPRESSION SYSTEM
MONITOR REMOTE CONSOLE PANEL DOCK NO. 1



\PPENDIX D

\PERATIONAL READY PO

\ SYSTEM DOCK NO. 1 /

\OCK NO. 1

\TIC WATER-ONLY

CLOSED

CLOSED

CLOSED

OPEN

CLOSED

OFF

K NO. 2

WATER-ONLY

DSED

DSED

SED

EN

SED

F

APPENDIX C

TECHNICAL DATA
(Sheet 3)

DOCK FIRE SUPPRESSION SYSTEM
NITOR REMOTE CONSOLE PANEL DOCK NO. 2