B23A-A WELLHEAD FACILITY TOPSIDE DESIGN

THESIS

Submitted in Partial Fulfilment of the Requirements

for the Award of the Degree of

MASTER OF TECHNOLOGY

(PROCESS DESIGN ENGINEERING)

Submitted by

MANJUNATHA

College of Engineering

University of Petroleum & Energy Studies

Dehradun

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Under the guidance of

ASST. PROF. ADARSH ARYA

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University of Petroleum and Energy Studies

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College of Engineering

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UNIVERSITY OF PETROLEUM & ENERGY STUDIES
(ISO 9001:2000 Certified)

CERTIFICATE

This is to certify that the work contained in this thesis titled **"B23A-A WELLHEAD FACILITY TOPSIDE DESIGN"** has been carried out by **Mr.MANJUNATHA** under my supervision and has not been submitted elsewhere for a degree.

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Manjunatha

ABSTRACT

B23A-A is new gas field which has to be connected to upcoming Central Process Terminal (CPT) via pipeline where CPT is centralized process terminal for all wellhead clusters. This document covers "the broad scope of project work and basic information about Wellheads". These well heads are located in the northern B-1 basin of Bombay high offshore.

B23A-A wellhead contain 4 gas producing wells. Individual flow arms / wells shall be connected to test / production manifold. For gas wells gas flow rates are measured by using senior orifice instrument. All supporting utilities along with operational requirement shall be met while designing the wellheads. Pipeline to connect wellhead with CPT is not considered in the present scope of work.

FIELD PRODUCTION CAPACITY PER STRING:

- Condensate : 1873 BCPD
- Gas : 0.9 MMSCMD

All the wells are natural lift type and water injection is not anticipated. Utility used in wellheads shall be instrument air and utility air system, potable water storage and distribution system, chemical injection system and solar power generation system.

CONTENTS

1.0 INTRODUCTION

B-193 cluster fields comprising of seven oil /gas fields viz. B-193, B-172, B-178, B-179, B-180, B-28A and B-23A which are located in the Heera- Panna-Bassein block of Bombay Offshore basin, about 60-90 km towards west of Mumbai city in water depth ranging from 60 to 75m. The fields are in close proximity of the giant Bassein gas field towards south.

The development will be exploited as to install B193 well cum process platform having separate bridge connected living quarter platform and 5 well platforms B-172-A, B-178-A, B-179-A, B-28-A-A, B-23-A-A and intra field sub-marine pipelines.

1.1 OBJECTIVE

This report "Process Design Basis" defines the basis on which the facilities on wellhead platforms have been designed. It also explains the methodology adopted in arriving at this design basis from information provided by ONGC. In addition, it presents an overview of the Wellhead platform. The objective of this design basis is to meet the requirements specified in the "Design criteria-process Vol II sec 3.2" Rev 0 (Bid Document).

1.2 WELLHEAD PLATFORMS

Well platform B-23A-A is 4 legged jacket platform with cellar deck and main deck cum helideck.

1.3 DESIGN LIFE

Design Life of the facilities to be designed shall be 25 years.

2.0 ABBREVIATION

ANSI	American National Standards Institute
API	American petroleum Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BCPD	Barrels of Condensate Per Day
BOPD	Barrels of Oil Per Day
BLPD	Barrels of Liquid Per Day
BWPD	Barrels of Water Per Day
BS&W	Basic Sediment and Water
CFC	Chloro Fluoro Carbon
CA	Corrosion Allowance
CS	Carbon Steel
DCP	Dry Chemical Powder
ESD	Emergency shutdown
HIPPS	High Integrity Pressure Protection System
MMSCMD	Million Standard Cubic Meter per Day
NACE	National Association of Corrosion Engineers
NFPA	National Fire Protection Association
RVP	Reid Vapor Pressure
RTU	Remote Telemetry Unit
SIL	Safety integrity level
SS	Stainless Steel
SSV	Surface Safety Valve
SSSV	Sub-Surface Safety Valve

3.0 OVERALL PROCESS DESCRIPTION

This general process description reflects the topside configuration for Well Head Platform project The process/utility systems that shall be present on the wellhead are as follows:

- Well fluid flow arms.
- Production header
- Testing facilities consisting of senior orifice with flow computer on B-23A-A platform
- Instrument & utility air system
- Well head safety shutdown system inclusive of pneumatic well shutdown panel
- Safety & relief system
- Fire & gas detection system
- Fire suppression system
- Chemical injection system
- Effluent disposal system
- Vent and drain system
- Diesel storage system
- Potable water system
- Launcher / Receiver for submarine pipeline
- 5 Tone Monorail net work system on all well platforms
- High Integrity Pressure Protection System (HIPPS)
- Solar power system
- Structure consist of jacket, cellar deck, main deck cum helideck
- Structure consist of shelter room, switch gear room and telemetry and battery bank room
- Navigational aid
- CP system

- Personnel protection
- Corrosion coupon
- CO_2 snuffing system

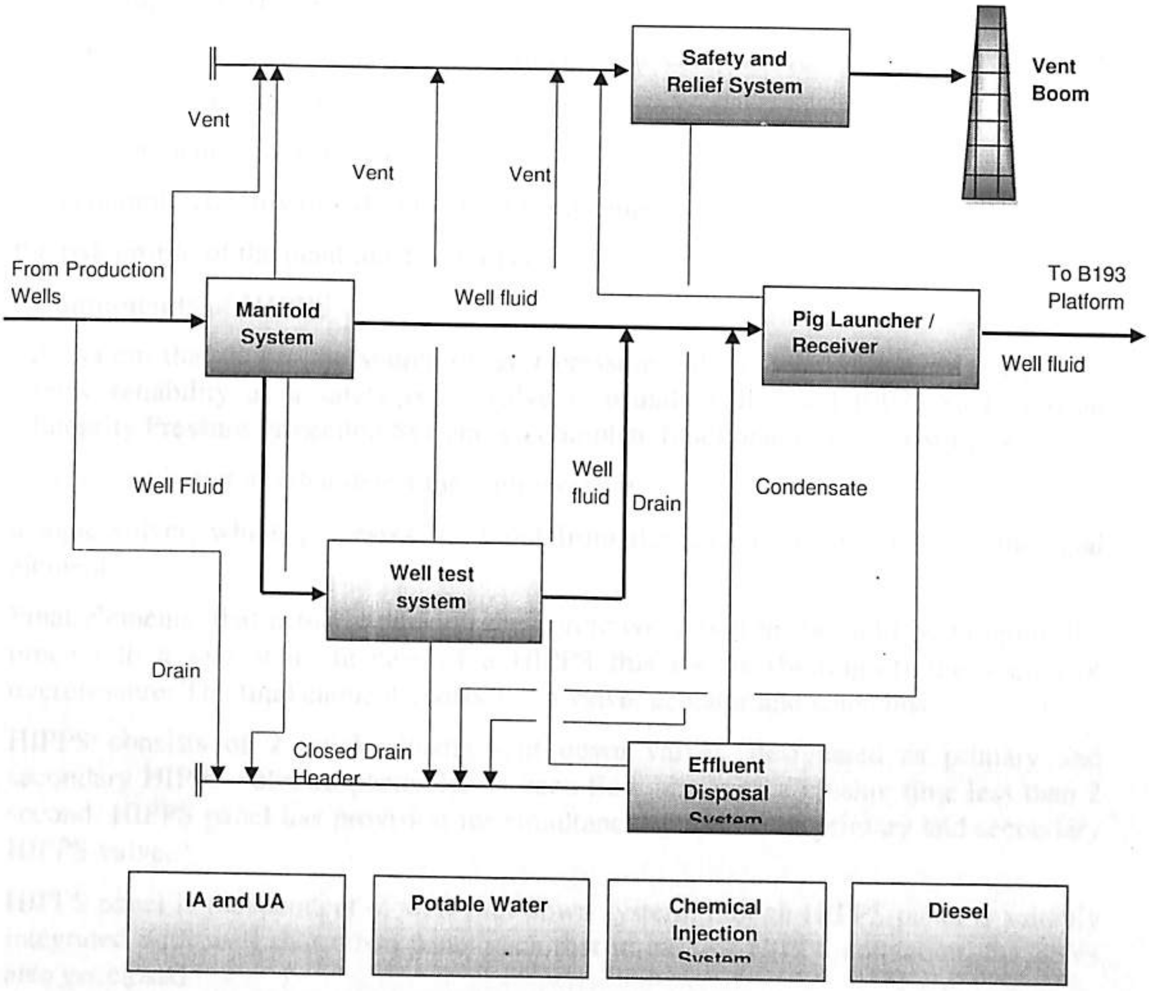
Well fluid from individual producing wells join the well fluid flow arm downstream of multiple choke arrangement. Shutdown valves associated with HIPPS are located on the flow arm.

Production of each well is directed through the production header and to the pig launcher for transportation of well fluid to B193 platform, through sub-marine pipeline or directed through test header and to the test separator.

Well fluid from each well is directed to the test header and testing facilities consisting of senior orifice with flow computer on B-23A-A platform

All the open drain and closed drain headers are routed to Effluent disposal system which consists of Crude condensate drum and condensate transfer pumps. Oil/Condensate along with water is transferred to well fluid pipeline by Condensate transfer pumps (P-512A/B).

Vent gas from well head platforms is routed to Glycol seal pot (V-920). Hydrocarbon Condensate is removed and routed to Crude condensate drum (V-900) and the dry gas is vented out safely through Vent boom.



4.0 DESCRIPTION OF THE WELLHEAD PLATFORM SYSTEMS

Wellhead platform topside facilities are presented in the form of simplified block diagram above.

4.1 WELL FLUID FLOW ARMS

Well fluid from individual producing wells join the well fluid flow arm downstream of multiple choke arrangement. Shutdown valves associated with HIPPS are located on the flow arm.

4.2 WELL HEAD SHUTDOWN PANEL

Well Shut Down panel is pneumatic operated. The system has provision for both local and remote monitoring and control. ESD and FSD loops are controlled by the same SD Panel.

4.3 HIGH INTEGRITY PRESSURE PROTECTION SYSTEM (HIPPS)

High Integrity Pressure Protection System (HIPPS) is a type of safety instrumented system (SIS) designed to prevent over-pressurization of a facility. The HIPPS will shut-off the source of the high pressure before the design pressure of the system is exceeded, thus preventing loss of containment through rupture (explosion) of a line or vessel. Therefore, the HIPPS is considered as a barrier between a high-pressure and a low-pressure section of an installation. In order to protect the under rated topside piping, High Integrity Pressure Protection System (HIPPS) is installed.

Advantages of HIPPS

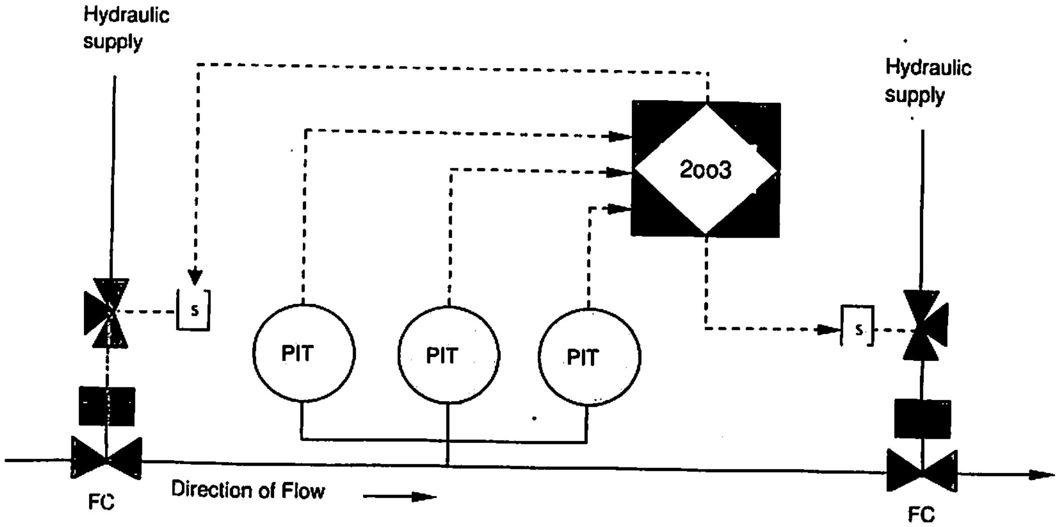
HIPPS provides a solution to protect equipment in cases where:

- high-pressures and / or flow rates are processed
- the environment is to be protected
- the economic viability of a development needs improvement
- the risk profile of the plant must be reduced

Components of HIPPS

A system that closes the source of over-pressure within 2 seconds with at least the same reliability as a safety relief valve is usually called a HIPPS. Such a High Integrity Pressure Protection System is a complete functional loop consisting of:

- sensors, (or initiators) that detect the high pressure
- a logic solver, which processes the input from the sensors to an output to the final element
- Final elements, that actually perform the corrective action in the field by bringing the process to a safe state. In case of a HIPPS this means shutting-off the source of overpressure. The final element consists of a valve, actuator and solenoids.
- HIPPS consists of 2 quick closing shut down valves, designated as primary and secondary HIPPS valve respectively, on each flow arm with a closing time less than 2 second. HIPPS panel has provision for simultaneous closure of primary and secondary HIPPS valve.
- HIPPS panel is independent of well shut down system, though HIPPS panel is suitably integrated with well shut down panel such that in case of HIPPS activation, the SSVs also get closed.



The scheme above presents 3 pressure transmitters (PT) connected to a logic solver. The solver will decide based on 2-out-of-3 (2oo3) voting whether or not to activate the final element. The final elements consist here of two block valves that stop inflow and flow to the downstream facilities to prevent them from exceeding a maximum pressure. The operator is warned through a pressure alarm (PA) that the HIPPS was activated. This system has a high degree of redundancy:

- Failure of one of the 3 pressure transmitters will not compromise the HIPPS functionality, as two readings of high pressure are needed for activation.
- Failure of one of the 2 block valves will not compromise the HIPPS functionality, as the other valve will close on activation of the HIPPS.

One dedicated independent HIPPS loop is provided for each of the present and future wells in the platforms as given below.

B-23A-A Platform - 4 Nos. HIPPS loops

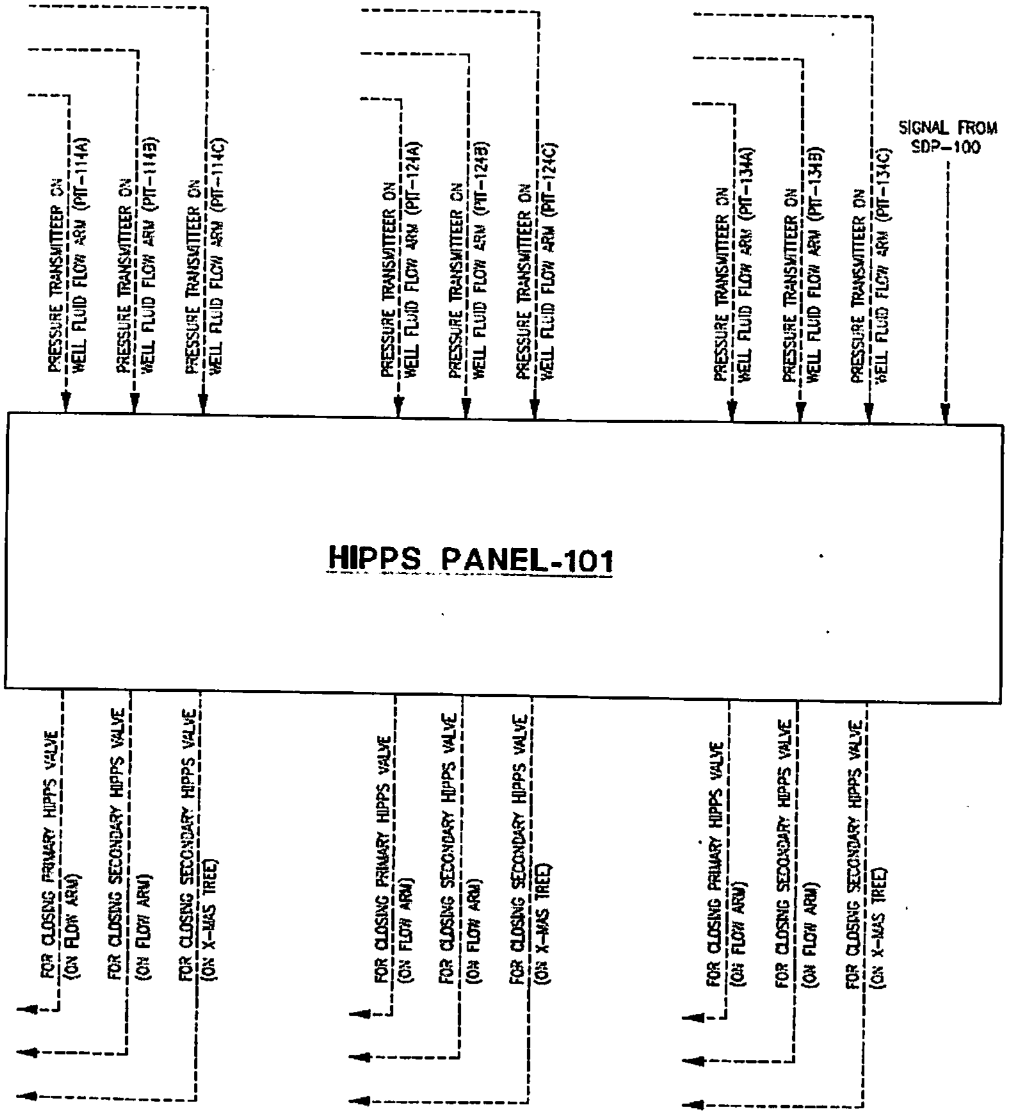
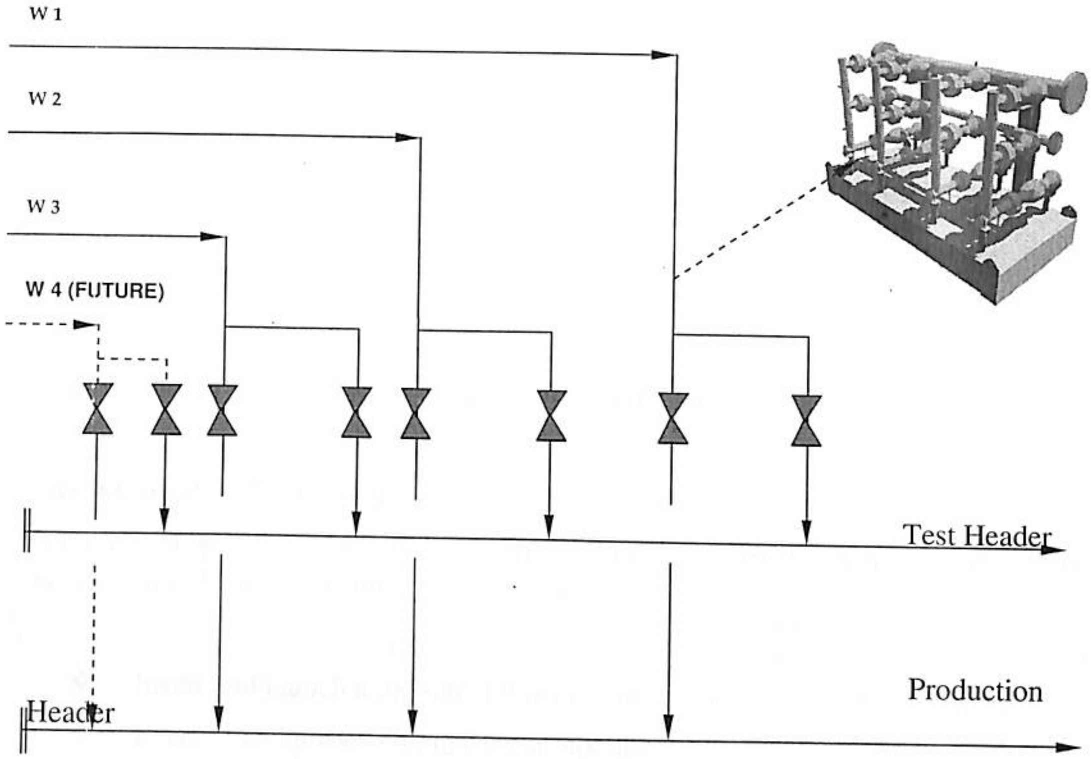

PRESSURE TRANSMITTEER ON WELL FLUID FLOW ARM (PIT-114A)
PRESSURE TRANSMITTEER ON WELL FLUID FLOW ARM (PIT-114B)
PRESSURE TRANSMITTEER ON WELL FLUID FLOW ARM (PIT-114C)
PRESSURE TRANSMITTEER ON WELL FLUID FLOW ARM (PIT-124A)
PRESSURE TRANSMITTEER ON WELL FLUID FLOW ARM (PIT-124B)
PRESSURE TRANSMITTEER ON WELL FLUID FLOW ARM (PIT-124C)
PRESSURE TRANSMITTEER ON WELL FLUID FLOW ARM (PIT-134A)
PRESSURE TRANSMITTEER ON WELL FLUID FLOW ARM (PIT-134B)
PRESSURE TRANSMITTEER ON WELL FLUID FLOW ARM (PIT-134C)
SIGNAL FROM SDP-100
HIPPS PANEL-101
FOR CLOSING PRIMARY HIPPS VALVE (ON FLOW ARM)
FOR CLOSING SECONDARY HIPPS VALVE (ON FLOW ARM)
FOR CLOSING SECONDARY HIPPS VALVE (ON X-MAS TREE)
FOR CLOSING PRIMARY HIPPS VALVE (ON FLOW ARM)
FOR CLOSING SECONDARY HIPPS VALVE (ON FLOW ARM)
FOR CLOSING SECONDARY HIPPS VALVE (ON X-MAS TREE)
FOR CLOSING PRIMARY HIPPS VALVE (ON FLOW ARM)
FOR CLOSING SECONDARY HIPPS VALVE (ON FLOW ARM)
FOR CLOSING SECONDARY HIPPS VALVE (ON X-MAS TREE)

Fig –HIPPS Panel

4.4 PRODUCTION HEADER/TEST HEADER

The production of each well is directed through the production header and onto the pig launcher for transportation of well fluid to destination platform, through sub-marine pipeline or directed through test header and to the test separator.



For dual completion well, 2 strings are considered and each string has hook-up provision in production and test headers.

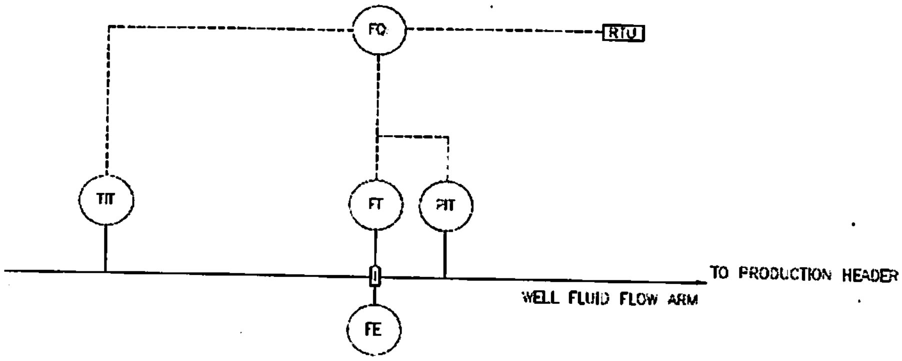
The production and test headers also have hook-up provision for future wells (spare slots).

4.5 WELL TESTING SYSTEM

Well fluid from each well is directed to the test header and testing facilities consisting of senior orifice with flow computer on B-23A-A platform .The test manifold is designed to operate at a maximum working pressure of 93.7 kg/cm^{2}g and 104°C.

4.5.1 SENIOR ORIFICE WITH NET FLOW COMPUTER

A senior orifice, instead of a test separator is provided with net flow computer, to determine condensate, water and gas on B23A-A gas platform. Flow Computer is a panel mounted computer designed specifically for hydrocarbon liquid and gas measurement where versatility and accuracy matter.



Fig– Process flow diagram – Senior orifice with net flow computer

4.6 LAUNCHER / RECEIVER

The main purpose of a pipeline pig trap system is to provide, in a safe manner and without flow interruption, the means to either:

- Insert and launch a pig into a pipeline; or
- Receive and retrieve a pig from a pipeline.

4.6.1 COMPONENTS OF PIG TRAP (AUNCHER / RECEIVER)

Components of pig trap is listed below

- Barrel
- Pipes
- Branch Connection
- Valves
- End closure
- Pig Signallers
- Pressure Indicators
- Sphere launching/receiving Pins/Flappers
- Supports

Components of each pig trap is described below

BARREL

The barrel is the section of the pig trap, from the pig trap valve up to and including the end closure, which is required to launch and receive pigs.

It consists of four parts, as follows:

End closure	A quick opening closure welded to the major barrel allowing the insertion and removal of pigs.
Major barrel	An enlarged section of the barrel used for loading or retrieving pigs
Reducer	A reducer between major and minor barrel
Minor barrel	A section of the barrel between the pig trap valve and the reducer.

PIPES

KICKER LINE

A kicker line is required to connect the major barrel with the bypass line to enable diversion of the fluid through the barrel to launch or receive a pig. For a launcher the kicker line shall be connected to the major barrel as close as possible to the end closure and for a receiver as close as possible to the reducer.

EQUALIZATION LINE

An equalization line is provided on launchers to enable filling and pressurizing of the barrel on both sides of the pig at the same time. This is to prevent a pig which is ready to be launched from moving either forwards (and thereby hitting and possibly damaging the pig trap valve) or backwards (and losing the seal in the reducer). To ensure this, the balance line, branching off from the kicker line, is connected to the minor barrel as close as possible to the pig trap valve.

THERMAL RELIEF LINE

A thermal relief line is provided on the Launcher/Receiver where shut-in pressure of trapped fluid could exceed the design pressure.

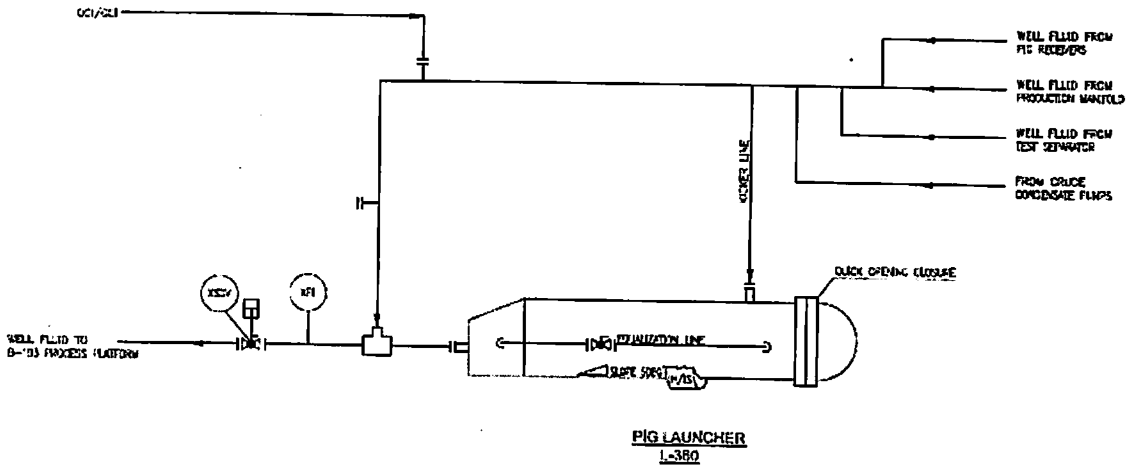
DRAIN LINE

Drain points are provided on both launchers and receivers near the end closure and near the pig trap valve to drain liquid accumulated in the barrel

VENT/FLARE/BLOWDOWN LINES

A vent line is provided near the end closure to vent/purge the barrel and near the pig trap valve for horizontal traps to ensure depressurization behind a pig in the event of it being stuck in the minor barrel.

Configuration of Pig traps is given below


OCI/SCI
WELL FLUID FROM PIG RECEIVERS
WELL FLUID FROM PRODUCTION MANIFOLD
WELL FLUID FROM TEST SEPARATOR
FROM CRUDE CONDENSATE PUMPS
KICKER LINE
QUICK OPENING CLOSURE
XSV
XFI
WELL FLUID TO B-193 PROCESS PLATFORM
EQUALIZATION LINE
SLOPE 50
H/IS
PIG LAUNCHER
L-380

Fig– Process flow diagram - Pig Launchers

Table – Summary of Launcher/Receiver

S.No	Platform	Barrel Size	Pipeline size	Service
1	B-23A-A Launcher	12 " X 16"	12"	Well fluid from B-23A-A to B-193A

4.7 EFFLUENT DISPOSAL SYSTEM

Effluent disposal system consists of the following equipment

- Crude Condensate Vessel
- Crude Condensate Transfer Pump

4.7.1 *CRUDE CONDENSATE VESSEL*

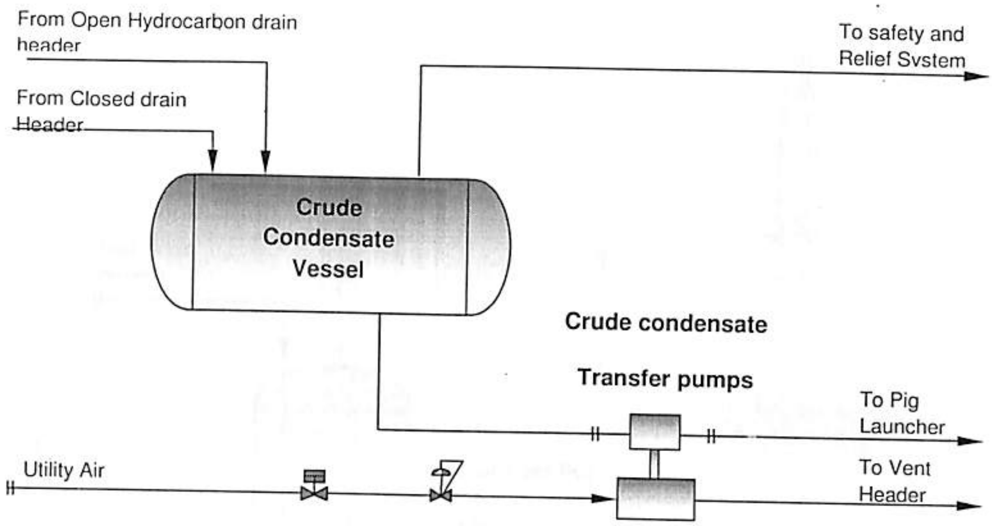
Since well fluid contains considerable amount H_2S, all drains (closed drain header and Open Hydrocarbon drain) are routed to Crude Condensate Vessel.

Crude Condensate Vessel is a horizontal vessel operates at atmosphere. Oil/ condensate along with water is transferred to well fluid pipeline by utility air driven transfer pump.

Crude condensate vessel is designed for a hold-up volume of 2 m^3 (min) with 80% full.

4.7.2 *CRUDE CONDENSATE PUMP*

Utility air driven reciprocating pump is utilized to transfer effluent from crude condensate vessel to well fluid pipeline. Pump capacity of 400 LPH, suitable to evacuate the vessel manually in 5 hrs is considered. 2 x 100% configuration of pumps are provided with one operating and one stand-by.



4.8 HAZARDOUS OPEN DRAINS

Drains from well head facilities will be collected and routed to the Crude condensate vessel through liquid seal.

4.9 CLOSED DRAINS

Wellhead facilities with hydrocarbon liquid inventory under normal operating conditions are provided with closed drains to enable draining of liquid during maintenance. All hydrocarbon level instruments will also drain in to the closed drain header. The collectors are connected to a central closed drain header that will route all collected fluid to the Crude condensate Vessel.

4.10 SAFETY & RELIEF SYSTEM

All vents and reliefs are discharged to safety and relief system comprising of

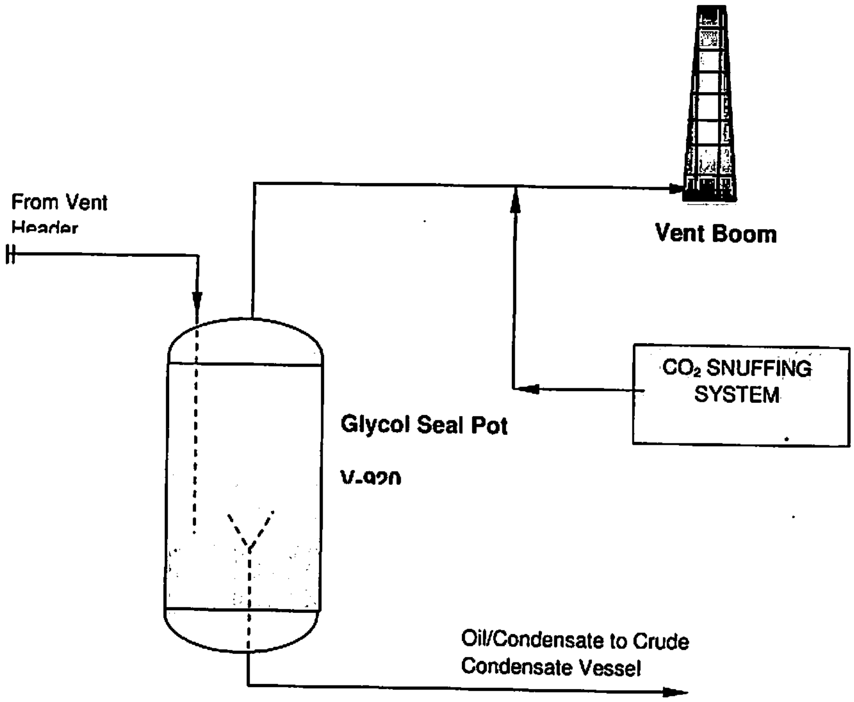
- Glycol Seal Pot,
- Vent Boom
- Flame Arrestors
- CO2 Snuffing

4.10.1 GLYCOL SEAL POT

In the glycol seal pot, the condensate / process liquid remains in the gas are separated and the oil/condensate is routed to Crude Condensate Vessel.

The purpose of the glycol seal pot is:

- To prevent any flashback, initiated from the vent or flare tip and propagated further upstream of the glycol seal pot;
- To prevent air ingress due to a sudden temperature change of the flare and relief system
- To maintain a slight overpressure in the flare system to ensure that air will not enter the system



The glycol seal pot is designed for a back pressure of 0.2 kg/cm^{2}g (max.). The design pressure and design temperature of glycol seal pot is 3.5 kg/cm^{2}g + 50mm WC and 104 deg C, respectively.

4.10.2 *VENT BOOM*

The vent boom is located such that any H_2S and HC gas concentration on the platform remains within acceptable limits for personnel safety, under worst conditions. Vent boom point of discharge is located 3m above from heli-deck and 11m away from platform and it will be finalized after dispersion analysis considering all production scenarios and worst environmental conditions.

4.10.3 *FLAME ARRESTORS*

A flame arrester is a piece of equipment installed in a vent pipe to stop the propagation of a deflagration travelling along a pipeline by extinguishing the flame.

Flame arrestors will be placed near to the tip of the vent, but still be accessible for maintenance and inspection. This is to prevent explosions occurring in the vent pipe.

Flame arrestors cannot be used as an alternative to a continuous purge for flash back protection because they are

- Susceptible to blockage;
- Susceptible to undetected mechanical damage;
- Provide an obstruction to flow;
- Become ineffective within a few minutes of ignition due to heat build up if located near the vent tip.

4.10.4 *VENT SNUFFING*

The fitting of a remote controlled snuffing system on vent stacks is considered in order to avoid continuous burning in the event of accidental ignition of the vented gases (Scenario such as lightning in the sky).

The snuffing medium is carbon dioxide. Halon or other CFCs shall not be used due to their adverse effects on the environment.

The snuffing system is operated from a manual station. Once the flame is extinguished, the control system will ensure that metal temperatures at the tip of the vent drop sufficiently to prevent spontaneous ignition of gas and the danger of flashback. The snuffing facility is sized to extinguish the stack at least two times in succession when it is burning and discharging at a rate corresponding to one percent of the maximum vent rate.

4.11 INSTRUMENT & UTILITY AIR SYSTEM

The instrument and utility air system is designed to cater the instrumentation requirements and pneumatic supply to crude/condensate transfer pump and diesel transfer pump.

The system is designed for 400 Nm^3/hr. However, all facilities associated with the instrument air alone are designed for a capacity of 25 Nm^3/hr.

The instrument and utility air system consists of the following packages.

IA/UA Compressor

Number:	Two (One operating and one standby on each well platform
Type:	Diesel engine driven non-lubricating reciprocating compressor (non lubricating reciprocating compressor)
Discharge pressure	35 kg/cm^{2}g
Capacity	400 Nm^3/hr. (Min.)

Instrument Air Dryer

Number	One (with all equipments having one in operation and one in standby/ re-generation philosophy) including pre-filter and after- filter
Type	Heatless type - Pressure Swing Adsorption (PSA) type.
Dew point	(-) 40°C at atmospheric pressure

The desiccant bed will be designed so as to operate without any intervention or maintenance for a continuous period of 30 days.

Utility Air Receiver

Number	One

Capacity	7 days requirement between normal and minimum pressure level
Pressure, kg/cm^2(g) (Normal/Minimum/Design)	35/8.0/42.0
Utility Air header	5.5 to 8 kg/cm^2 (g)

Instrument Air Receiver

Number	One
Capacity	15 minutes requirement between normal and minimum pressure level.
Pressure, kg/cm^2(g) (Normal/Minimum/Design)	8/5.5/10.6
Instrument Air header	5.5 to 8 kg/cm^2 (g)

4.12 DIESEL STORAGE SYSTEM

Diesel system consists of Diesel storage tank and Diesel transfer pump.

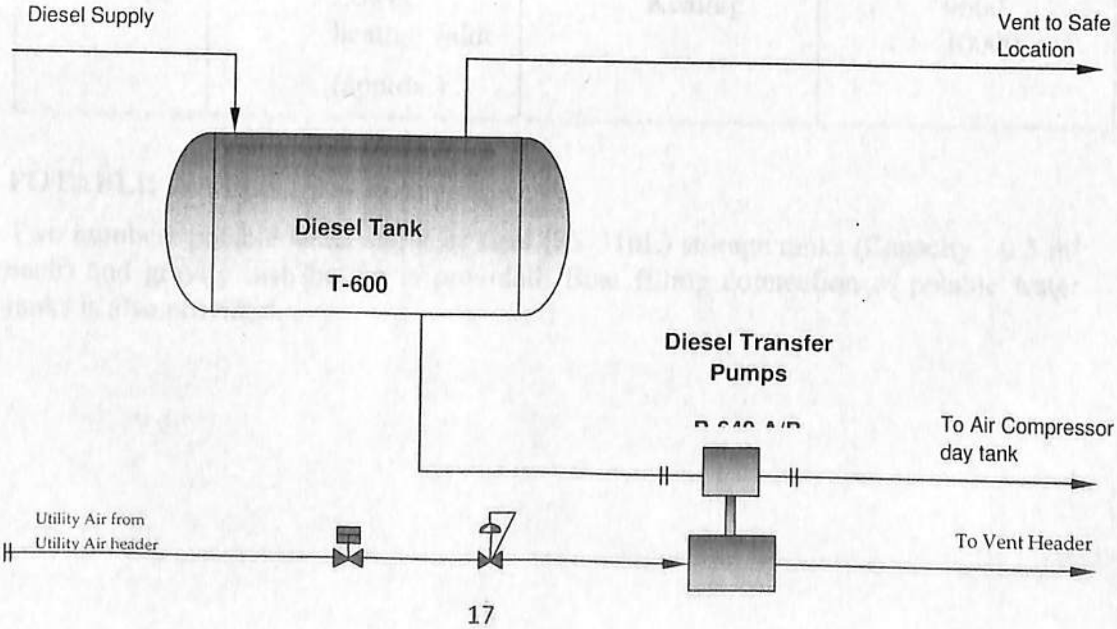
4.12.1 DIESEL STORAGE TANK

Diesel is stored in cylindrical storage tank (1000 litres capacity min). The storage facility is designed to meet the requirement of 48 hours of continuous operation of diesel engine driven air compressor and DG boost charging kit.

4.12.2 DIESEL TRANSFER PUMP

Diesel Transfer pump is a reciprocating type pump. The diesel is distributed to day tank through utility air driven diesel transfer pump (1+1), having the following specification

- Capacity: 1000 lph
- Differential pressure: 3 kg / cm^2

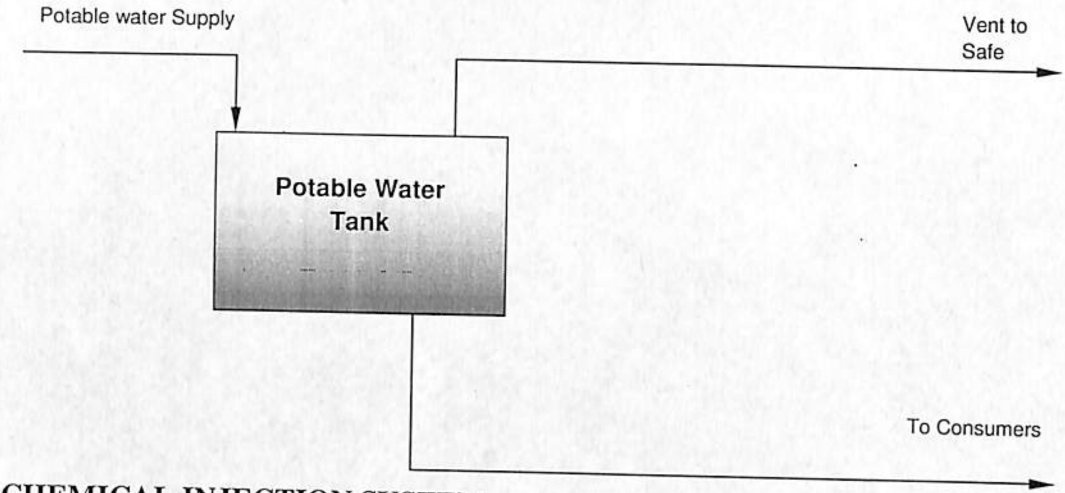


Diesel Fuel specification is given below

S .No.	Property	Unit	Range of Value
1	Distillation	% recovery at 366 deg C	90 (min.)
2	Specific Gravity	@ 15/15 Deg C	0.84 – 0.88 (approx.)
3	Copper strip corrosion	@ 100 deg C for 3 hrs.	No worse than No.1
4	Kinematic viscosity	Cst at 38 deg C	2 – 7.5
5	Cetane Number	-	41
6	Flash Point	deg C	35
7	Sulphur	Wt %	1.0 max.
8	Water	ppmw	50 max.
9	Sediment	Wt%	Nil
10	Acidity inorganic	-	Nil
11	Acidity total	Mg KOH/g	0.05 – 0.5 max)
12	Carbon Residue	Wt %	0.2 max.
13	Ash content	Wt %	0.01 – 0.02 max
14	Lower heating value (approx.)	Kcal/kg	9600 - 10000

4.13 POTABLE WATER SYSTEM

Two numbers potable water stainless steel (SS-316L) storage tanks (Capacity - 0.5 m^3 each) and gravity distribution is provided. Boat filling connection to potable water tanks is also provided.



4.14 CHEMICAL INJECTION SYSTEM

Chemical injection is envisaged to aid production of oil, gas and water and to control corrosion.

Corrosion inhibitor is pumped from B-193A process platform to individual well platforms through independent umbilical / rigid pipelines which are a part of piggy back flexi-pack/ rigid pipelines. Gas Corrosion Inhibitor (GCI) is used for B-23A-A wellhead platform.

On well platform, provision is made for hook-up of umbilical/ rigid pipe with suitable size pipe which is further bifurcated in to 2 pipes having non-return valve and isolation valve. These pipes are hooked-up with production manifold and well fluid launcher (at the upstream).

The independent dosing, regulating and metering facilities for all the well platforms are provided on B-193A-P process platform. The provision for online monitoring of chemical injection rate is kept in B-193A-P process platform control room.

The metering facilities on chemical injection lines to all well platform has flow transmitters which is integrated with B-193A DCS for online monitoring of chemical injection rate.

• GCI Injection rate	75 ppm (Weight Basis)

4.15 SOLAR POWER SYSTEM

Solar powered lighting is provided in the following locations on each wellhead platform.

• Battery Room	2 Nos of Lighting
• Electrical & Instrumentation Room	2 Nos of Lighting
• Shelter	1 No of Lighting

4.16 GAS DETECTION AND SUPPRESSION SYSTEM

Various gas detection facilities are provided to ensure safe operation of the platforms.

This includes the followings:-

Fixed HC Gas Detection, Alarm and Shutdown System

Fixed H_2S detection, alarm and shutdown system

Fixed H_2 detection and alarm system

Portable H_2S & HC Gas Detectors (2 nos. for each platform and kept at the main process complex)

Fusible plug loop with necessary ESD and FSD system

In addition, fire suppression facilities including fixed DCP skids and portable CO_2 and DCP fire extinguishers at various locations, as per applicable codes and standard practices, is provided.

5.0 WELL DATA

5.1 WELL CONFIGURATION

Platform	Total Slots	Producer Wells		Gas lift Requirement	Free slots
		Single completion	Dual completion		
B-23A-A	4	3	NIL	No	1

5.2 WELL FLUID CONDITION

Platform	Shut – in - Conditions		Choke upstream Conditions		Choke Downstream Conditions	
	Pressure kg/cm^{2}g	Temp °C	Operating Pressure kg/cm^{2}g	Operating Temp °C	Operating Pressure kg/cm^{2}g	Operating Temp °C
B-23A-A	414	163	30 - 217	76-95	30 - 77	76-95

5.3 WELL FLUID CHARACTERISTICS

5.3.1 ASSOCIATED GAS COMPOSITIONS

Component	Case-1 (Vol %)	Case-2 (Vol %)
Methane	79.96	54.40
Ethane	5.10	13.92
Propane	2.02	11.93
i-Butane	0.34	1.82
n-Butane	0.54	2.70
i-Pentane	0.15	0.47
n-Pentane	0.20	0.47
Hexane	0.25	0.16
Heptane	0.15	0.04

CO_2	9.37	11.84
Nitrogen	1.92	2.25
H_2S, ppm (Note-1)	50.00	50.00
Specific Gravity	0.7275	0.9536
Calorific value	-	-

NOTE:

1. For simulation, overall composition to be normalized for H_2S concentration.

5.3.2 *CRUDE OIL ANALYSIS*

Parameter	**Value / Range**
Density at 15°c, gm/ml	0.8356
Specific gravity	0.8360
API gravity	35.61 – 37.75
Pour point, °C	30 - 36
Kinematic Viscosity, CSt@37.8°C	7.12
RVP, psi @ 37.8° C	2.8
Water Content (D&S), % vol	Traces
BS &W, % Volume	0.05
Salt Content, mg/litre	5
Asphaltenes, % wt.	0.69 – 3.24
Resin, % wt.	5.8 – 6.7
Wax, % wt.	12.99 – 16.8
KUOP	12.10
Saturates, % by wt.	63.68 – 66.76
Aromatics, % by wt.	18.93 - 23
Base of the crude	Intermediate
Ash Content, % wt.	0.01

5.3.3 *ASTM DISTILLATION DATA – CONDENSATE (B-23A)*

TEMP. RANGE°C	**OBJECT-II (IBP:68°C)**		**OBJECT-III (IBP:62°C)**	
	Cum.vol. (CC)	**% vol. distillate**	**Cum.vol. (CC)**	**% vol. distillate**
IBP-75	0.5	0.5	4.0	4.0
75-100	8.0	7.5	17.0	13.0
100-125	26.0	18.0	34.0	17.0
125-150	47.0	21.0	49.0	15.0
150-175	58.0	11.0	60.0	11.0
175-200	64.0	6.0	66.0	6.0
200-225	68.0	4.0	72.0	6.0
225-250	73.0	5.0	77.0	5.0
250-275	79.0	6.0	83.0	6.0
275-300	85.0	6.0	89.0	6.0
%wt distillate	84.68		88.18	
%wt residue	14.41		10.55	
%wt losses	0.91		1.27	

6.0 PRODUCTION DETAILS

6.1 PRODUCTION DATA

The production rates for B-23A-A platform and producer well capacity per string (flow arm) at stock tank conditions are given below

Table - Production rates B 23A-A Platform

Stream/Case	**Max. gas**
Gas, MMSCMD (DRY Basis)	0.9
Condensate, BCPD	1873

Table – Producer well capacity per string B-23A-A Platform

Stream/ Case	**Max. Gas**
Gas, MMSCMD	0.5
Condensate, BCPD	1048

7.0 DESIGN CONSIDERATION

7.1 DESIGN MARGIN

The following guidelines are used for sizing equipments to provide a consistent approach

Description	Design Margin
Well flow arms	25 % surge factor on maximum well fluid flow
Utility system	10% margin is considered on maximum consumption for various consumers. Entire system including piping is designed accordingly.

8.0 ENVIRONMENTAL CONDITION

For the purpose of process design of topside facility the following are considered as design parameters:

8.1 LOCATION AND GEOGRAPHICAL DATA

Offshore	Bombay Offshore basin,
Water depth	60 – 75 m

8.2 TEMPERTURE CRITERIA

8.2.1 AIR TEMPERATURE

Minimum	16 °C
Maximum	40 °C

8.2.2 SEAWATER TEMPERATURE

Minimum	22.78 °C

9.0 PROCESS SIMULATION

The process simulation models are developed for process studies, topsides equipment design, pipe sizing and other general engineering design activities. It is prepared with HYSYS 3.2 process simulation software and unit operations to represent the major process equipment associated with the topsides operation.

The simulation uses the arrival pressure and temperature at the topsides as specified in the Design criteria – Process Vol II sec 3.2 Rev 0 provided by ONGC.

Property calculations are based on Peng-Robinson's enhanced equations of state. This equation provides reasonably accurate phase equilibrium predictions for hydrocarbon systems.

9.1 SIMULATION PROCEDURE

- B-23A-A wellhead platform contains 4 slots of single completion producer wells (3 operating + 1 free slot). The well fluid from individual well reaches choke valve at 30-217 kg/cm^{2}g @ 76-95°C

- Pressure of the well fluid is reduced from 30-217 kg/cm^{2}g to 30-77 kg/cm^{2}g@ 76-95°C across the choke valve in 3stages as below,
  - At first choke valve – from 217 to 170 kg/cm^2 g.
  - At second choke valve – from 170 to 124 kg/cm^2 g.
  - At third choke valve – from 124 to 77 kg/cm^2 g.

- Well fluid after pressure reduction joins the production header. This scheme is simulated with necessary pressure drop.

- The well fluid flow arms with senior orifice flow meters on flow line and flow computer to determine gas and condensate along with associated monitoring systems.

- Condensates from the crude condensate vessel are pumped at the flow rate of 1 m^3/hr. A pump with necessary differential head is modeled.

9.2 SIMULATION ASSUMPTIONS

The assumptions used in the simulation modeling and indicative results are summarized below,

- The minimum pressure drop across PCV and LCV in test separator is not considered in this simulation.
- The pipeline pressure drop of 1 kg/cm2g is assumed for the line from crude condensate drum (P-512A/B) to Pig launcher (L-360)

10.0 SIMULATION CASE DESCRIPTION

10.1 CASE DEFINITION

Based on the assessment of reservoir fluid compositions and arrival conditions, sixteen (16) simulation cases are considered.

Table 8.1-1 Simulation Cases Description

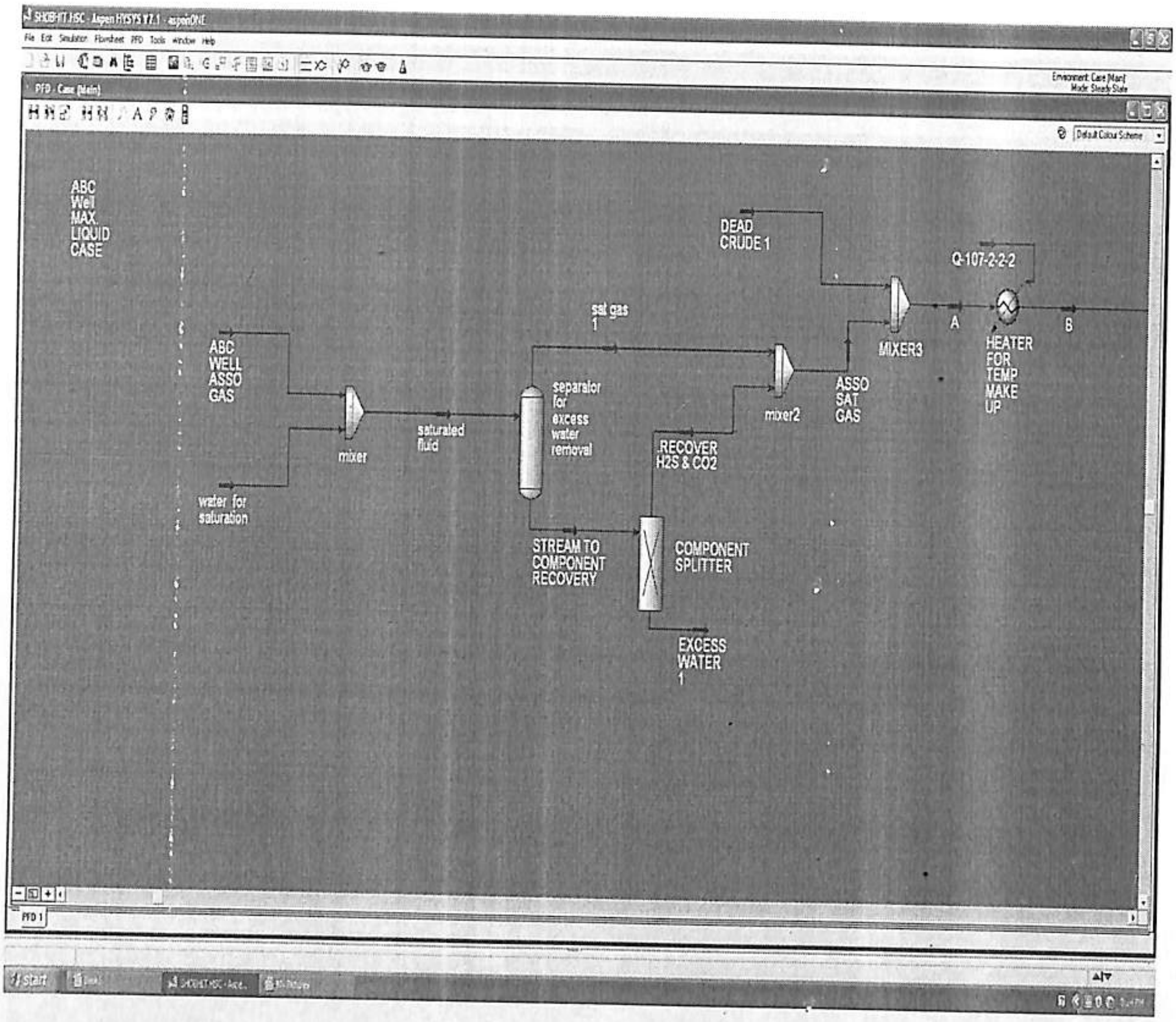
CASE NUMBER	CASE DESCRIPTION
Case 1	Minimum temperature + Maximum Pressure upstream of choke & maximum pressure downstream of choke (Composition case-1 & ASTM object-II)
Case 2	Maximum temperature + maximum pressure upstream of choke and maximum pressure downstream of choke (composition case-1 & ASTM object-II)
Case 3	Minimum temperature + maximum pressure upstream of choke + maximum pressure downstream of choke (composition case-2 & ASTM object- II)
Case 4	Maximum temperature + maximum pressure upstream of choke and maximum pressure downstream of choke (composition case-2 & ASTM object- II)
Case 5	Minimum temperature + maximum pressure upstream of choke and minimum pressure downstream of choke (composition case-1 & ASTM object-II)
Case 6	Maximum temperature + maximum pressure upstream of choke and minimum pressure downstream of choke (composition case-1 & ASTM object-II)
Case 7	Minimum temperature + maximum pressure upstream of choke and minimum pressure downstream of choke (composition case-2 & ASTM object- II)
Case 8	Maximum temperature + maximum pressure upstream of choke and minimum pressure downstream of choke (composition case-2 & ASTM object- II)
Case 9	Minimum temperature + maximum pressure upstream of choke and maximum pressure downstream of choke (composition case-1 & ASTM object- III)
Case 10	Maximum temperature + maximum pressure upstream of choke and maximum pressure downstream of choke (composition case-1 & ASTM object- III)
Case 11	Minimum temperature + maximum pressure upstream of choke and maximum pressure downstream of choke (composition case-2 & ASTM object-III)
Case 12	Maximum temperature + maximum pressure upstream of choke and maximum pressure downstream of choke (composition case-2 & ASTM object-III)
Case 13	Minimum temperature + maximum pressure upstream of choke and minimum pressure downstream of choke (composition case-1 & ASTM object- III)

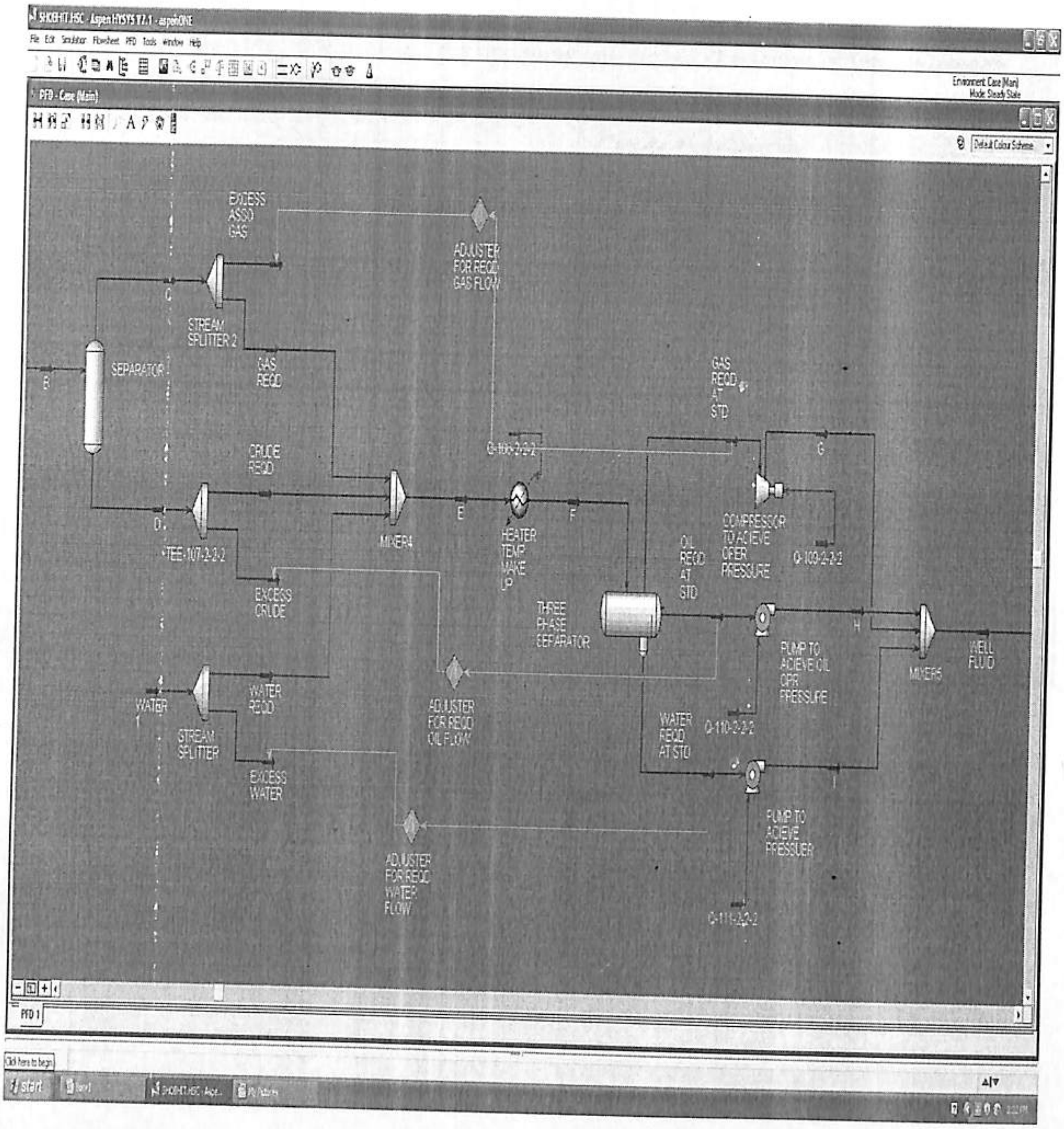
Case 14	Maximum temperature + maximum pressure upstream of choke and minimum pressure downstream of choke (composition case-1 & ASTM object- III)
Case 15	Minimum temperature + maximum pressure upstream of choke and minimum pressure downstream of choke (composition case-2 & ASTM object-III)
Case 16	Maximum temperature + maximum pressure upstream of choke and minimum pressure downstream of choke (composition case-2 & ASTM object-III)

The low pressure upstream of choke conditions is not considered for simulation purpose. The low pressure upstream of choke pressure will be similar to the case low pressure downstream of choke.

10.2 GOVERNING CASE

From the above 16 cases, based on maximum temperature, minimum pressure and maximum total volumetric flow rate Case-6(maximum temperature + maximum pressure upstream of choke and minimum pressure downstream of choke(composition case-1 & ASTM object-II)) is selected as governing case for sizing of lines, equipments, instruments etc.


ABC Well MAX. LIQUID CASE
ABC WELL ASSO GAS
water for saturation
mixer
saturated fluid
separator for excess water removal
sat gas 1
STREAM TO COMPONENT RECOVERY
COMPONENT SPLITTER
EXCESS WATER 1
RECOVER H2S & CO2
mixer2
ASSO SAT GAS
DEAD CRUDE 1
MIXER3
A
Q-107-2-2-2
HEATER FOR TEMP MAKE UP
B
PFD 1
start


SHOEHIT.HSC - Aspen HYSYS V7.1 - aspenONE
File Edit Simulation Flowsheet PFD Tools Window Help
Environment: Case (Main)
Mode: Steady State
PFD - Case (Main)
Default Colour Scheme
EXCESS ASSO GAS
ADJUSTER FOR REQD GAS FLOW
C
STREAM SPLITTER 2
B
SEPARATOR
GAS REQD
GAS REQD AT STD
Q-106-2-2-2
G
CRUDE REQD
D
TEE-107-2-2-2
MIXER4
E
F
HEATER TEMP MAKE UP
COMPRESSOR TO ACIEVE OFER PRESSURE
Q-109-2-2-2
OIL REQD AT STD
EXCESS CRUDE
THREE PHASE SEPARATOR
H
WELL FLUID
PUMP TO ACIEVE OIL OPR PRESSURE
MIXER5
WATER
STREAM SPLITTER
WATER REQD
ADJUSTER FOR REQD OIL FLOW
WATER REQD AT STD
Q-110-2-2-2
EXCESS WATER
I
PUMP TO ACIEVE PRESSUER
ADJUSTER FOR REQD WATER FLOW
Q-111-2-2-2
PFD 1
Click here to begin
start

11.0 OPERATING AND DESIGN PARAMETERS

The following table provides the operating and design conditions of the equipments on B-23A-A platform.

Parameter	**Crude Condensate Vessel (V-900)**	**Crude Condensate Transfer Pump (P-512 A/B)**	**Glycol Seal Pot (V-920)**
Operating pressure (kg/cm^2g)	0.2	33-80	0.2
Operating temperature (°C)	40-50	40-50	40-50
Design pressure (kg/cm^2g)	3.5	93.7	3.5+50mm WC
Design temperature (°C)	104	104	104

12.0 UTILITY CONSUMPTION CALCULATION

This section of the document provides total consumption rates of various utilities on the B-23A-A Well Platform. The following utilities are considered

- Instrument air
- Utility air
- Potable water
- Diesel
- Chemical – Gas corrosion Inhibitor

12.1 INSTRUMENT AIR

Instrument air is required for the operation of control valves, shutdown valves, pressure and level switches, control panels, thermal detectors, pneumatic pressure transmitters, pneumatic controllers, air filter regulators etc.

Operating Pressure	: 5.5 – 8 kg/cm^{2}g
Operating Temperature	: 50°C
Design Pressure	: 10.6 kg/cm^{2}g
Design Temperature	: 80°C
Quantity (continuous)	: 2.0 Nm^3/hr (Consumption rate)
Quantity (intermittent)	: 30.7 Nm^3/hr (Consumption rate)

Instrument air consumption list (B-23A-A PLATFORM)

S. No	Item description	Quantity	Continuous (Nm^3/hr) (Note-1)		Intermittent (Nm^3/hr)	
			Unit consumption	Total consumption	Unit consumption	Total consumption
1	Shutdown valves (SDV)	3			1.5	4.5
2	High / Low pressure pilots	4	0.026	0.104	0.1	0.4
3	Control valves	0	1	0		
4	Air filter regulators	12			0.1	1.2
5	Pneumatic transmitters	0	0.3	0		
6	Pneumatic level	4	0.1	0.4	0.1	0.4

	switches					
7	Pneumatic Pressure switches	1	0.026	0.026	0.1	0.1
8	Dryer control panel	1	0.078	0.078	4	4
9	Thermal detector (CO_2 snuffing system)	1	0.026	0.026	0.5	0.5
10	SDP	15	0.078	1.17	15	15
11	Test separator SDP	0			0	0
12	Total consumption			**1.83**		26.1
	Including 10% margin			2.0		28.71
	Overall consumption (Note-2)					**30.70**

Note:

1. The given continuous consumption of instrument air is based on leakage of in instruments. (Provided /confirmed by vendors)
2. The total consumption has been considered for design conditions.

12.2 UTILITY AIR

Utility air is required for operating the crude condensate pumps and diesel transfer pumps.

Operating Pressure	: 8 - 35 kg/cm^{2}g (Upstream of PCV-420/421)
Operating Pressure	: 5.5 - 8 kg/cm^{2}g (Downstream of PCV-420/421)
Operating Temperature	: 50°C
Design Pressure	: 42 kg/cm^{2}g
Design Temperature	: 150°C
Quantity	: 81 Nm^3/hr

Utility air consumption list

S. No	Item description	Quantity	Continuous (Nm^3/hr)	Intermittent (Nm^3/hr)

			Unit consumption	Total consumption	Unit consumption	Total consumption
1	Crude condensate pumps (2x100%)	1			57.88	57.88
2	Diesel transfer pumps (2x100%)	1			14.47	14.47
	Total					73
	Including 10% margin					**81**

12.3 POTABLE WATER

Potable water is required for eye wash and shelters/bunkers etc.

Operating Pressure : ATM
Operating Temperature : 16 - 40°C
Design Pressure : ATM + FULL OF LIQUID
Design Temperature : 55°C
Quantity : 1.0 m^3

12.4 DIESEL

Diesel is required as fuel for diesel engine driven utility and instrument air compressors.

Operating Pressure : ATM
Operating Temperature : 16 - 40°C
Design Pressure : 3.5 kg/cm^2g / 50mm WC vacuum
Design Temperature : 55°C
Quantity : 50 lit/hr *

*10% design margin is considered on diesel consumption.

12.5 CHEMICAL – GAS CORROSION INHIBITOR

Oil corrosion inhibitor is used to reduce the corrosion rate in the piping.

Operating Pressure : 32 - 79 kg/cm^2g
Operating Temperature : 16 - 40°C
Design Pressure : 93.7 kg/cm^2g
Design Temperature : 60°C
Quantity injected : 136.4 lit/hr

Gas corrosion Inhibitor consumption list

S. No	**Injection point**	**Quantity**	**Continuous (lit/hr)**		**Intermittent (lit/hr)**	
			Unit consumption	**Total consumption**	**Unit consumption**	**Total consumption**
1	Production header	1	62	62		
2	Pig launcher inlet	1	62	62		
	Total			124		
	Including 10% margin			**136.4**		

13.0 PIPING AND INSTRUMENTATION DAIGRAM

Please refer **ANNEXURE I**

14.0 PROCESS FLOW DAIGRAM

Please refer **ANNEXURE II**

15.0 CAUSE AND EFFECT MATRIX

Please refer **ANNEXURE III**

16.0 VESSEL SIZING CALCULATIONS

Please refer **ANNEXURE IV**

17.0 LINE SIZING CALCULATIONS

Please refer **ANNEXURE V**

18.0 HEAT AND MATERIAL BALANCE SHEET

Please refer **ANNEXURE VI**

19.0 MATERIAL OF CONSTRUCTION

Factors influencing material selection are H_2S content in the well fluid is 50 ppmV max. Well fluid composition of all platforms indicates the presence of H_2S and CO_2 in the higher range. Material selection was carried out based on H_2S content in the well fluid, Oxygen content and presence of other oxidizing agents, Operating Temperature & Pressure, Biological activity and Condensing conditions.

Use of stainless steel is limited to a maximum operating temperature of 60°C.

Topside Facilities

Well fluid flow arms (From Christmas tree up to Inlet manifold)	INCOLOY 825
Well fluid deck piping	CS NACE
Pipelines	CS NACE

Utilities

Utility Air lines	SS 316 / Galvanized CS
Instrument Air piping	SS 316 / Galvanized CS
Closed Drain piping	CS + 3 mm CA
Open Drain piping	CS + 3 mm CA
Crude Condensate Vessel	CS (NACE) + 3 mm CA
Potable water tank	SS 316L
Diesel Storage Tank	CS+3 mm CA +Epoxy coating
Glycol seal Pot	CS + 3 mm CA
Chemical injection	Stainless steel

20.0 INSTRUMENTATION & CONTROL

All instrumentation in well fluid, oil, gas and water service on well platforms are pneumatic supply based (except SSSVs, SSVs,) RTU system is provided for well platform monitoring from process platform/ base.

Remote operation, monitoring, control and communication from B-193A platform to individual well platforms is through wireless communication.

All shutdown valves are provided with two position switches; one for open indication and one for close indication (Please refer annexure III for Cause and Effect Matrix for further details).

21.0 RESULTS AND DISCUSSION

By using simulation following analysis/studies are made:

- Associated Gas (free gas along with the condensate) from the reservoir shall be saturated with water before mixing with the condensate. While reporting gas composition from reservoir it is always expressed in dry basis. Amount of crude oil shall be expressed in STB (Stock Tank Barrel) i.e. at 60 ^{0}F and 1 atm pressure.
- During start-up temperature of well head can be ambient. There is high pressure drop in choke valve during start-up time. Hydrate formation is expected in the downstream of choke vale. By using HYSYS hydrate formation case checked for high pressure and lowest ambient temperature at choke upstream with highest pressure drop at choke valve.
- As flow rates are provided in standard conditions (i.e. 60 ^{0}F and 1 atm pressure). By using HYSYS properties at different temperatures and pressures are generated. To fix closed drain pump capacity first well fluid shall be depressurized to ambient pressure.
- By using Choke valves (In X-mass tree's) pressure reduction is done in three equal steps. This is to reduce the formation of hydrates. Also possible ways of overcoming hydrate formation like preheating, chemical (methanol) injection, etc are also looked at as alternative.

22.0 CONCLUSION

1. To avoid hydrate formation initially whole well fluid flow arm shall be pressurized with water. For this arrangement provided in well head area (please refer attached P&ID for the details).
2. Various operational conditions are considered and Cause and Effect Matrix is generated. Operational overrides (by-pass arrangements) are provided wherever problem expected during start-up and shutdown conditions. (Please refer attached P&ID for the details).
3. Instead of providing HIPPS, other possibilities like providing block discharge PSV (Pressure Safety Valve) were also looked at. But amount of H_2S/hydrocarbon gas is very high. So other options are neglected.
4. Start-up, shut down and normal operation requirements are indicated in P&ID. But for complete details operating manuals shall be prepared and referred.
5. Equipments under the scope of vendor shall be evaluated, checked before placing order. All the vendor evaluation (technical and commercial) are not covered in this document.

23.0 REFERENCES

23.1 CODES AND STANDARDS

The following codes and standards are applicable for the design.

STANDARDS	DESCRIPTION
ASME Section-II, Div-I	Boilers and Pressure Vessel Code- Materials
ASME Section-VIII, Div-I	Boilers and Pressure Vessel Code
ASME Section-IX	Boilers and Pressure Vessel Code- welding and Brazing qualification
ANSI B 31.3	Process piping
API RP 2G	Production Facilities of Offshore Structure
API RP 14C	Analysis, Design, Installation, Testing of Basic Surface Safety Systems for Offshore Production Platforms
API-RP-14 E	Recommended practice for Design and installation of offshore production platform piping system
API RP 14F/14FZ	Design & Installation of Electrical system for offshore production system
API RP 14G	Fire prevention and control on open type offshore production platforms
API RP 14J	Recommended Practice for Design and Hazards analysis for Offshore Production Facilities
API RP 75	Recommended Practice for Development of a Safety and Environmental Management Program for Offshore Operations and Facilities
API RP 500	Hazardous Area Classification
API RP 520	Design and Installation of relieving system in Refineries
API RP521	Guide for pressure relief and depressurizing system
API RP 550	Installation of Refinery instruments and control system
API 618	Reciprocating compressors for general Refinery Service
API 619	Rotary Type Positive Displacement Compressor

	(Screw Compressor)
API 650	Welded Steel tank for oil storage
ASTM	American Society for Testing and Material
ANSI	American National Standards Institute
ANSI B 1.1	Screw threads
ANSI B 16.5	Steel pipe flanges and flange fittings
NACE-MR0175/ISO 15156	Materials for use in H2S Containing Environments in oil and gas Production

23.2 REFERNCE DOCUMENTS

1. *Aspen HYSYS dynamics –dynamic modelling 2004*
2. *HYSYS tutorial and applications*
3. *ONGC B-193 5 WHP Project Bid/ tender documents.*

ANNEXURE I

(PIPING AND INSTRUMENTATION DIAGRAM)

GEND & SYMBOLS WELL HEAD PLATFORM PROJ

CLIENT:

MBOLS (SHEET 2 OF 4)	01 FEB 11								
MBOLS (SHEET 3 OF 4)	01 FEB 11								
MBOLS (SHEET 4 OF 4)	01 FEB 11								

CLIENT:

FACE LEVEL TRANSMIT

ALARM
ALARM HIGH
ALARM HIGH LOW
ALARM LOW
CONTROLLER
CONTROL VALVE
GAUGE
INDICATOR
INDICATING CONTROLLER
INDICATING TRANSMITTER
RECORDER
RECORDER CONTROLLER
SWITCH
SWITCH HIGH
SWITCH LOW
TRANSMITTER
WITCH HIGH HIGH
LARM HIGH HIGH
WITCH LOW LOW
LARM LOW LOW

E ANALYSER
E ANALYSER ALARM
E INDICATOR
E INDICATOR ALARM
LOADING SYSTEM
PERATED VALVE
TRANSMITTER
FLOW CONTROLLER
ASE FLOW METER
RT VALVE

ALARM
ALARM LOW
ALARM HIGH
ALARM HIGH HIGH
ALARM LOW LOW
TON
CONTROLLER
CONTROL VALVE
IFFERENTIAL CONTROLLER
DIFFERENTIAL CONTROL
IFFERENTIAL INDICATOR
DIFFERENTIAL INDICATING
R
FFERENTIAL SWITCH HIGH
FFERENTIAL SWITCH LOW
FFERENTIAL TRANSMITTER
FFERENTIAL SWITCH HIGH

PSLL	PRESSURE SWITCH LOW LOW
PSHH	PRESSURE SWITCH HIGH HIGH
PSHL	PRESSURE SWITCH HIGH LOW
PSV	PRESSURE SAFETY VALVE
PT	PRESSURE TRANSMITTER
PTR	PRESSURE/TEMPERATURE RECORDER
PVSV	PRESSURE CUM VACUUM SAFTY VALVE
PY	PRESSURE RELAY
PDAH	PRESSURE DIFFERANTIAL ALARM HIGH
PDAL	PRESSURE DIFFERANTIAL ALARM LOW

R

RD	RUPTURE DISC
RO	RESTRICTION ORIFICE
ROV	REMOTE OPERATED VALVE
RTU	REMOTE TELEMETRY UNIT
R/E	RESISTANCE TO ELECTRICAL TRANSDUCER

S

SC	SPEED CONTROLLER
SDA	SHUTDOWN ALARM
SG	SIGHT GLASS
SOV	SOLENOID OPERATED VALVE
SR	SPEED RECORDER
SS	SPEED SWITCH
SSH	SPEED SWITCH HIGH
SSL	SPEED SWITCH LOW
SSSV	SUB SURFACE SAFETY VALVE
SSV	SURFACE SAFETY VALVE
ST	SPEED TRANSMITTER

T

TA	TEMPERATURE ALARM
TAH	TEMPERATURE ALARM HIGH
TAL	TEMPERATURE ALARM LOW
TC	TEMPERATURE CONTROLLER
TCV	TEMPERATURE CONTROL VALVE
TE	TEMPERATURE ELEMENT
TG	TEMPERATURE GAUGE
TR	TEMPERATURE RECORDER
TRC	TEMPERATURE RECORDER CONTROLLER
TI	TEMPERATURE INDICATOR
TIC	TEMPERATURE INDICATING CONTROLLER
TS	TEMPERATURE SWITCH
TSH	TEMPERATURE SWITCH HIGH
TSL	TEMPERATURE SWITCH LOW
TSV	THERMAL SAFETY VALVE
TT	TEMPERATURE TRANSMITTER
TW	THERMOWELL
TSHH	TEMPERATURE SWITCH HIGH HIGH
TAHH	TEMPERATURE ALARM HIGH HIGH
TSLL	TEMPERATURE SWITCH LOW LOW
TALL	TEMPERATURE ALARM LOW LOW
TM	TIMER
TLMT	TELEMETRY UNIT

COMPENSATOR

X

XDE	DEW POINT ELEMENT
XA	MISC ALARM
XAS	AUTO SELECT RELAY
XBA	BEACON ALARM
XBDV	BLOWDOWN VALVE
XC	CONVERTER
XCM	CORROSION METER
XCR	CONTROL RELAY
XCV	MISC CONTROL VALVE
XDAH	DEW POINT ALARM HIGH
XDAL	DEW POINT ALARM LOW
XDR	DEW POINT RECORDER
XDC	DERIVATIVE CONTROLLER
XDI	DEW POINT INDICATOR
XDT	DEW POINT TRANSMITTER
XFA	FLOW ADDER
XFFA	FLAME FAILURE ALARM
XFS	FLAME SENSOR
XFT	FLOW TOTALISER
XGD	HAZARDOUS GAS DETECTOR
XIP	IGNITION PANEL
XPA	PIG ALARM
XPI	PIG DETECTOR / INDICATOR
XPIS	PIG INDICATOR SWITCH
XPSU	POWER SUPPLY UNIT
XPV	PILOT VALVE
XRU	RAMP GENERATOR
XRR	RATIO RELAY
XS	SELECTOR SWITCH
XSD	SPHERE DETECTOR
XSDV	SHUTDOWN VALVE
XSRH	SELECTOR RELAY HIGH
XSRL	SELECTOR RELAY LOW
XSH	LIMIT SWITCH HIGH
XSV	SOLENOID VALVE
XTC	TEMPERATURE CONVERTER
XTP	TICKET PRINTER
XVA	VIBRATION ALARM
XVB	VOLUME BOOSTER
XVPA	VALVE POSITION ALARM
XVPI	VALVE POSITION INDICATOR
XVPS	VALVE POSITION SWITCH
XVPT	VALVE POSITION TRANSMITTER
XVS	VIBRATION SWITCH
XLY	HIGH LIMITERS
XI/XL	RUNNING LIGHT INDICATOR
XPIT	PIG INDICATOR & TRNSMITTER

CU	CONTINUOUS DRAINER
CN	CHOKE NIPPLE
CO	CLEAN OUT
CP	CORROSION PROBE
CSC	CAR SEAL CLOSED
CSO	CAR SEAL OPEN
CTC	CENTRAL TELEMETRY CONTROL
ESD	EMERGENCY SHUTDOWN
DA	DIRECT ACTION
ID	INSIDE DIAMETER
FB	FULL BORE
FC	FAIL CLOSE
FO	FAIL OPEN
FL	FAIL LOCKED
FSD	FIRE SHUTDOWN
HH	HAND HOLE
HY	HYDRANT
LC	LOCK CLOSED
LO	LOCK OPEN
MCC	MOTOR CONTROL CENTRE
MO	MANUALLY OPERATED
MOL	MAIN OIL LINE
MR	MANUAL RESET
MW	MANWAY
BF	MAINTENANCE FLANGE
LCP	LOCAL CONTROL PANEL
LEL	LOWER EXPLOSIVE LIMIT
OD	OUTSIDE DIAMETER
NB	NOMINAL BORE
D/S	DOWN STREAM
U/S	UP STREAM
FCP	FILTER CONTROL PANEL
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
RA	REVERSE ACTING
RB	REDUCED BORE
RM	REMOTE MANIFOLD
RS	REMOTE STATION
S	SAMPLE POINT
SDP	SHUT DOWN PANEL
SP	SPECIAL ITEM
STR	STRAINER (PERMENANT)
S/S	SEAM TO SEAM
SS	SELECTOR SWITCH
TH	THIEF HATCH
TSO	TIGHT SHUT OFF
UC	UTILITY CONNECTION
TYP.	TYPICAL
VF	VENDOR FURNISHED
HEL	HIGHER EXPLOSIVE LIMIT
T/T	TANGENT TO TANGENT
F&G	FIRE & GAS PANEL
OCI	OIL CORROSION INHIBITOR
GCI	GAS CORROSION INHIBITOR
DCS	DISTRIBUTED CONTROL SYSTEM
FBI	FIRE OPTIC INTERFACE BOX

M	MIXER
M	MOTOR
P	PUMP
R	RECEIVER
S	SUMP CASSION & BLOW CASE
T	TANK
V	VESSEL
M/X	MISCELLANEOUS
FM	FLOW METERING
PM	PRODUCTION MANIFOLD
CH	CHLORINATOR
CM	CENTRAL MANIFOLD
IM	INLET MANIFOLD
WH	WELL HEAD
WM	WATER MAKER
OM	OIL MANIFOLD
GLM	GAS LIFT MANIFOLD
WIM	WATER INJECTION MANIFOLD
TG	TURBO GENERATOR
DG	DIESEL GENERATOR
CIM	COMPRESSOR INLET MANIFOLD
COM	COMPRESSOR OUTLET MANIFOLD
GDM	GAS DEHYDRATION OUTLET MANIFOLD
GOM	GAS WELL FLUID OUTLET MANIFOLD
FPM	FREE GAS PRODUCTION MANIFOLD

E	VOLTAGE (EMF)	ELEMENT
F	FLOW	FRACTION (RATIO)
G	GLAZING (DIMENSIONAL)	GLASS-GAUGE
H	HAND INITIATED	-
I	CURRENT (ELECTRICAL)	INDICATOR/INDICATING
J	POWER	SCAN
K	TIME	CONTROL STATION
L	LEVEL	LIGHT(PILOT)/LEVEL/LIMIT
M	MOISTURE OR HUMIDITY	-
N	-	-
O	-	ORIFICE RESTRICTION
P	PRESSURE OR VACUUM	POINT(TEST CONNECTION)
Q	QUANTITY OR UNIT	INTEGRATE/TOTALIZE
R	-	RECORDER
S	SPEED OR FREQUENCY	SWITCH/SAFETY
T	TEMPERATURE	TRANSMITTER
U	-	-
V	VISCOSITY/VACUUM	VALVE
W	WEIGHT OR FORCE /WATER	WELL
X	UNCLASSIFIED	UNCLASSIFIED
Y	-	RELAY
Z	POSITION	DRIVE

LINE LEGEND NO SERIES

PROCESS LINES

P	PROCESS LIQUIDS & VAPOURS	1000-1300
WR	RAW SEA WATER	1500-1600
WI	WATER INJECTION	1800-1900

DRAIN LINES

BD	BLOW DOWN	2701-2800
DH	DRAIN HYDROCARBON	2000-2100 2800-2900
DW	DRAIN WATER FTC.	2251-2300
FL	FLARE	2501-2600
SV	SAFETY VALVE DISCHARGE	2301-2400
VG	VENT GAS	2101-2250

STEAM & CONDENSATE

HB	BOILER FEED WATER	3001-3100
CD	CONDENSATE	3101-320
S	STEAM	3201-3300

UTILITY WATER

WC	COOLING WATER	4101-4200
WF	FIRE WATER	4201-4300
WP	POTABLE WATER	4301-4400
SW	SEWER	4401-4500
WU	UTILITY WATER	4001-4100

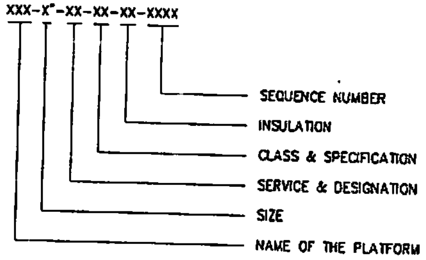
UTILITY GENERAL

AI	AIR INSTRUMENT	5201-5300
AU	AIR UTILITY	5301-5400
GI	GAS INSTRUMENT	5401-5500
GU	GAS UTILITY	5000-5100
AB	AIR BREATHING	5501-5600

UTILITY OILS

LO	LUBE OIL	7001-7100
SO	SEAL OIL	7101-7200

LINE IDENTIFICATION



UTILITY GAS & FUEL

BG	BLANKET GAS	6301-6400
DF	DIESEL FUEL	6101-6200
FG	FUEL GAS	6201-6300
N	NITROGEN	6001-6100
PI	PILOT IGNITION	6401-6500

CHEMICALS

C	CHEMICAL	8001-8100
GL	GLYCOL	8101-8200
SH	SODIUM HYPOCHLORITE	8201-8300

OTHERS

PL	SUB-SEA PIPE LINES	9001-9100
T	THERMAL	9101-9200
EX	TURBINE EXHAUST	9201-9300

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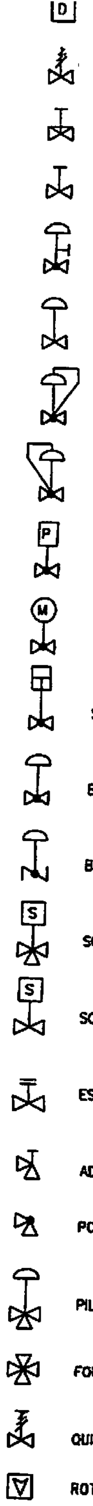
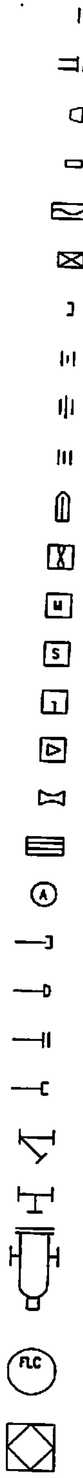
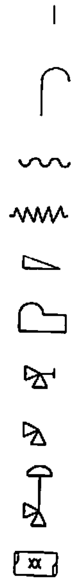


DOUBLE BLOCK AND BLEED
SPRING LOADED VALVE
DIAPHRAGM VALVE
HAND OPERATED VALVE
CONTROL VALVE WITH HAND WHEEL
CONTROL VALVE
SELF ACTUATED PCV (DOWN STREAM)
SELF ACTUATED PCV (UP STREAM)
PISTON OPERATED VALVE
MOTOR OPERATED VALVE
SHUT DOWN VALVE
BALL CONTROL VALVE
BUTTERFLY CONTROL VALVE
SOLENOID VALVE (3 WAY)
SOLENOID VALVE (2 WAY)
ESD/FSD PUSH BUTTON VALVE
ADJUSTABLE CHOKE VALVE
POSITIVE CHOKE VALVE
PILOT VALVE (XPV)
FOUR WAY VALVE
QUICK EXHAUST VALVE
ROTAMETER

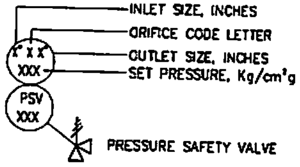


FLANGE ON LINE
FLANGE ON VESSEL
REDUCER / EXPANDER
BLEED RING
DIAPHRAGM SEAL
FLAME ARRESTER
ADAPTER (TUBING PIPE)
INSULATION JOINT
UNION
RESTRICTION ORIFICE / FLOW ELEMENT ORIFICE
SENIOR ORIFICE
TURBINE METER
ELECTRIC MOTOR
SONIC METER
PILOT TUBE
VORTEX FLOW METER
VENTURI METER
STRAIGHTENING VANE
ANALYSER
CAP (THREADED)
CAP (WELDED)
BLIND FLANGE
HOSE CONNECTION
Y-TYPE STRAINER
T-TYPE STRAINER
BASKET TYPE STRAINER
FLOW COMPUTER
PROGRAMMABLE LOGIC CONTROL MOUNTED IN MAIN CONTROL ROOM

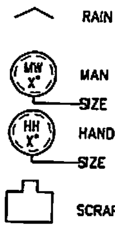


(WITH LIQUID SEAL)
VENT (HOOK TYPE)
FLEXIBLE HOSE
EXPANSION JOINT
SLOPE (DOWN WARD)
CONTINUOUS DRAIN
ANGLE CHOKE VALVE
ANGLE VALVE
ANGLE CONTROL VALVE
INSULATION

IH – INSULATION HOT
IC – INSULATION COLD
IS – INSULATION SAFETY
IA – INSULATION ACOUSTIC
IT – STEAM TRACING
IE – ELECTRICAL TRACING
IF – THERMAL FLUID TRACING



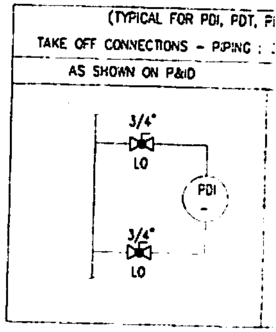
PRESSURE SAFETY VALVE



RAIN CAP
MAN WAY
SIZE
HAND HOLE
SIZE
SCRAPPER TEE / SPHERE TEE/BARREL TEE

LO/LC	NORMALLY LOCK OPEN INTERCHANGABLE TO LC
LC/LO	NORMALLY LOCK CLOSE INTERCHANGABLE TO LO
NO	NORMALY OPEN
NC	NORMALY CLOSED

11.2



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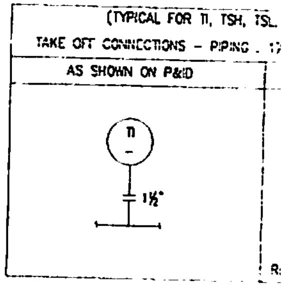

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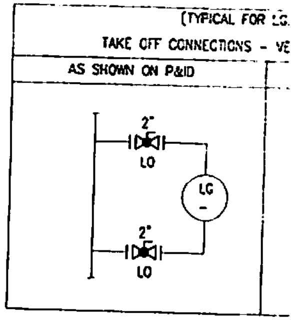

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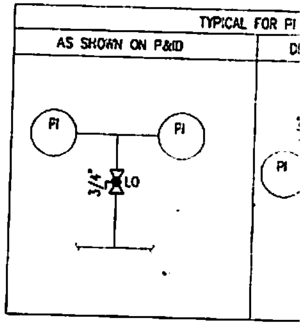

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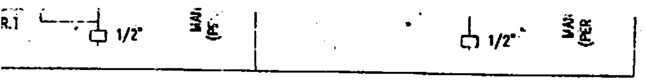
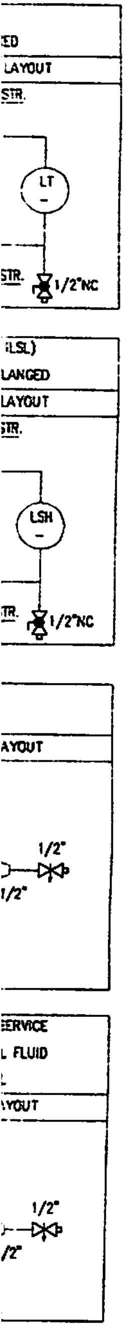
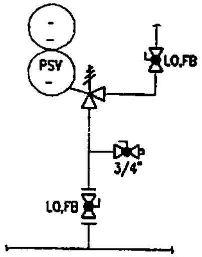




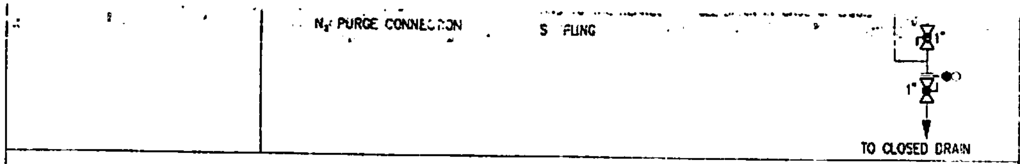
14. TEST CONNECTION NOT SHOWN ON P&IDS SHALL BE PROVIDE FOR ALL SAFETY VALVES IN HC SERVICE AS PER FOLLOWING DETAILS



THE DETAIL SHOWN IS ALSO APPLICABLE FOR NON HC SERVICE WHERE PSV SIZE IS 3" AND ABOVE FOR PSV'S OF SMALLER SIZE DECISION SHALL BE TAKEN ON CASE TO CASE BASIS D/S ISOLATION VALVES FOR PSV DISCHARGING TO ATM / OVERBOARD SHALL NOT BE PROVIDED.

15. ALL EQUIPMENT AND INSTRUMENTS SHALL BE SUITABLE FOR CORROSIVE, SALT LADEN MARINE ENVIRONMENT WITH 100% HUMIDITY & OCCASIONAL PRESENCE OF H_2S & CO_2
16. SOUR SERVICE LEVEL INSTRUMENT VENT & DRAIN CONNECTIONS SHALL BE CONNECTED TO VENT HEADER & CLOSED DRAIN HEADER RESPECTIVELY.
17. ALL SAFETY VALVES DISCHARGE LINES SHALL JOIN THE RELIEF HEADER FROM TOP & SHALL BE AT AN ANGLE OF 30° TO 45° WITH THE AXIS OF THE HEADER.
18. ACOUSTIC INSULATION SHALL BE PROVIDED WHEREVER REQUIRED.
19. 5° SLOP SHALL BE PROVIDED FOR BARRELS OF ALL RECEIVERS TOWARDS THE HINGED CLOSURE AND FOR BARRELS OF ALL LAUNCHERS TOWARDS THE RECEIVER.
20. PIG FINGERS SHALL BE PROVIDED FOR ALL VERTICAL WATER INJECTION LAUNCHERS.
21. SEAL SYSTEMS SHALL BE USED TO ISOLATE INSTRUMENT FROM THE PROCESS FLUIDS ENCOUNTERED IN THE FOLLOWING SERVICES:-
    - (A) WET GAS. WHICH MAY CONDENSE IN THE INSTRUMENT LINES.
    - (B) PROCESS FLUIDS THAT VAPORIZE, CONDENSE OR SOLIDIFY UNDER OPERATING PRESSURE & AMBIENT TEMPERATURE.
    - (C) PROCESS FLUIDS THAT WILL SUBJECT THE ELEMENT TO HIGH TEMPERATURE.
    - (D) CORROSIVE PROCESS CONDITIONS.
    - (E) VISCOUS LIQUIDS.

    SEALING MAY BE ACCOMPLISHED WITH DIAPHRAGM SEALS.
22. CORROSION COUPON/BIOPROBE INSTALLATION POINTS SHALL BE ACCESSIBLE AND BE LOCATED TO PROVIDE ACCESS FOR PROBE INSERTION AND RETRIEVAL TOOLS.
23. ALL TAPPINGS ON HYDROCARBON & UTILITY LINES FOR FUTURE / SPARE CONNECTION SHALL BE PROVIDED WITH A BALL VALVE (LC/LO) AND BLIND CONVENIENT LOCATION. THESE SHALL BE ACCESSIBLE FROM A CONVENIENT LOCATION.
24. ALL INSTRUMENT, TUBING,CABLING FOR FACILITIES MARKED AS FUTURE SHALL BE PROVIDED BY CONTRACTOR IN LOCAL CONTROL PANEL, DCS,CCP AND SHUTDOWN PANEL ON THE DECK. ALL TUBINGS/ELEC. CABLES FOR FUTURE FACILITIES SHALL BE SUPPLIED AND LAID. THESE SHALL BE TERMINATED ON BULK HEAD PLATES/JN. BOXES PROVIDED NEAR SPACE MARKED FOR FUTURE FACILITIES.
25. ALL INJECTION AND TRANSFER PUMPS SHALL HAVE ADQUATE SPACE FOR MAINTENENCE AND REMOVAL OF SUCTION AND DISCHARGE VALVES. SUCTION & DISCHARGE LINES SHALL HAVE FLANGE /UNION CONNECTIONS CLOSE TO PUMP FOR EASY DISMANTLING.
26. ALL OPEN DECK DRAINS SHALL BE SEAL WELDED.
27. VENT HEADERS SHALL HAVE 1:100 SLOPE.
28. THE DISTRIBUTION / ROUTING OF ALL UTILITY SYSTEM,VENT AND CLOSED DRAIN SHALL BE DONE AS PER APPROVED LAYOUT.



FOR LOCATION WHERE SAMPLING POINTS ARE PROVIDED AND NO NEARBY EQUIPMENT IS AVAILABLE THE ARRANGEMENT SHALL BE SIMILAR EXCEPT THAT OUTLET SHALL BE DIRECTLY CONNECTED TO VENT/CLOSED DRAIN AS THE CASE MAY BE WITH AN ADDITIONAL ISOLATION BALL VALVE AND SPECTACLE BLIND.

30. ISOLATION VALVE PROVIDED UPSTREAM OF DOUBLE PSVS SHALL HAVE BOTH LOCK OPEN AND LOCK CLOSE PROVISIONS.
31. ALL VENT AND CLOSED DRAIN LINES SHALL HAVE A COMBINATION OF A BALL VALVE, SPECTACLE BLIND AND A GLOBE VALVE AT EACH POINT. BOTH VALVES SHALL BE OF HIGHER RATING.
32. DRAIN CONNECTIONS SHALL BE PROVIDED WITH BLINDS WHERE SPECTACLE BLINDS ARE REQUIRED TO BE REVERSED. IT DOES NOT APPLY TO SPECTACLE BLIND FLANGED DIRECTLY TO A VALVE.
33. DETAILS SHOWN WITH IN PACKAGE LIMITS ARE TYPICAL ONLY. THE VENDOR'S SUPPLY SHALL INCLUDE BUT NOT BE LIMITED TO THE DETAILS SHOWN, INCLUDING THE REQUIREMENTS OF PACKAGE SPECIFICATIONS. VENDOR SHALL SUPPLEMENT THESE TO MEET THE TOTAL REQUIREMENTS OF THE PACKAGE.
34. ALL SAMPLE POINTS SHALL BE CONVENIENTLY ACCESSIBLE AND LOCATED IN HORIZONTAL LINE EXCEPT WELL FLUID SAMPLES. ONLY WHEN FOUND DIFFICULT SAMPLE POINTS MAY BE LOCATED IN VERTICAL LINES WITH ONGC'S APPROVAL.
35. FOR ALL INSTRUMENTS SHUT DOWN PARAMETERS SHALL BE DEPICTED BY ◇1 IN THE RESPECTIVE P&IDS.
36. THE SLOPE OF LINES (WITH VALUE OF SLOPE) AS REQUIRED SHALL BE INDICATED IN THE P&ID'S.
37. FOR ALL THE CONTROL VALVES , RESPECTIVE INDICATION (PRESSURE,TEMPERATURE,FLOW ETC) SHALL BE VISIBLE FROM THE BYPASS VALVE OF THE CONTROL VALVE.
38. NECCESSARY PURGE AND VENT CONNECTIONS FOR START-UP/ COMMISSIONING SHALL BE PROVIDED AS PER P&ID'S.
39. BLEED VALVE (3/4" SIZE) FOR CONTROL VALVES SHALL BE PROVIDED AS FOLLOWINGS:
    - A. BOTH U/S AND D/S FOR FAIL CLOSED VALVES.
    - B. AT EITHER U/S OR D/S FOR FAIL OPEN VALVES. THESE SHALL BE INDICATED ON P&ID'S.
40. VENT AND DRAIN HEADERS SHALL RUN THROUGH OUT OF THE PLATFORM. VARIOUS VENT/DRAIN LINES SHALL BE ROUTED AS PER LAYOUT.
41. MONEL (INSTEAD OF CU,NI) SHALL BE USED FOR SEA WATER SERVICE AT LOCATIONS SUCH AS BENDS, DOWNSTREAM OF CONTROL VALVES ETC. IN ADDITION TO THIS, MONEL SHALL BE USED WHEREVER POSSIBILITY OF FLOW VELOCITY EXCEEDING 3.3 m/sec FOR 3"NB AND ABOVE AND 1.8 m/sec FOR 2"NB AND BELOW, AND FOR PIPES THAT ARE EXISITING IN LOCATIONS PRONE TO IMPINGEMENT OF FLOW STREAMS ON PIPES/FITTINGS.
42. DOUBLE VALVES WITH A SPECTACLE BLIND IN BETWEEN SHALL BE PROVIDED FOR DRAINING, VENTING AND DEPRESSURISATION OF EQUIPMENT IF OPERTAING PRESSURE EXCEEDS 100 PSIG AND ON LOWER PRESSURE IF SPECIFICALLY SHOWN. THE UPSTREAM VALVE SHALL BE OF BALL VALVE AND D/S VALVE GLOBE VALVE. BOTH VALVES SHALL BE HIGHER RATING.
43. ALL XPV 'S SHALL BE FIELD MANUAL RESET TYPE UNLESS SPECIFIED OTHERWISE. ALL XSV'S (EXCEPT THOSE WHICH ARE AUTO-RESET TYPE) SHALL BE CONTROL ROOM PUSH BUTTON RESET TYPE, ALL XSV'S SHALL BE MOUNTED ON THE SHUTDOWN PANEL.
44. ALL MODIFICATIONS AND INSTALLATION OF NEW EQUIPMENTS VIZ, MANIFOLDS, LAUNCHERS, RECEIVERS, PUMPS ETC. SHALL BE DONE SUCH THAT THEY DO NOT BLOCK ANY EMERGENCY ESCAPE ROUTES OR WALKWAYS.
45. PROVISION OF OPEN DECK DRAINS (ODD) OPEN HYDROCARBON DRAIN(OHD) CLOSED DRAINS,VENT HEADERS ETC. AND THEIR INTEGRATION WITH EXISTING SYSTEM AS NECESSARY FOR DECK EXTENSION AREAS AND WHERE NEW EQUIPMENT IS INSTALLED, SHALL BE AS PER P&ID TIE-IN DETAILS.
46. COMPLETE INSULATION WORK (ACOUSTIC /HOT/PERSONNEL PROTECTION ETC.) AND ELECTRICAL HEAT TRACING OF NEW / MODIFIED / OTHER AFFECTED PIPING / EQUIPMENT (AS APPLICABLE) SHALL BE AS PER DETAILS PROVIDED IN P&ID'S.
47. FOR INSTALLATION / MODIFICATION WORK, IT MAY BE NECESSARY TO DISMANTLE / REMOVE / CUT CONNECTED PIPING / INSTRUMENT CABLING / WIRING / EQUIPMENT ETC. THE SAME CONTRACTOR'S FIRM SCOPE OF WORK. PIPING/FITTING/FLANGES/BLINDS/GASKET/VALVES/THERMOWELLS/CABLING /WIRING/TUBING ETC. NECESSARY FOR RE-HOOKING OR RESTORATION OF WORK SHALL ALSO BE CONTRACTOR'S SCOPE.
48. INSTRUMENT ABBREVIATIONS/LINE DESIGNATIONS / EQUIPMENT PREFIXES / PIPING SYMBOLS ETC. SHOWN HERE HAVE BEEN FOLLWED FOR NEW / MODIFIED PIPING / INSTRUMENT / EQUIPMENT IN THE ENCLOSED P&ID'S. EXISTING PIPING/INSTRUMENTS/EQUIPMENT NOMENCLATURE AND SYMBOLS COULD BE DIFFERENT FROM THOSE ADOPTED FOR NEW ITEMS. CONTRACTOR SHALL VERIFY FOR EACH PLATFORM. NOMENCLATURES/SYMBOLS USED FOR EXISTING PIPING/INSTRUMENT/EQUIPMENT ETC. AND ADOPT THE SAME.
49. ALL SAFETY VALVES DISCHARGES SHALL BE INDIVIDUALLY ROUTED TO A SAFE LOCATION, UNLESS SPECEFIED OTHERWISE.
50. PIPING SHALL BE PROVIDED WITH INSULATION FOR PERSONNEL PROTECTION BY CONTRACTOR AS PER THE GENERAL STANDARDS.
51. ALL SAMPLE CONNECTION IN WELL FLUID SERVICE SHALL BE EXTENDED UPTO CENTER TO THE CROSS SECTION OF PI SO AS TO FACILITATE CONNECTION OF REPRESENTATIVE SAMPLE.
52. ALL LAUNCHERS SHALL BE PROVIDED WITH 2" BALANCED LINE.
53 ALL CONTROL VALVES IN HC AND INJECTION WATER SERVICE WHEREVER INDICATED IN P&ID'S SHALL HAVE HAND WHEEL PROVISION FOR MANUAL OPERATION.
54. ALL INSRUMENTS RELATED PARAMETERS AS MENTIONED IN RESPECTIVE P&ID SHALL BE TERMINATED UP TO TIC/MARSHALLING RACK FOR REMOTE MONITORING AND OPERATION AT PROCESS CONTROL ROOM DCS/CCP/RTU.SUPPLY AND INSTALLATION OF NECESSARY HOOK UP MATERIAL AND ASSOCIATED ACCESSORIES SHALL BE IN CONTRACTOR'S SCOPE.

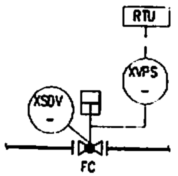
PROVIDED. THESE SHALL BE SUITAB

61. IN MODIFICATIOIN WORKS WHEREVER EX
    SAME ALONG WITH THE ASSOCIATED P
    SHUT DOWN SYSTEM, SUPPORTS ETC
    IN THE BID DOCUMENT. UNLESS SPEC
    AT CRITICAL POINTS WHEREVER REQUIR
62. ALL VALVES REQUIRING PRESSURE BAL
    IF SUCH FACILITIES NOT AVAILABLE EX
    PROVIDED BY THE CONTRACTOR.
63. VALVE TAG NUMBERS SHALL BE INDICA
64. ALL TRANSMITTERS, (PRESSURE, TEMP,
    LOCAL INDICATION
65. SAMPLING POINT SHALL BE TAKEN US
66. CONTRACTOR SHALL ENSURE MAINTAIN
    EXTENT FEASIBLE.
67. THERMOWELL FLANGES SHALL BE RATE
    (APPLICABLE FOR ALL P&ID'S)
68. CONTRACTOR SHALL ENSURE PROVISION
    IN HIGH PRESSURE SERVICE (INCLUDING
69. SOURCE TO VARIOUS DRAIN HEADERS
    - A. OPEN DECK DRAINS:-
      DECK DRAINS, SKID DRAIN (RAIN WAT
      EQUIPMENT SYSTEMS
    - B. CLOSED DRAIN HEADERS:-
      SAFETY VALVES DISCHARGE, DRAINS
      PRODUCTION MANIFOLD, LAUNCHER/RE
    - C. OPEN HYDROCARBON DRAIN HEADERS:
      DRAINS FROM HYDROCARBON HANDLIN

70.

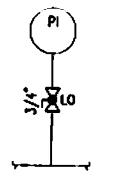
SHUTDOWN

AS SHOWN ON P&ID



71.

AS SHOWN ON P&ID



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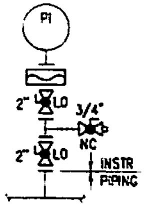
LAYOUT



A2	GL,T	150
B2	GL,T	300
D2	GL,T	600
E2	GL,T	900
A3	AI, AU	150
B3	AU	300
A4	WC	150
A5	WF,WU,WR,DW	150
A6	EX	150
A7	SH	150
A8	WF,WU,SW	150
A15	P,SV,CD,GI	150
B15	P,SV,CD,GI	300
D15	P,SV,CD,GI	600
D23	P,SV,CD,GI	600
E15	P,SV,CD,GI	900
F15	P,SV,CD,GI,C	1500
PE11	PL	900
F2	GL	1500
A13	WP	150
A1H	FL	150
A10	P,SV,CD,FG,BD	150
B10	P,SV,FG,BD,CD	300
A9	LO,SO,AI,C,WP	150
B9	LO,SO	300
D9	LO, SO	600
E9	LO, SO	900
PA1	PL	150
PB1	PL	300
PD1	PL	600
PXE1N	PL	900
PXE1	PL	900
PE1	PL	900
PXF1	PL	1500
PXF1N	PL	1500
PF1	PL	1500
PF1N	FL	1500
XG1	C,P	API-5000
PF15	P,SV,CD,GI,C	1500
A10	P,FG,DW,DH,BD	150
B10	P,FG,DW,DH,ED	300
D10	P,FG,DW,DH,ED	600
E10	P,FG,DW,DH,ED	900
F10	P,FG,DW,DH,ED	1500
A1N	P,DW,BD,DH,FG,CD,SV,GI,GU	150
B1N	P,DW,BD,DH,FG,CD,GU	300
D1N	P,DW,BD,DH,FG,CD,GU	600
E1N	P,DW,BD,DH,FG,CD,GU	900
F1N	P,DW,BD,DH,FG,CD,GU	1500
PXEG	PL	2500
B11	P,DW,DH,CD	300
D11	P,DW,DH,CD	600
E11	P,DW,DH,CD	900
F11	P,DW,DH,CD	1500
A3S	DW,WF,WU	150

CLIENT:

A — PIPING AND INSTRUMENTATION DIAG

CLIENT:

FLOW ARMS (SHEET 2 OF 2)	01 FEB 11							
ON MANIFOLD	01 FEB 11							
DISPOSAL SYSTEM	01 FEB 11							
RAGE AND POTABLE WATER SYSTEM	01 FEB 11							
LAUNCHER	01 FEB 11							
T AND UTILITY AIR COMPRESSOR PACKAGE	01 FEB 11							
T AIR DRYER PACKAGE	01 FEB 11							
T AND UTILITY AIR RECEIVER	01 FEB 11							
- SHUTDOWN PANEL	01 FEB 11							
OP &FIRE STATIONS	01 FEB 11							
/RECEIVERS (FUTURE)	01 FEB 11							

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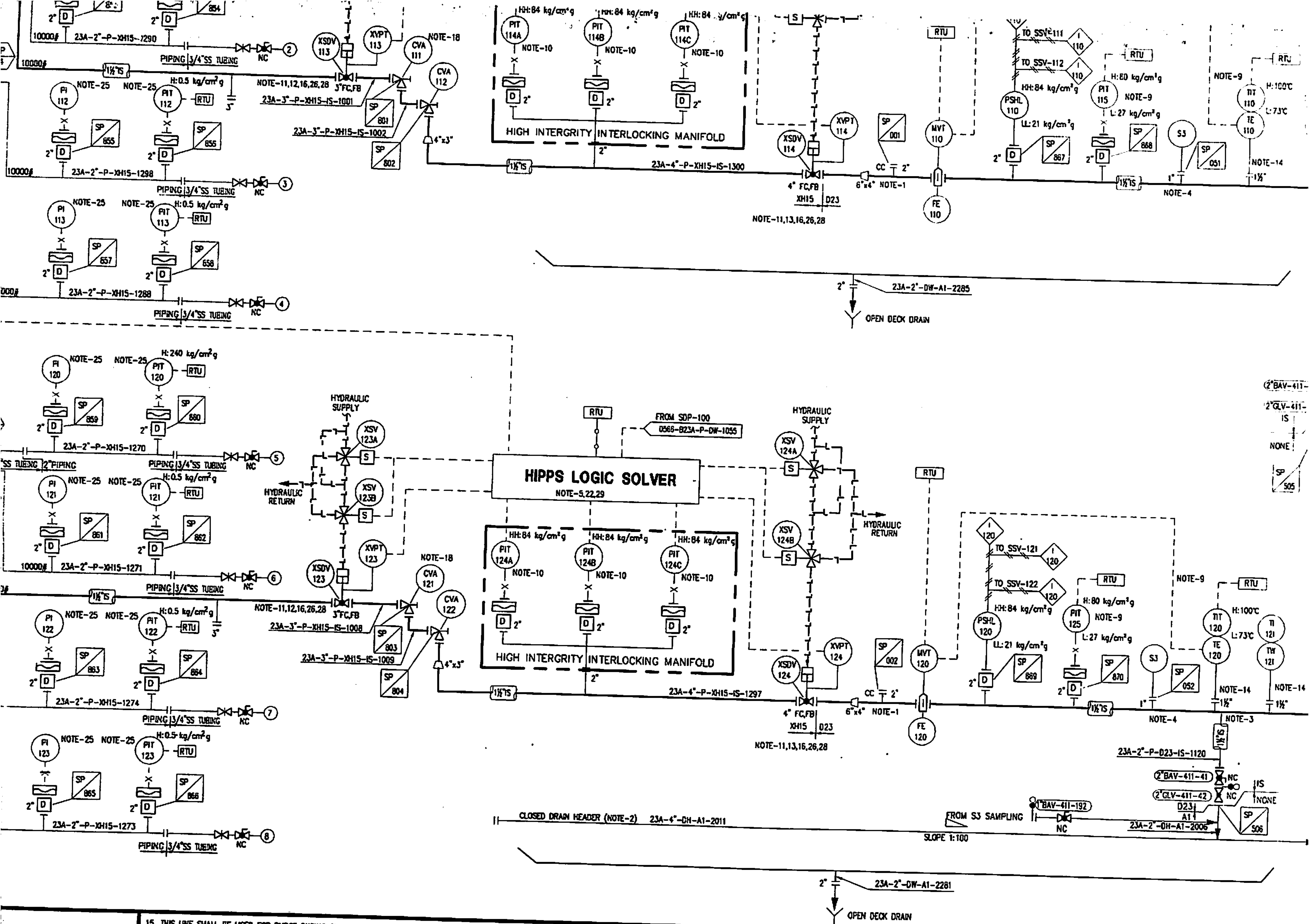
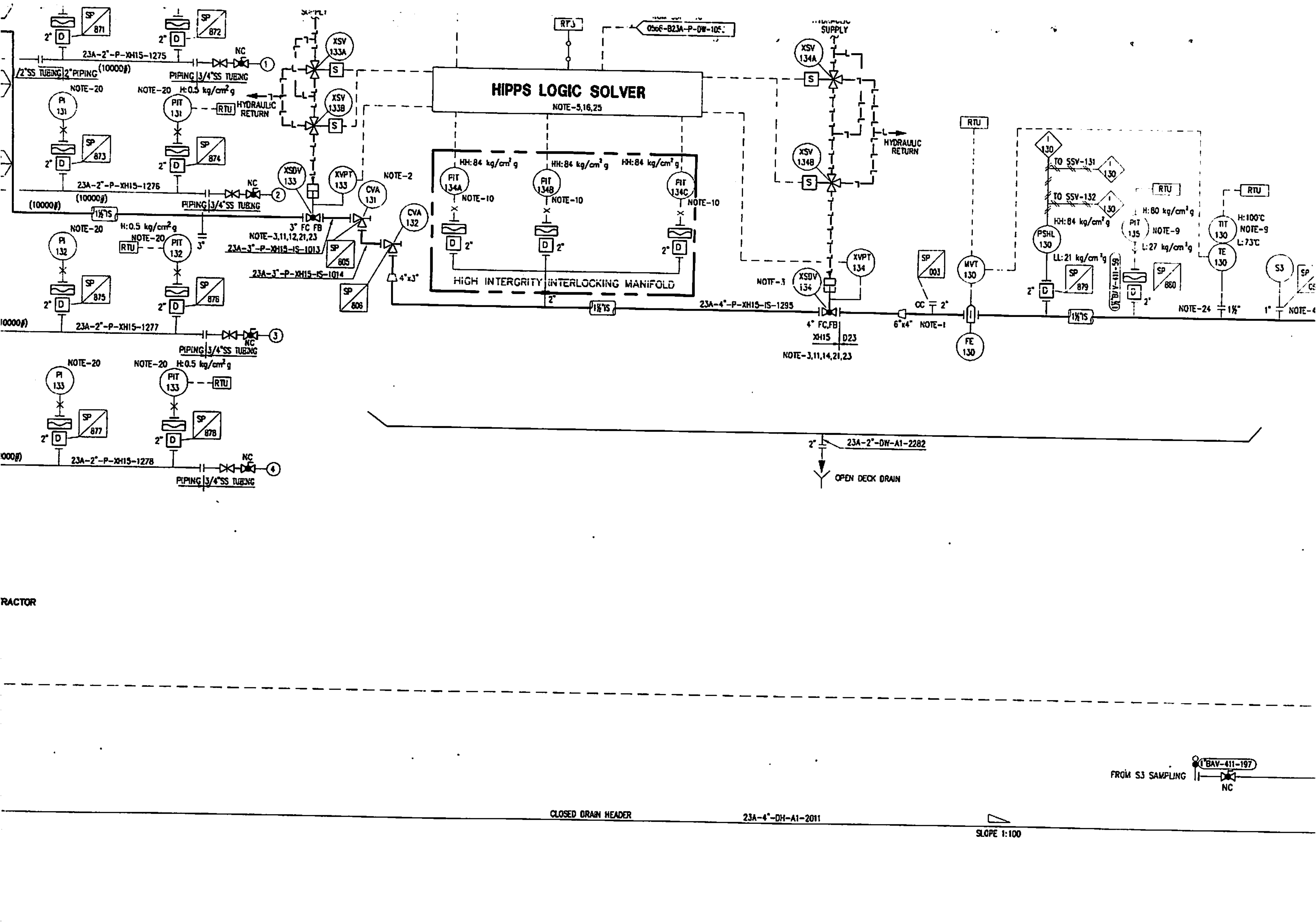


ACCESS SHALL BE PROVIDED FOR

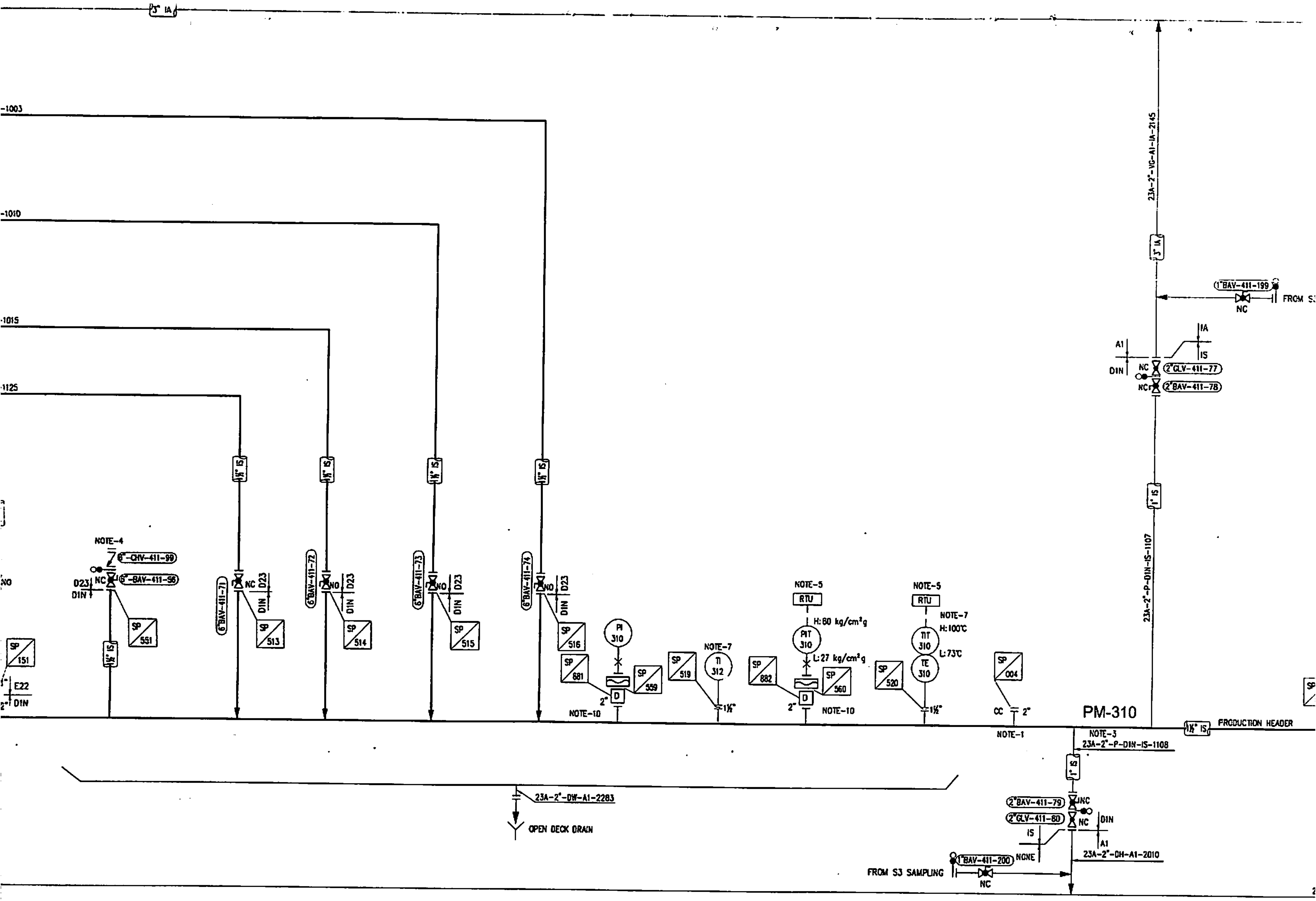
15. THIS LINE SHALL BE USED FOR PURGE DURING CHOKE CHANGING OPERATION.
16. STATUS OF HIPPS VALVE SHALL BE MONITORED THROUGH RTU

CLIENT:



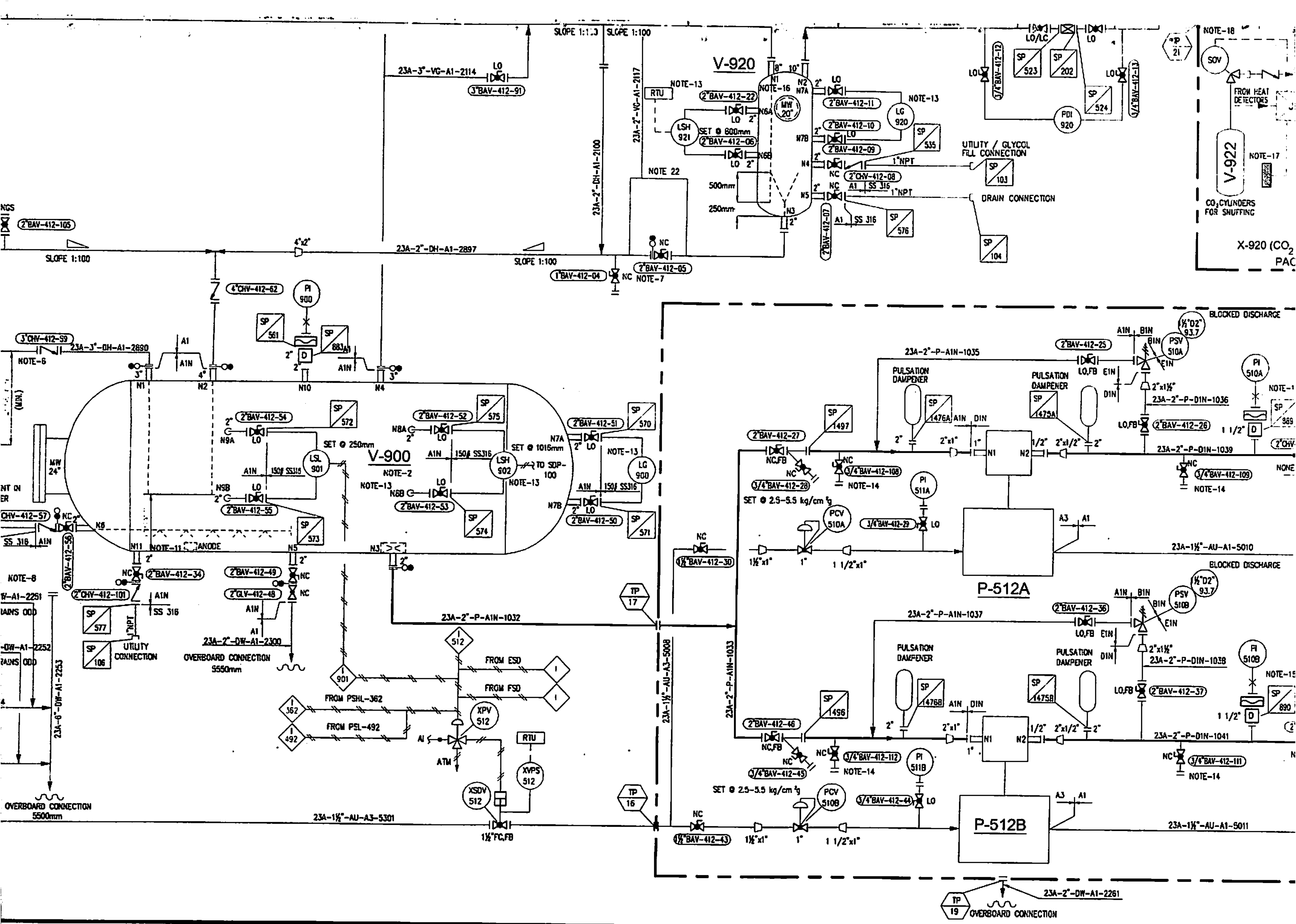
13. THIS LINE SHALL BE USED FOR PURGE DURING CHOKE CHANGING OPERATION.

CLIENT:



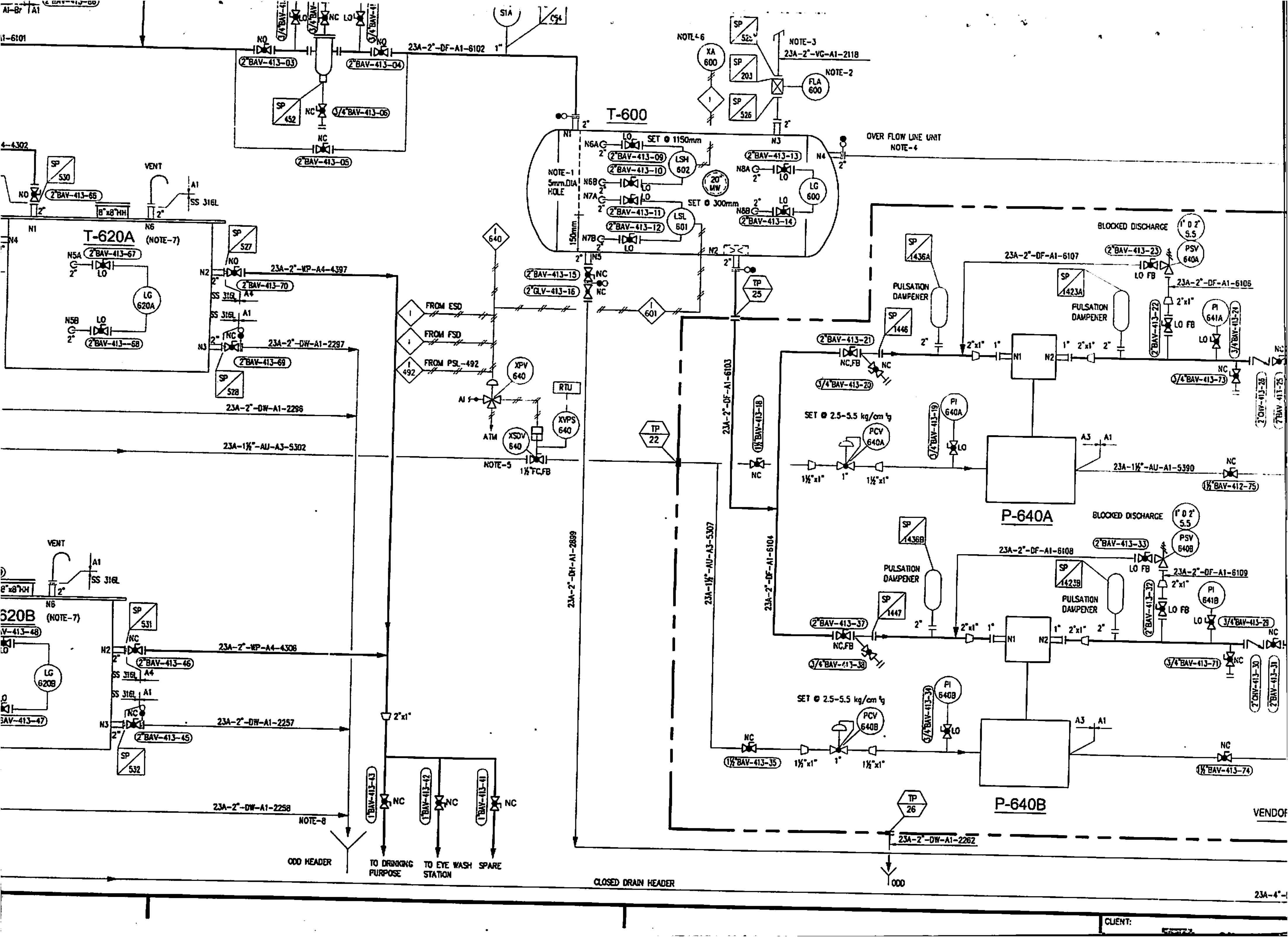
10. DBB FLANGES SHALL BE RATED ONE PIPING CLASS HIGHER THAN THE PIPE TO WHICH IT IS CONNECTED. WHEREVER NECESSARY

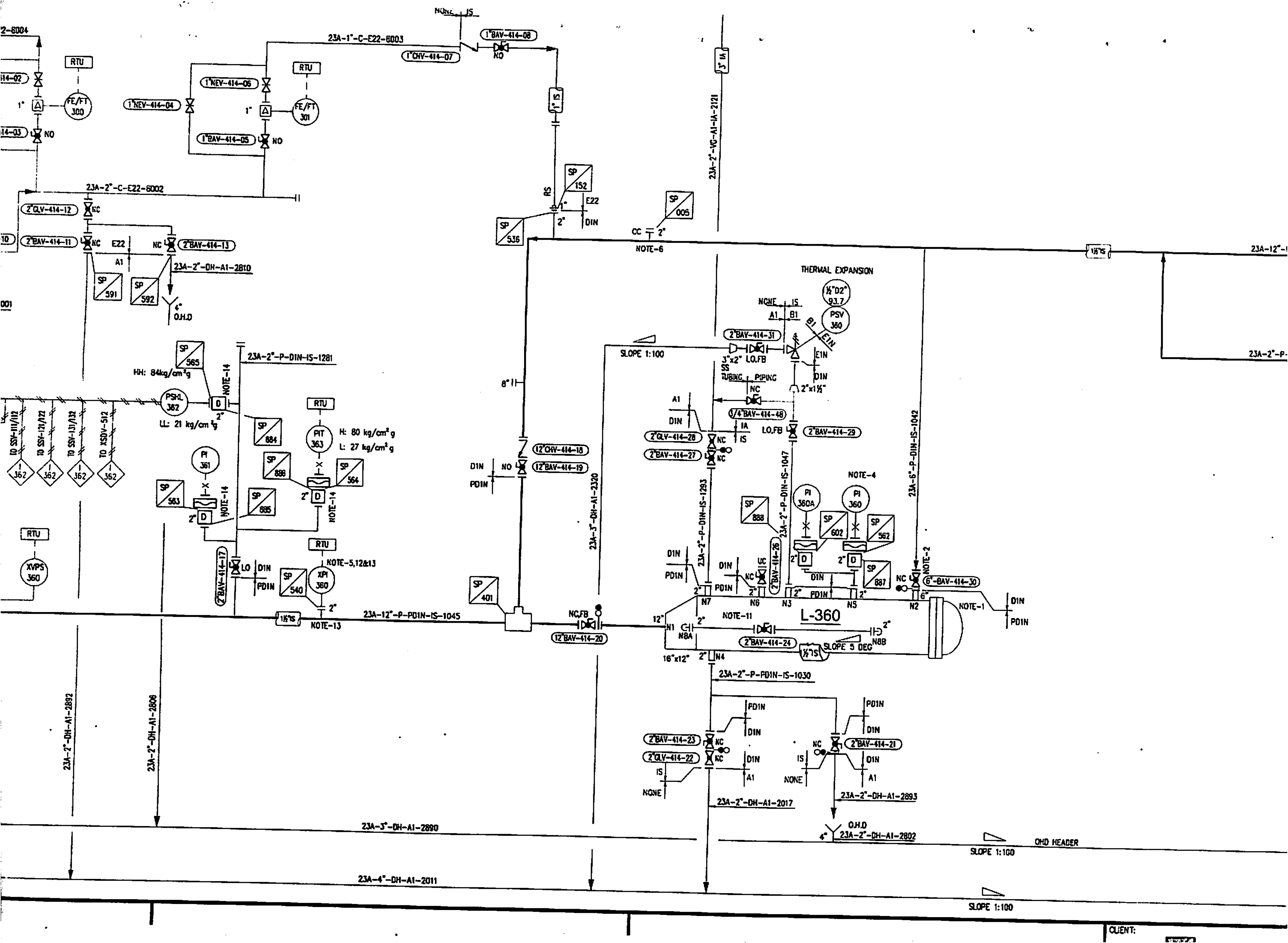
CLIENT:

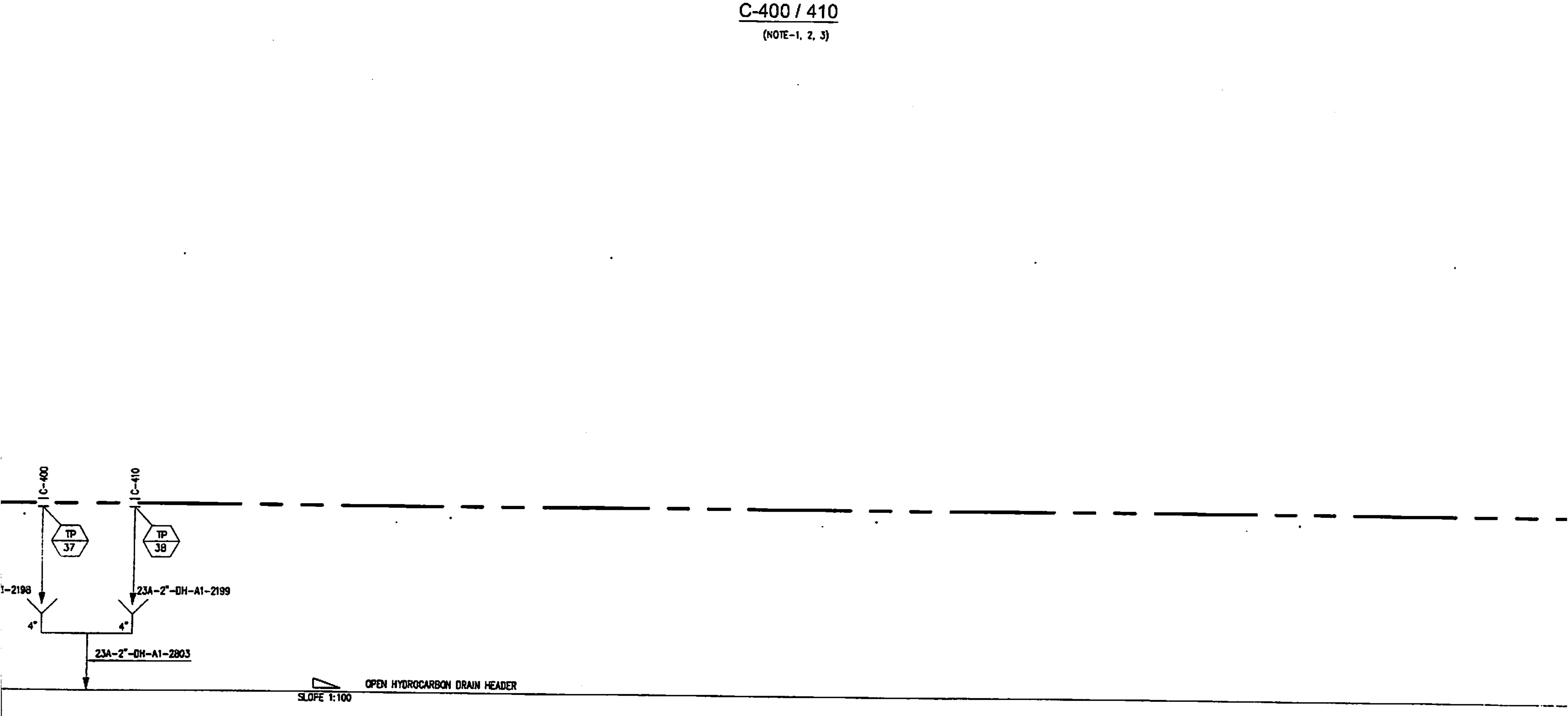


13. VENTS AND DRAINS OF LEVEL INSTRUMENTS ON CRUDE CONDENSATE DRUM SHALL BE CONNECTED TO VENT HEADER AND

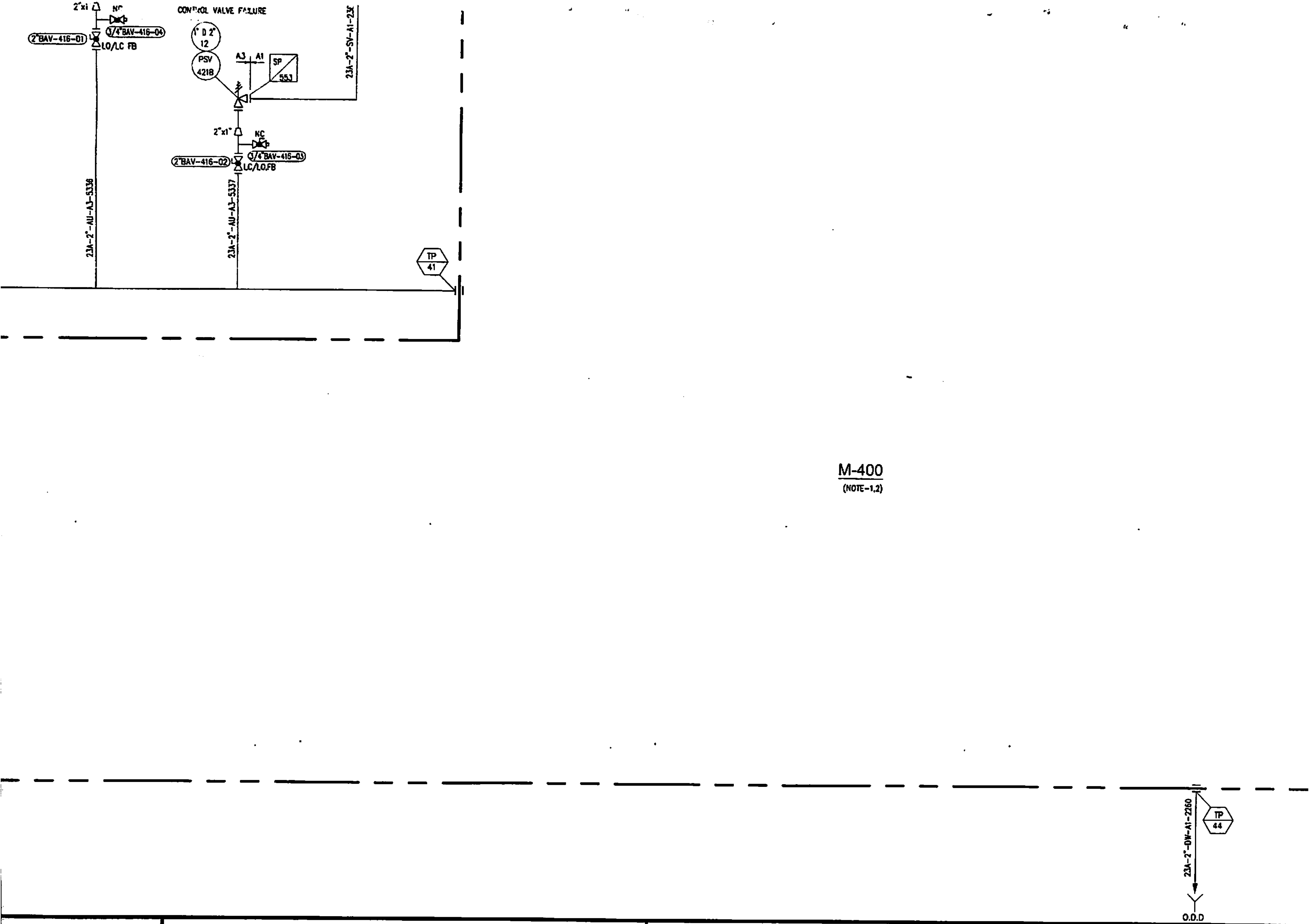
CLIENT:


T-600
T-620A
620B
P-640A
P-640B
23A-2"-DF-A1-6102
2"BAV-413-03
2"BAV-413-04
2"BAV-413-05
3/4"BAV-413-06
SP 452
S1A
CS4
NOTE-6
XA 600
SP 525
SP 203
SP 526
NOTE-3
23A-2"-VG-A1-2118
NOTE-2
FLA 600
N1
N3
N4
OVER FLOW LINE UNIT
NOTE-4
NOTE-1
5mm.DIA HOLE
150mm
N6A
N6B
N7A
N7B
N8A
N8B
2"BAV-413-09
2"BAV-413-10
2"BAV-413-11
2"BAV-413-12
2"BAV-413-13
2"BAV-413-14
SET @ 1150mm
SET @ 300mm
LSH 602
LSL 601
LG 600
20" MW
N2
N5
2"BAV-413-15
2"GLV-413-16
TP 25
I 601
I 640
FROM ESD
FROM FSD
FROM PSL-492
I 492
XPV 640
RTU
XVPS 640
XSDV 640
NOTE-5
1½"FC,FB
ATM
TP 22
23A-2"-DF-A1-6103
1½"BAV-413-18
23A-1½"-AU-A3-5307
23A-2"-DF-A1-6104
23A-2"-DW-A1-2899
BLOCKED DISCHARGE
1" D 2" 5.5
PSV 640A
2"BAV-413-23
23A-2"-DF-A1-6107
23A-2"-DF-A1-6106
SP 1436A
SP 1423A
PULSATION DAMPENER
2"BAV-413-21
NC,FB
SP 1446
3/4"BAV-413-20
2"BAV-413-22
PI 641A
3/4"BAV-413-24
3/4"BAV-413-73
2"DW-413-26
2"BAV-413-25
PI 640A
3/4"BAV-413-19
SET @ 2.5-5.5 kg/cm²g
PCV 640A
1½"x1"
A3
A1
23A-1½"-AU-A1-5390
1½"BAV-412-75
PSV 640B
2"BAV-413-33
23A-2"-DF-A1-6108
23A-2"-DF-A1-6109
SP 1436B
SP 1423B
SP 1447
2"BAV-413-37
3/4"BAV-413-38
2"BAV-413-32
PI 641B
3/4"BAV-413-29
3/4"BAV-413-71
2"DW-413-30
2"BAV-413-31
PI 640B
3/4"BAV-413-34
PCV 640B
1½"BAV-413-35
1½"BAV-413-74
TP 26
23A-2"-DW-A1-2262
VENDOR
ODD
CLOSED DRAIN HEADER
23A-4"-
CLIENT:
A1-6101
4-4302
SP 530
2"BAV-413-65
8"x8"HH
VENT
SS 316L
N6
NOTE-7
N5A
N5B
2"BAV-413-67
2"BAV-413-68
LG 620A
SP 527
23A-2"-WP-A4-4397
2"BAV-413-70
23A-2"-DW-A1-2297
2"BAV-413-69
SP 528
23A-2"-DW-A1-2296
23A-1½"-AU-A3-5302
V-413-48
LG 620B
AV-413-47
SP 531
23A-2"-WP-A4-4306
2"BAV-413-46
23A-2"-DW-A1-2257
2"BAV-413-45
SP 532
23A-2"-DW-A1-2258
NOTE-8
2"x1"
1"BAV-413-43
1"BAV-413-42
1"BAV-413-41
ODD HEADER
TO DRINKING PURPOSE
TO EYE WASH STATION
SPARE
NO
NC
LO
LO FB


2-6004
RTU
FE/FT 300
FE/FT 301
1"NEV-414-06
1"NEV-414-04
1"BAV-414-05
NO
23A-1"-C-E22-6003
1"CHV-414-07
1"BAV-414-08
NONE IS
1" IS
3" IA
23A-2"-VG-A1-IA-2121
23A-2"-C-E22-6002
2"GLV-414-12
2"BAV-414-11
2"BAV-414-13
NC
E22
A1
23A-2"-DH-A1-2810
SP 591
SP 592
4" O.H.D
SP 152
RS
E22
DIN
SP 536
SP 005
CC
NOTE-6
1½"IS
23A-12"-
THERMAL EXPANSION
½"D2" 93.7
PSV 360
NONE IS
A1 B1
2"BAV-414-31
3"x2" SS
LO.FB
E1N
TUBING PIPING
2"x1½"
3/4"BAV-414-48
2"BAV-414-29
SLOPE 1:100
23A-2"-P-
SP 565
HH: 84kg/cm²g
LL: 21 kg/cm²g
PSHL 362
NOTE-14
23A-2"-P-DIN-IS-1281
TO SSV-111/112
TO SSV-121/122
TO SSV-131/132
TO XSDV-512
362
SP 884
RTU
PIT 363
H: 80 kg/cm²g
L: 27 kg/cm²g
SP 886
SP 564
PI 361
SP 563
SP 885
8"
12"CHV-414-18
12"BAV-414-19
DIN
PDIN
23A-3"-DH-A1-2320
2"GLV-414-28
2"BAV-414-27
23A-2"-P-DIN-IS-1293
23A-2"-P-DIN-IS-1047
23A-6"-P-DIN-IS-1042
IA IS
NOTE-4
PI 360A
PI 360
SP 888
SP 602
SP 562
SP 887
2"BAV-414-26
6"-BAV-414-30
NOTE-2
NOTE-1
RTU
XVPS 360
2"BAV-414-17
LO
RTU
XPI 360
NOTE-5,12&13
SP 540
SP 401
1½"IS
NOTE-13
23A-12"-P-PDIN-IS-1045
NC,FB
12"BAV-414-20
N7 N6 N3 N5 N2
N1 N8A N8B N4
L-360
NOTE-11
12"
16"x12"
2"BAV-414-24
½"IS
SLOPE 5 DEG
23A-2"-P-PDIN-IS-1030
2"BAV-414-23
2"GLV-414-22
2"BAV-414-21
FDIN
IS
NONE
23A-2"-DH-A1-2017
23A-2"-DH-A1-2893
O.H.D
23A-2"-DH-A1-2802
OHD HEADER
SLOPE 1:100
23A-2"-DH-A1-2892
23A-2"-DH-A1-2806
23A-3"-DH-A1-2890
23A-4"-DH-A1-2011
SLOPE 1:100
CLIENT:

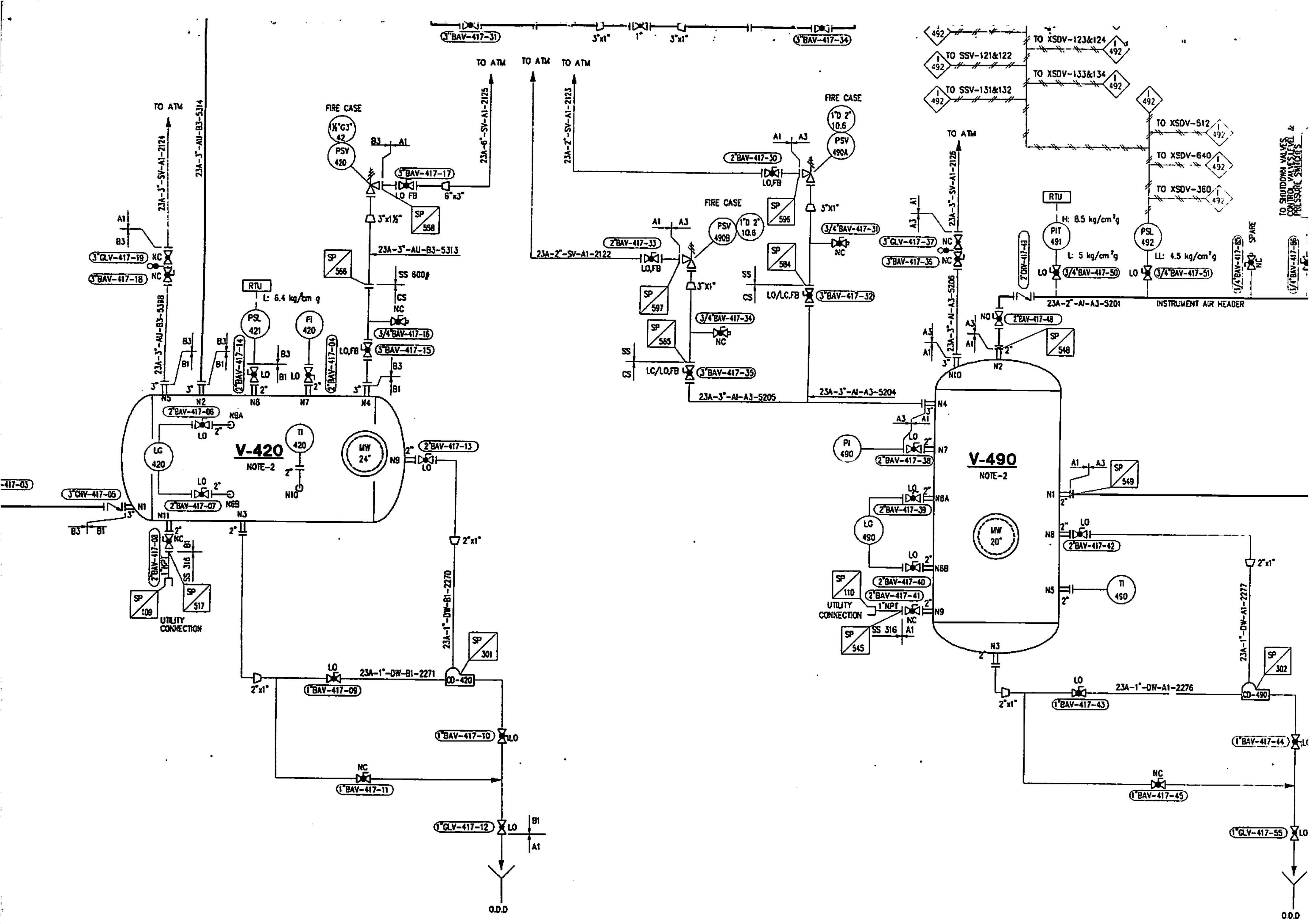

C-400 / 410
(NOTE-1, 2, 3)
C-400
C-410
TP
37
TP
38
-2198
23A-2"-DH-A1-2199
4"
4"
23A-2"-DH-A1-2803
OPEN HYDROCARBON DRAIN HEADER
SLOPE 1:100

CLIENT:

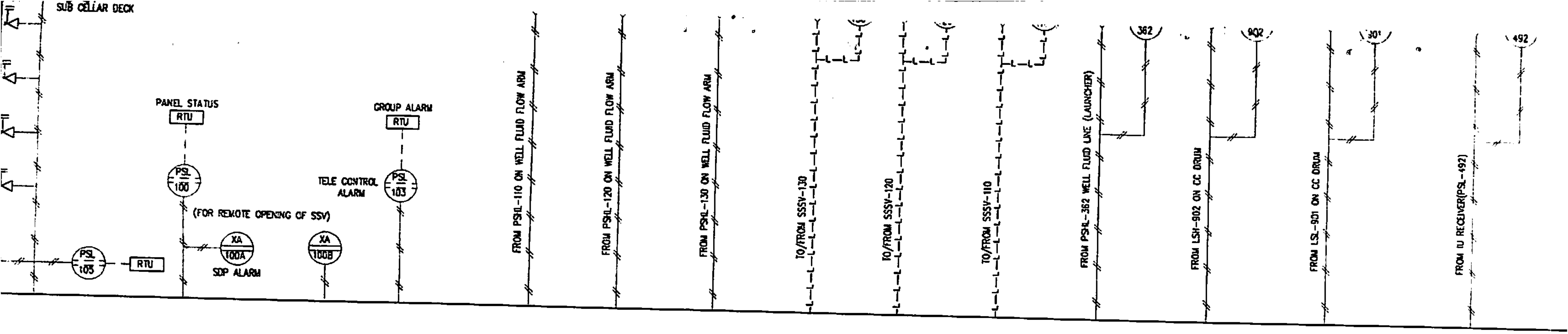


CONFIDENTIAL AGREEMENT

CLIENT:

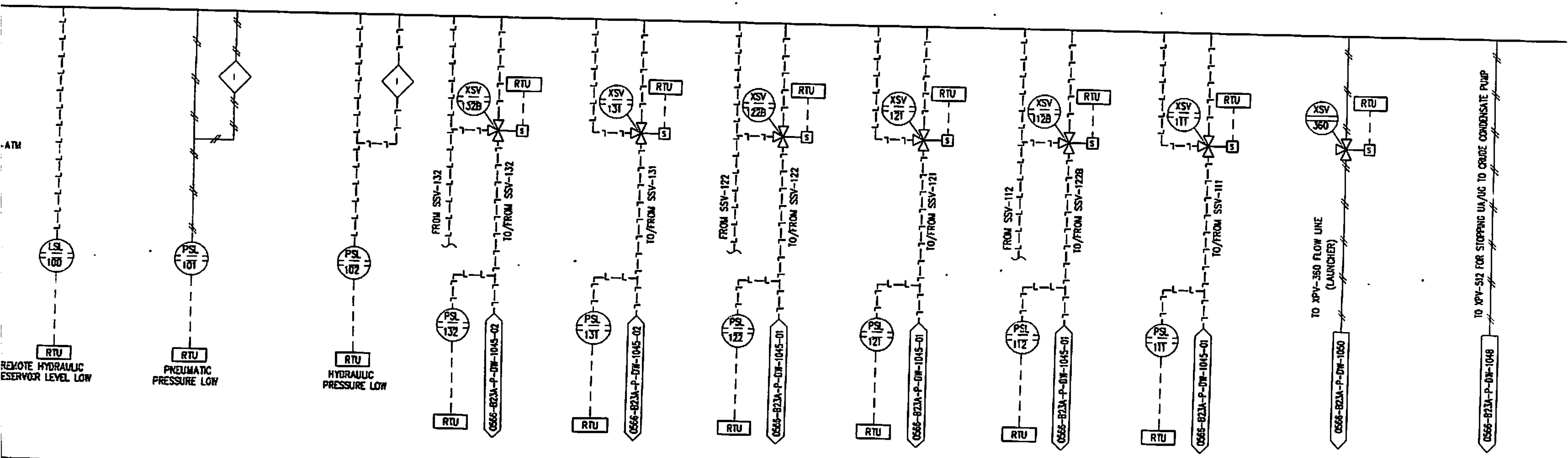

3"BAV-417-31
3"x1"
1"
3"x1"
3"BAV-417-34
TO ATM
TO ATM
TO ATM
TO ATM
23A-3"-SV-A1-2124
23A-3"-AU-B3-5314
23A-6"-SV-A1-2125
23A-2"-SV-A1-2123
FIRE CASE
1½"GJ3"
42
PSV
420
B3
A1
3"BAV-417-17
LO FB
6"x3"
3"x1½"
SP
558
23A-3"-AU-B3-5313
SP
566
SS 600#
CS
NC
3/4"BAV-417-16
LO,FB
3"BAV-417-15
A1
B3
3"GLV-417-19
NC
3"BAV-417-18
NC
23A-3"-AU-B3-5388
RTU
L: 6.4 kg/cm g
PSL
421
FI
420
2"BAV-417-14
2"BAV-417-04
LO
LO
B1
B3
B3
B1
B3
B1
3"
3"
2"
2"
3"
N5
N2
N8
N7
N4
2"BAV-417-06
N6A
LO
2"
LG
420
V-420
NOTE-2
TI
420
2"
N10
MW
24"
2"
2"BAV-417-13
N9
LO
LO
2"
2"BAV-417-07
N6B
-417-03
3"CHV-417-05
N1
3"
B3
B1
N11
N3
2"
2"
NC
2"BAV-417-08
1"NPT
B1
SS 316
SP
109
SP
517
UTILITY
CONNECTION
2"x1"
23A-1"-DW-B1-2270
SP
301
2"x1"
LO
23A-1"-DW-B1-2271
1"BAV-417-09
CD-420
1"BAV-417-10
LO
NC
1"BAV-417-11
1"GLV-417-12
LO
B1
A1
O.D.D
FIRE CASE
1"D 2"
10.6
PSV
490A
A1
A3
2"BAV-417-30
LO,FB
SP
596
3"X1"
3/4"BAV-417-31
NC
SP
584
SS
CS
LO/LC,FB
3"BAV-417-32
FIRE CASE
A1
A3
PSV
490B
1"D 2"
10.6
2"BAV-417-33
23A-2"-SV-A1-2122
LO,FB
3"X1"
SP
597
3/4"BAV-417-34
NC
SP
585
SS
CS
LC/LO,FB
3"BAV-417-35
23A-3"-AI-A3-5205
23A-3"-AI-A3-5204
492
TO XSDV-123&124
492
TO SSV-121&122
492
TO XSDV-133&134
492
TO SSV-131&132
492
492
TO XSDV-512
492
TO XSDV-640
492
TO XSDV-360
492
TO SHUTDOWN VALVES, CONTROL VALVES,LEVEL & PRESSURE SWITCHES
TO ATM
23A-3"-SV-A1-2126
A1
A3
3"GLV-417-37
NC
3"BAV-417-36
NC
RTU
H: 8.5 kg/cm²g
PIT
491
L: 5 kg/cm²g
LO
3/4"BAV-417-50
PSL
492
LL: 4.5 kg/cm²g
LO
3/4"BAV-417-51
3/4"BAV-417-65
SPARE
NC
3/4"BAV-417-66
2"CHV-417-43
23A-2"-AI-A3-5201
INSTRUMENT AIR HEADER
23A-3"-AI-A3-5206
NO
2"BAV-417-48
SP
548
A3
A1
A3
A1
2"
3"
N10
N2
N4
3"
A3
A1
LO
PI
490
2"
N7
2"BAV-417-38
V-490
NOTE-2
A1
A3
SP
549
N1
2"
LO
2"
N6A
2"BAV-417-39
LG
490
MW
20"
2"
N8
LO
2"BAV-417-42
2"x1"
LO
2"
N6B
2"BAV-417-40
N5
2"
TI
490
SP
110
2"BAV-417-41
UTILITY
CONNECTION
1"NPT
2"
N9
NC
A1
SS 316
SP
545
N3
2"
23A-1"-DW-A1-2277
SP
302
2"x1"
LO
23A-1"-DW-A1-2276
1"BAV-417-43
CD-490
1"BAV-417-44
LO
NC
1"BAV-417-45
1"GLV-417-55
LO
O.D.D

CLIENT:



SDP-100

WELL / FIRE-SHUTDOWN PANEL



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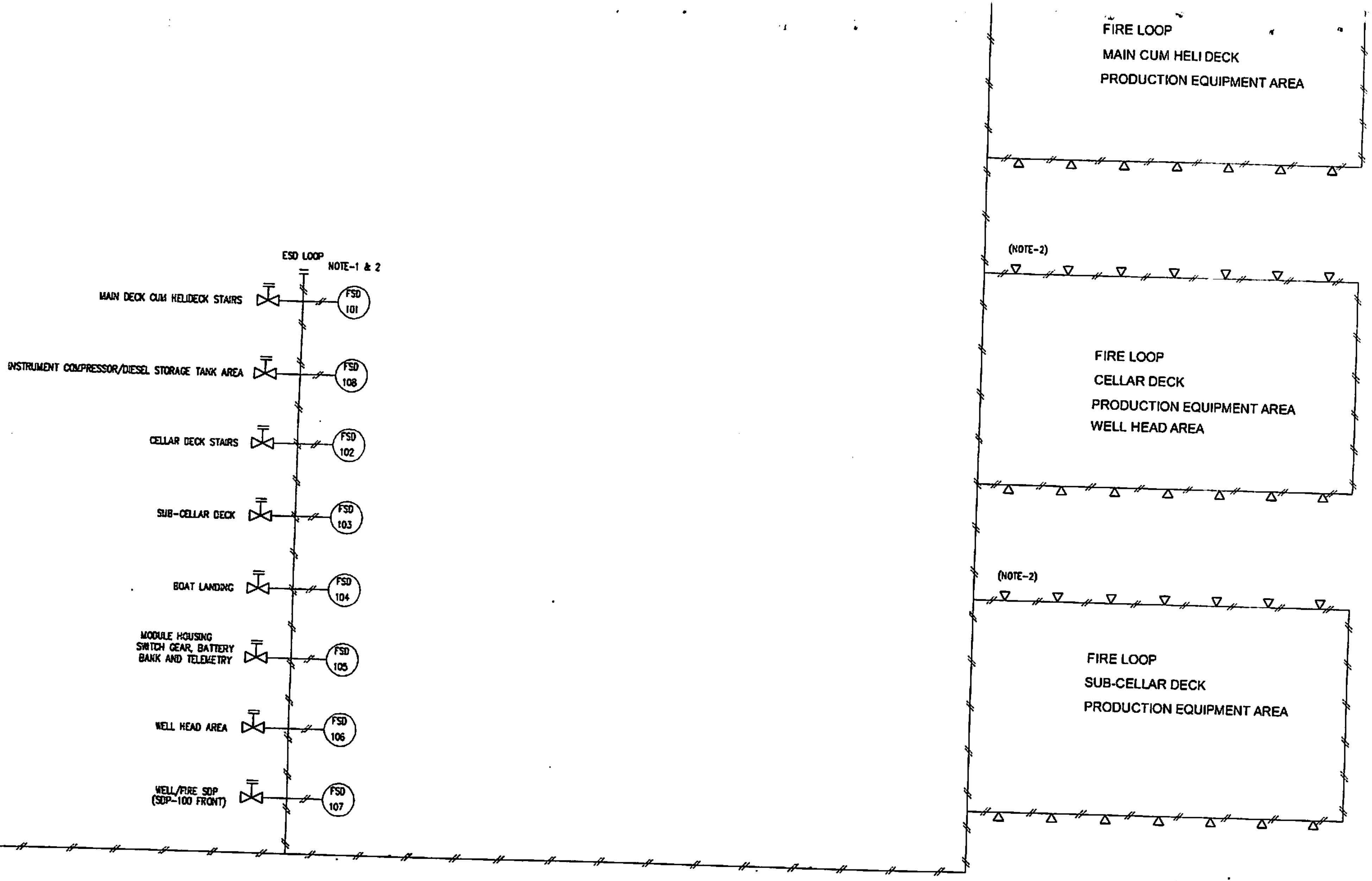
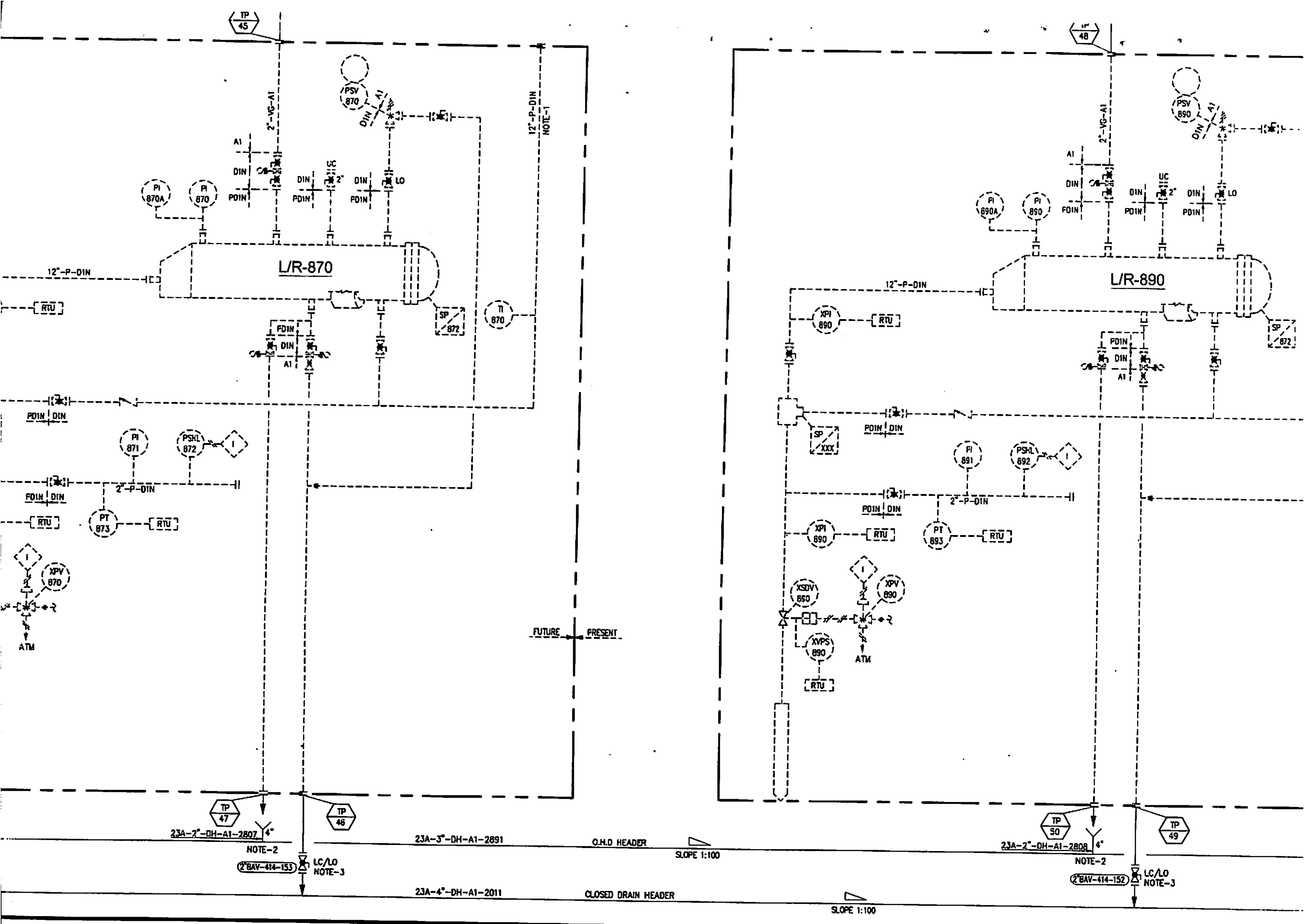

FIRE LOOP
MAIN CUM HELI DECK
PRODUCTION EQUIPMENT AREA
ESD LOOP
NOTE-1 & 2
MAIN DECK CUM HELIDECK STAIRS
FSD 101
INSTRUMENT COMPRESSOR/DIESEL STORAGE TANK AREA
FSD 108
CELLAR DECK STAIRS
FSD 102
SUB-CELLAR DECK
FSD 103
BOAT LANDING
FSD 104
MODULE HOUSING SWITCH GEAR, BATTERY BANK AND TELEMETRY
FSD 105
WELL HEAD AREA
FSD 106
WELL/FIRE SDP (SDP-100 FRONT)
FSD 107
(NOTE-2)
FIRE LOOP
CELLAR DECK
PRODUCTION EQUIPMENT AREA
WELL HEAD AREA
(NOTE-2)
FIRE LOOP
SUB-CELLAR DECK
PRODUCTION EQUIPMENT AREA

CLIENT:


TP 45
TP 48
2"-VG-A1
12"-P-DIN
NOTE-1
PSV 870
PSV 890
A1
DIN
FDIN
PDIN
UC
2"
LO
PI 870A
PI 870
PI 890A
PI 890
L/R-870
L/R-890
12"-P-DIN
RTU
SP 872
TI 870
XPI 890
SP XXX
PDIN DIN
FDIN DIN
PI 871
PSHL 872
PI 891
PSHL 892
2"-P-DIN
PT 873
PT 893
XPV 870
XPV 890
XSDV 890
XVPS 890
ATM
FUTURE
PRESENT
TP 47
TP 46
TP 50
TP 49
23A-2"-DH-A1-2807
23A-2"-DH-A1-2808
4"
NOTE-2
23A-3"-DH-A1-2891
O.H.D HEADER
SLOPE 1:100
2"BAV-414-153
2"BAV-414-152
LC/LO
NOTE-3
23A-4"-DH-A1-2011
CLOSED DRAIN HEADER
SLOPE 1:100

CLIENT:

ANNEXURE II

(PROCESS FLOW DIAGRAM)

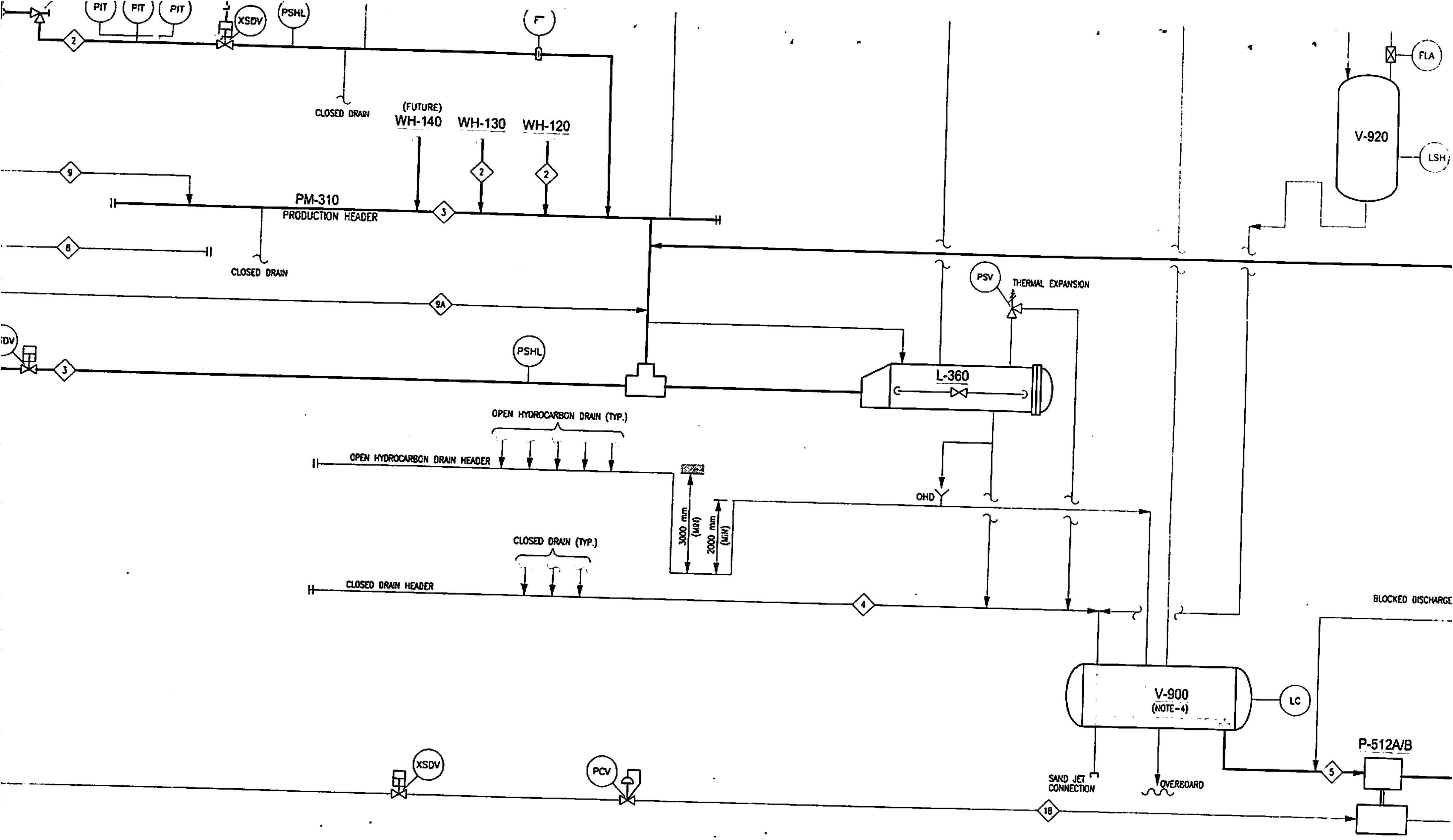
A-A - PROCESS/UTILITY FLOW DIAG

AP	
ONGC	
OD	OW

CLIENT:

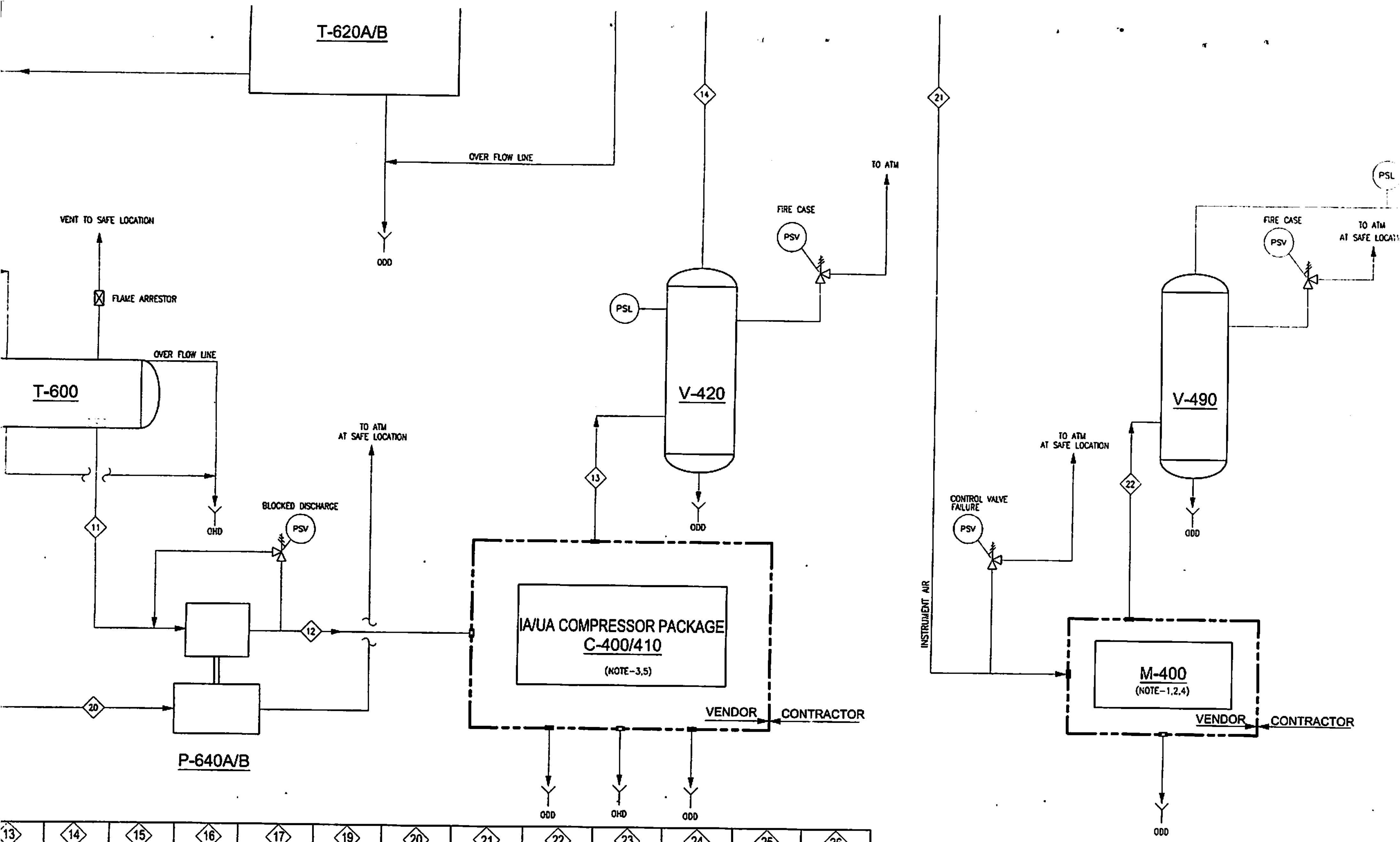
AGRAM (SHEET 2 OF 2)	10 MAR 11								ISSUED FOR COMMENTS

CLIENT:



1B	2	3	4	5	6	7	8	9	9A	10	18
78	61.5	61.5	40-50	40-50	40-50	40-50	16-40	16-40	16-40	16-40	50
92	30	30	0.2	0.2	33-80	0.2	32-79	32-79	32-79	0.2	2.5-8.5
17760	17900	32230	-	-	-	1048	-	-	-	970 kg/min	75
626	7483	13390	825	319.2	319.2	-	300	150	150	-	-
.4762	0.4848	0.8727	-	-	-	0.02837	-	-	-	1.576	58 Nm³/hr
0.62	9.753	17.45	1.0	0.4	0.4	-	0.3	0.15	0.15	-	-

CLIENT:



13	14	15	16	17	19	20	21	22	23	24	25	26
0	50	50	50	50	50	50	50	50	50	50	50	50
5–8	35–8	8–5.5	8–5.5	8–5.5	8–5.5	5.5–2.5	8–5.5	8–5.5	8–5.5	8–5.5	8–5.5	8–5.5
15.0	515.0	131.7	94.5	75.0	19.5	19.5	37.2	32.5	8.534	7.76	2.07	0.2585
	–	–	–	–	–	–	–	–	–	–	–	–
00	400	101.75	73	58	15	15	28.75	25.0	6.6	6.0	1.6	0.2
	–	–	–	–	–	–	–	–	–	–	–	–

CLIENT:

ANNEXURE III

(CAUSE AND EFFECT MATRIX)

B23 A - A WELL HEAD PLATFORM PROJECT

CAUSE AND EFFECT MATRIX- B-23A-A

6	P&ID-FUSIBLE LOOP AND FIRE STATIONS (B-23A-A)	CONFIDENTIAL AGREEMENT	CLIENT ओएनजीसी ONGC	OIL AND NATURA
5	P&ID-WELL SHUTDOWN PANEL (B23A-A)			
3	P&ID-IA/UA RECEIVERS (B-23A-A)			
1	P&ID-IA/UA COMPRESSOR (B-23A-A)		CONTRACTOR	
1	P&ID-INSTRUMENT & UTILITY AIR COMPRESSOR PACKAGE (B23A-A)			

PTION	REVISION								
	A								REVISION DESCRIPTION
	5-Mar-11								ISSUED FOR COMMENTS
	5-Mar-11								ISSUED FOR COMMENTS
	5-Mar-11								ISSUED FOR COMMENTS
	5-Mar-11								ISSUED FOR COMMENTS
	5-Mar-11								ISSUED FOR COMMENTS

ASED ON 2oo3 VOTING LOGIC

ICATION PROGRAM IN PLC/LOGIC SOLVER WILL BE MODIFIED SO THAT ACTIVATION OF EACH KEYSWITCH IN HIPPS PANEL(HARDWARE) WILL OVERRIDE THE 2 PRIMARY AND 2 SECONDARY HIPPS SOLENOIDS. THE P
TY TIMER. AFTER 6 HOURS THE OVERRIDES WILL BE REMOVED AUTOMATICALLY REGARDLESS OF THE POSITION OF THE KEYSWITCH. TO RE-INSTATE THE OVERRIDE THE KEYSWITCH WILL HAVE TO BE TURNED FR
AVAILABLE.

RRIDE FACILITY IS PROVIDED IN THE WELL HEAD CONTROL PANEL.

CTION SYSTEM

EFFECT

CAUSE

							P&ID			0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-			0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-							0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-	0566-B23A-		0566-B23A-	0566-B23A-								
							DESCRIPTION	COMMON ALARM	HIPPS PANEL -101	CLOSE SECONDARY HIPPS VALVE ON WH-110 FLOW ARM (NOTE-2)	CLOSE PRIMARY HIPPS VALVE ON WH-110 FLOW ARM(NOTE-2)	CLOSE SECONDARY HIPPS VALVE ON WH-120 FLOW ARM (NOTE-2)	CLOSE PRIMARY HIPPS VALVE ON WH-120 FLOW ARM (NOTE-2)	CLOSE SECONDARY HIPPS VALVE ON WH-130 FLOW ARM (NOTE-2)	CLOSE PRIMARY HIPPS VALVE ON WH-130 FLOW ARM (NOTE-2)		SHUTDOWN PANEL-100	CLOSE SUB SURFACE SAFETY VALVE (SSSV-110) ON WH-110 FLOW ARM	CLOSE SURFACE SAFETY VALVE (SSV-111) ON WH-110 FLOW ARM(NOTE-3)	CLOSE SURFACE SAFETY VALVE (SSV-112) ON WH-110 FLOW ARM(NOTE-3)	CLOSE SUB SURFACE SAFETY VALVE (SSSV-120) ON WH-120 FLOW ARM	CLOSE SURFACE SAFETY VALVE (SSV-121) ON WH-120 FLOW ARM(NOTE-3)	CLOSE SURFACE SAFETY VALVE (SSV-122) ON WH-120 FLOW ARM(NOTE-3)	CLOSE SUB SURFACE SAFETY VALVE (SSSV-130) ON WH-130 FLOW ARM	CLOSE SURFACE SAFETY VALVE (SSV-131) ON WH-130 FLOW ARM(NOTE-3)	CLOSE SURFACE SAFETY VALVE (SSV-132) ON WH-130 FLOW ARM(NOTE-3)	SHUT-OFF UTILITY AIR SUPPLY FOR CRUDE CONDENSATE TRANSFER PUMP	SHUT-OFF UTILITY AIR SUPPLY FOR DIESEL TRANSFER PUMP	SHUT-OFF WELL FLUID FROM PIG LAUNCHER (L-360) TO PIG RECEIVER B-193A							ALARM IN RTU	ALARM IN HIPPS	TELE CONTROL ALARM	ESD ALARM	FSD ALARM		AUDIBLE ALARM AT BOAT LANDING	TRIP AIR COMPRESSOR PACKAGE		SOLAR POWER CONTROLLER	SHUNT TRIP SIGNAL TO MCCB-1 & MCCB-2 OF SPC	SHUNT TRIP SIGNAL TO MCCB-1 & MCCB-2 OF SPC				
							DEVICE LOC	SDP-100		F	F	F	F	F	F			F	F	F	F	F	F	F	F	F	F	F	F							F	F	F	F	F		F	F			F	F				
							TAG NO	XA-100A		XSDV-113	XSDV-114	XSDV-123	XSDV-124	XSDV-133	XSDV-134			SSSV-110	SSV-111	SSV-112	SSSV-120	SSV-121	SSV-122	SSSV-130	SSV-131	SSV-132	XSDV-512	XSDV-640	XSDV-360							.	.	XA-100B	XA-100C	XA-100D		XA-600	C-400/410			SC-401	SC-402				
	TYPE			TAG NO.	OVERRIDE		ACT	ALARM		CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE			CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE	CLOSE							ALARM	ALARM	ALARM	ALARM	ALARM		ALARM	TRIP			TRIP	TRIP				
	TYPE	LOC	SGL		MOS	OOS																																											
RM								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
RM							1																																										
-1)	PIT	F	AN	PIT-114A	N	N	2	X		X	X									X																X	X														
-1)	PIT	F	AN	PIT-114B	N	N	3	X		X	X									X																X	X														
-1)	PIT	F	AN	PIT-114C	N	N	4	X		X	X									X																X	X														
	PSHL	F	PN	PSH-110	Y	N	5	X											X	X																X															
	PSHL	F	PN	PSL-110	Y	Y	6	X											X	X																X															
							7																																										
M							8																																										
-1)	PIT	F	AN	PIT-124A	N	N	9	X				X	X										X													X	X														
-1)	PIT	F	AN	PIT-124B	N	N	10	X				X	X										X													X	X														
-1)	PIT	F	AN	PIT-124C	N	N	11	X				X	X										X													X	X														
	PSHL	F	PN	PSH-120	Y	N	12	X														X	X													X															
	PSHL	F	PN	PSL-120	Y	Y	13	X														X	X													X															
							14																																										
M							15																																										
1)	PIT	F	AN	PIT-134A	N	N	16	X						X	X											X										X	X														
1)	PIT	F	AN	PIT-134B	N	N	17	X						X	X											X										X	X														
1)	PIT	F	AN	PIT-134C	N	N	18	X						X	X											X										X	X														
	PSHL	F	PN	PSH-130	Y	N	19	X																	X	X										X															
	PSHL	F	PN	PSL-130	Y	Y	20	X																	X	X										X															
							21																																										
							22																																										
							23																																										
	LSH	F	PN	LSH-902	Y	N	24	X																												X															
	LSL	F	PN	LSL-901	Y	Y	25	X																			X									X															
							26																																										
							27																																										
	LSH	F	PN	LSH-921	Y	N	28	X																												X															

ECTION SYSTEM

ER

EFFECT

	ACT	TAG NO	DEVICE LOC	DESCRIPTION	F
1	ALARM	XA-100A	SDP-100	COMMON ALARM	
2				HIPPS PANEL-101	
3	CLOSE	XSDV-113	F	CLOSE SECONDARY HIPPS VALVE ON WH-110 FLOW ARM (NOTE-2)	0566-B
4	CLOSE	XSDV-114	F	CLOSE PRIMARY HIPPS VALVE ON WH-110 FLOW ARM (NOTE-2)	0566-B
5	CLOSE	XSDV-123	F	CLOSE SECONDARY HIPPS VALVE ON WH-120 FLOW ARM (NOTE-2)	0566-B
6	CLOSE	XSDV-124	F	CLOSE PRIMARY HIPPS VALVE ON WH-120 FLOW ARM (NOTE-2)	0566-B
7	CLOSE	XSDV-133	F	CLOSE SECONDARY HIPPS VALVE ON WH-130 FLOW ARM (NOTE-2)	0566-B
8	CLOSE	XSDV-134	F	CLOSE PRIMARY HIPPS VALVE ON WH-130 FLOW ARM (NOTE-2)	0566-B
9					
10				SHUTDOWN PANEL-100	
11	CLOSE	SSSV-110	F	CLOSE SUB SURFACE SAFETY VALVE (SSSV-110) ON WH-110 FLOW ARM	0566-B
12	CLOSE	SSV-111	F	CLOSE SURFACE SAFETY VALVE (SSV-111) ON WH-110 FLOW ARM(NOTE-3)	0566-B
13	CLOSE	SSV-112	F	CLOSE SURFACE SAFETY VALVE (SSV-112) ON WH-110 FLOW ARM(NOTE-3)	0566-B
14	CLOSE	SSSV-120	F	CLOSE SUB SURFACE SAFETY VALVE (SSSV-120) ON WH-120 FLOW ARM	0566-B
15	CLOSE	SSV-121	F	CLOSE SURFACE SAFETY VALVE (SSV-121) ON WH-120 FLOW ARM(NOTE-3)	0566-B
16	CLOSE	SSV-122	F	CLOSE SURFACE SAFETY VALVE (SSV-122) ON WH-120 FLOW ARM(NOTE-3)	0566-B
17	CLOSE	SSSV-130	F	CLOSE SUB SURFACE SAFETY VALVE (SSSV-130) ON WH-130 FLOW ARM	0566-B
18	CLOSE	SSV-131	F	CLOSE SURFACE SAFETY VALVE (SSV-131) ON WH-130 FLOW ARM(NOTE-3)	0566-B
19	CLOSE	SSV-132	F	CLOSE SURFACE SAFETY VALVE (SSV-132) ON WH-130 FLOW ARM(NOTE-3)	0566-B
20	CLOSE	XSDV-512	F	SHUT-OFF UTILITY AIR SUPPLY FOR CRUDE CONDENSATE TRANSFER PUMP	0566-B
21	CLOSE	XSDV-640	F	SHUT-OFF UTILITY AIR SUPPLY FOR DIESEL TRANSFER PUMP	0566-B
22	CLOSE	XSDV-360	F	SHUT-OFF WELL FLUID FROM PIG LAUNCHER (L-360) TO PIG RECEIVER B-178A	0566-B
23					
24					
25					
26					
27					
28					
29					
30	ALARM	.	F	ALARM IN RTU	0566-B
31	ALARM	.	F	ALARM IN HIPPS	0566-B
32	ALARM	XA-100B	F	TELE CONTROL ALARM	0566-B
33	ALARM	XA-100C	F	ESD ALARM	0566-B
34	ALARM	XA-100D	F	FSD ALARM	0566-B
35					
36	ALARM	XA 600	F	AUDIBLE ALARM AT BOAT LANDING	0566-B
37	TRIP	C-400/410	F	TRIP AIR COMPRESSOR PACKAGE	0566-B
38					
39				SOLAR POWER CONTROLLER	
40	TRIP	SC 401	F	SHUNT TRIP SIGNAL TO MCCB-1 & MCCB-2 OF SPC	
41	TRIP	SC 402	F	SHUNT TRIP SIGNAL TO MCCB-1 & MCCB-2 OF SPC	
42					
43					
44					

CAUSE

CAUSE	TYPE			TAG NO.	OVERRIDE																																													
	TYPE	LOC	SGL		MOS	OOS		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
W	PSL	F	HY	PSL-102	Y	Y	41	X		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X								X			X				X							
W	PSL	F	PN	PSL-101	Y	Y	42	X		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X								X			X				X							
RVOIR LEVEL LOW	LSL	F	HY	LSL-100	Y	Y	43	X																													X														
							44																																										
	-	F	PN	-			45	X																													X														
	-	F	PN	-			46	X		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X								X			X				X			X	X			
	-	F	PN	-			47	X																													X														
	-	F	PN	-			48	X		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X								X			X				X							
ATIONS / PLATFORM ABANDON	-	F	PN	PSL-104	Y	Y	49	X		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X								X				X			X							
							50																																										
	-	F	PN	XSV-100	Y	Y	51	X		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X								X			X				X							
							52																																										
WELL FLUID LINE (LAUNCHER)	PSL	F	PN	PSL-362	Y	Y	53	X																													X														
WELL FLUID FLOW ARM -(SSSV-110)	PSL	F	HY	PSL-110	Y	Y	54	X																													X														
WELL FLUID FLOW ARM-(SSSV-120)	PSL	F	HY	PSL-120	Y	Y	55	X																													X														
WELL FLUID FLOW ARM-(SSSV-130)	PSL	F	HY	PSL-130	Y	Y	56	X																													X														
N CRUDE CONDENSATE DRUM	PSL	F	PN	PSL-902	Y	Y	57	X																													X														
N CRUDE CONDENSATE DRUM	PSL	F	PN	PSL-901	Y	Y	58	X																													X														
N IA RECEIVER	PSL	F	PN	PSL-492	Y	Y	59	X																													X														
N DIESEL STORAGE TANK	PSL	F	PN	PSL-601	Y	Y	60	X																													X														
ELL HEAD (WH-110) - (SSV-111)	PSL	F	HY	PSL-111	Y	Y	61	X																													X														
ELL HEAD (WH-110) - (SSV-112)	PSL	F	HY	PSL-112	Y	Y	62	X																													X														
ELL HEAD (WH-120) - (SSV-121)	PSL	F	HY	PSL-121	Y	Y	63	X																													X														
ELL HEAD (WH-120) - (SSV-122)	PSL	F	HY	PSL-122	Y	Y	64	X																													X														
ELL HEAD (WH-130) - (SSV-131)	PSL	F	HY	PSL-131	Y	Y	65	X																													X														
ELL HEAD (WH-130) - (SSV-132)	PSL	F	HY	PSL-132	Y	Y	66	X																													X														
T SDP	PSL	F	DI	PSL-106	Y	Y	67	X		X	X	X	X	X	X																						X	X						X							
							68																																										
							69																																										

ANNEXURE IV

(VESSEL SIZING CALCULATIONS)

Closed drain drum sizing

Liquid volume to be stored: 2 m^3

% of filling: 80

Actual volume of vessel required = 2/(0.8)

= 2.5 m^3

Assume inner diameter, d= 1.27 m, length, l = 1.8 m

Volume of the vessel = $V_S + 2V_H$

V_S :Volume of shell

V_H : Volume of head

Volume of shell, V_S $= \pi \text{ X } d^2 \text{ X } l/4$

$= \pi \text{ X } 1.27^2 \text{ X } 1.8/4$

$= 2.23 \ m^3$

Volume of head , V_H $= 2 \text{ X } \pi \text{ X } d^3 \text{ X } l/24$

$= 2 * \pi * 1.27^3 * 1.8/24$

$= 2 * 0.268$

$= 0.53 \ m^3$

Volume of closed drain drum = $V_S + 2V_H$

$= 2.75 \ m^3$

Adequacy checking of Closed Drain Drum (CCD) volume:

Production Manifold length = 25 m (Max)

Inner Diameter of Production manifold, d_p= 12 inch

d_p= 0.3048 m

Volume of manifold $= \pi \text{ X } d_p{}^2 \text{ X } l/4$

$= \pi \text{ X } 0.3048^2 \text{ X } 8/4$

$= 1.82 \ m^3$

So we can conclude that CCD drum volume is adequate.

Potable water tank sizing

Potable water to be stored (Two tanks each of capacity) : 0.5 m^3

Volume of tank = L (Length) X W (width) X H (height) , m^3

L = 0.8 m, W = 0.8 m, H = 1m

Volume of potable water tank = 0.8 X 0.8 X 1, m^3

= 0.64 m^3

Percentage of extra volume = 0.64/0.5

= 28 % vapor space provided

GCI Calculation

Maximum gas flow rate in kg/hr: G = 500[**]

GCI injection rate: 75ppmV

Density of GCI, ρ = 1000 kg/m^3 (Assumed value)

Maximum GCI flow rate required, $\hat{W}$ = G X $75/10^6$, kg/hr

= 500 X $75/10^6$

= 0.0375 kg/hr

Volumetric flow rate = $\hat{W} / \rho$

= 0.032 / 1000, m^3/hr

= .032 LPH (Liter Per hour)

[**] 10 % extra margin shall be considered on gas flow rate flow rate.

Diesel Storage Vessel sizing

Diesel required for air compressor drive, Q = 59 lph

Storage time, t = 48 hours

Total volume of diesel to be stored, m^3 = 48 X 59 / 1000

= 2.832, m^3

% of filling = 90

Actual volume of vessel required = 2.832/(0.9)

= 3.14 m^3

Assume inner diameter, d= 1.3 m, length, l = 2 m

Volume of the vessel = $V_S + 2V_H$

V_S :Volume of shell

V_H : Volume of head

Volume of shell, $V_S = \pi \text{ X } d^2 \text{ X } l/4$

$= \pi \text{ X } 1.3^2 \text{ X } 2/4$

$=2.66 \ m^3$

Volume of head, $V_H = 2 \text{ X } \pi \text{ X } d^3 \text{ X } l/24$

$= 2*\pi*1.27^3*1.8/24$

$= 2*0.268$

$= 0.57 \ m^3$

Volume of closed drain drum = $V_S + 2V_H$

$= 3.23 \ m^3$

Adequacy checking of Diesel Storage Vessel volume:

Storage capacity required =3.14 m^3

Storage capacity provided =3.23 m^3

So we can conclude that Diesel Storage vessel volume is adequate.

Instrument Air Storage Vessel sizing

Instrument air Flow Rate, Q_L: =25 Nm^3/hr

Input Data:

Operating Pressure, Initial: P_1 =8 kg/cm^2g

Operating Pressure, Final: P_2 =5.5 kg/cm^2g

Operating Temperature: T =50 ° C (323 K)

Design Pressure: P =10.6 kg/cm^2g

Design Temperature: T =80 ° C

Air Molecular Weight: M =28.9 kg/kgmol

Compressibility Factor: Z =1

Time Duration: min = 15

Density Calculations: **$\rho = PM/ZRT$**

Density of air @ Final condition: ρ_2 = (101325 + 550000) X 28.8 /(8314.47 X 1 X 323)
= 6.906 kg/m^3

Density of air @ Initial condition: ρ_1 = (101325 + 800000) X 28.8 /(8314.47 X 1 X 323)
= 9.549 kg/m^3

Volume of air to be stored: $= Q_L$ X time
= (25/60) X 15
= 6.25 Nm^3

Mass of air: m = 6.25 X 28.95/22.414, kg
= 8.073 kg

Required Volume of vessel: $= m/ (\rho 1 - \rho_2)$ m^3
= 3.055 m^3

Assume inner diameter, d= 1.2 m, length l = 2.5 m

Volume of the vessel = $V_S + 2V_H$

V_S : Volume of shell

V_H : Volume of head

Volume of shell, V_S $= \pi \times d^2 \times l/4$
$= \pi \times 1.2^2 \times 2.5/4$
$= 2.82\ m^3$

Volume of head, V_H $= 2 \times \pi \times d^3 \times l/24$
$= 2*\pi*1.2^3*2.5/24$
$= 2*0.268$
$= 0.45\ m^3$

Volume of closed drain drum = $V_S + 2V_H$
$= 3.28\ m^3$

Adequacy checking of Instrument Air Storage Vessel_volume:

Storage capacity required =3.05 m^3
Storage capacity provided =3.28 m^3

So we can conclude that Instrument air buffer vessel volume is adequate.

ANNEXURE V

(LINE SIZING CALCULATIONS)

Line sizing of Gas/Liquid 2-phase:

DATA:

Gas flow @ STD conditions, Q_g = MMSCFD

Liquid flow, Q_L = BOLPD

Operating pressure liquid, P_L = psia

Operating pressure gas, P_G = psia

Operating temperature, $T = {}^0R$

Compressibility factor, $Z = 0.$

Gas/oil ratio, $R = 591.4\text{ e+6}/13840 = 42731.2\text{ ft}^3/\text{barrel}$

Specific gravity of gas, S_G = Molecular wt. of gas/Molecular wt. of air =

Specific gravity of liquid, $S_L = \rho_{oil} / \rho_{H_2O} = 0.$

Calculation of Erosional velocity, V_e:

$$V_e = C/(\rho_m)^{0.5} \qquad C=100 \text{ for solids-free fluids}$$

Where ρ_m is given by the following relation

$$\rho_m = (12409 \times S_L \times P_L + 2.7 \times R \times P_G \times S_G)) / (198.7\, P_G + RTZ)$$

Substituting for the above variables, we get

ρ_m= lb/ft^3 (kg/m^3)

Therefore substituting for in the equation

$V_e = 100/(1.229)^{0.5}$

V_e = 90.18 ft/s (27.32 m/s)

Area of pipe based on Erosional velocity:

$A = \{9.35 + ZRT/(21.25 \times P_G)\}/V_e$, inch^2/1000 BOLD

$A = \{9.35+0.98264 \times 42098.36 \times 602.96/(21.25 \times 1320)\}/48.85$

Solving for A, we get

$A = \text{inch}^2/1000$ BOLD

Therefore area for 14032 BOLD, $A = \ x /1000 = \text{inch}^2$

$A = \ = (\Pi/4) \times d^2$

$d = 17.2"$

From Perry the nearest and next higher nominal pipe size is

NPS 20 I.D=18.814" $A = 237.13\ \text{Inch}^2$

Actual velocity, $V_{act} = V_c \times A_{required} / A_{provided}$

$V_{act} = 48.85 \times 237.13/(\Pi/4 \times 18.812^2) = 41.653$ m/s

Pressure drop, psi/100ft:

$\Delta P = 5 \times 10^{-6} \times W^2/(d^5 \times \rho_m)$ Eqn-2.17 a

$W = 3180 \times Q_g \times S_G + 14.6\ Q_L \times S_L$

$W = (3180 \times 591.4 \times 0.56) + (14.6 \times 14032 \times 0.71) = 1198620.83$

$\Delta P = 5 \times 10^{-6} \times (1198620.83)^2/(18.812^5 \times 4.19) = 0.72768$ psi/100ft

Line sizing of liquid phase

DATA:

Liquid flow,	$Q_L = 14032$ BOLPD
Average density	$\rho = 842.75\ \text{kg/m}^3$
Average viscosity	$\mu = 0.6422 \times 10^{-3}$ Pa.s
Specific gravity of liquid,	$S_L = \rho_{oil} / \rho_{H2O} = 0.71$

Calculation of flow velocity, V_L:

$$V_L = 0.012 \times Q_L/d^2$$

Assuming a velocity of 15 ft/s as per guide line given in API 14 E

$$d = (0.012 \times 13840/15)^{0.5}$$

$$d = 3.327" \ (0.0855 \text{ m})$$

From Perry, standard pipe size nearest to the obtained size is

NPS 4 40SH I.D=4.026" (A=12.73 inch^2 (8.213 x 10^{-3})

Therefore liquid velocity in the pipe, $V_L = 0.012 \times 13840/4.026^2 = 10.24$ft/s (3.123 m/s)

Reynolds number, $N_{re} = \rho Vd/ \mu$

$$= 842.75 \times 3.123 \times 0.1022 / 0.6422 \times 10^{-3}$$

$$N_{re} = 418843$$

Roughness factor (ϵ/d):

$\epsilon = 0.0457 \times 10^{-3}$ for commercial pipes

$\epsilon/d = 0.0457 \times 10^{-3}/0.1022 = 0.00044$

From Perry, f Vs N_{re} chart (6-10, fig 6-9, 6th edn)

f=fanning's friction factor = 0.004

f=Moody's friction factor = 4 x fanning's friction factor=0.016

Pressure drop, psi/100ft:

$$\Delta P = 0.00115 x f x Q^2 x S_l / d^5$$

$$\Delta P = 0.00115 \times 0.016 \times 14032^2 \times 0.71/4.026^5$$

$$\Delta P = 2.432 \text{ psi/100ft}$$

ANNEXURE VI

(HEAT AND MATERIAL BALANCE SHEET)

WELL HEAD PLATFORM PROJECT

HEAT AND MASS BALANCE TABLE- B-23A-A

CONFIDENTAL AGREEMENT

CLIENT

ओएनजीसी
ONGC

OIL AND NATURAL G

CONTRACTOR

CONSULTANT

RIPTION	REVISION								
	A								REVISION DESCRIPTION
	20-Feb-11								ISSUED FOR COMMENTS
	20-Feb-11								ISSUED FOR COMMENTS
	20-Feb-11								ISSUED FOR COMMENTS
ICE TABLE	20-Feb-11								ISSUED FOR COMMENTS
ICE TABLE	20-Feb-11								ISSUED FOR COMMENTS
ICE TABLE	20-Feb-11								ISSUED FOR COMMENTS
ICE TABLE	20-Feb-11								ISSUED FOR COMMENTS
CE TABLE	20-Feb-11								ISSUED FOR COMMENTS
CE TABLE	20-Feb-11								ISSUED FOR COMMENTS
CE TABLE	20-Feb-11								ISSUED FOR COMMENTS
CE TABLE	20-Feb-11								ISSUED FOR COMMENTS

MAX. PRESS 217 kg/cm^{2}g UPSTREAM OF CHOKE + MAX. PRESS. 77 kg/cm^{2}g DOWNSTREAM OF CHOKE (COMPOSITION CASE-1 & ASTM OBJECT-II)
MAX. PRESS 217 kg/cm^{2}g UPSTREAM OF CHOKE AND MAX. PRESS. 77 kg/cm^{2}g DOWN STREAM OF CHOKE (COMPOSITION CASE-1 & ASTM OBJECT-II)
MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE + MAX. PRESS. 77 kg/cm2g DOWNSTREAM OF CHOKE (COMPOSITION CASE-2 & ASTM OBJECT-II)
MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE AND MAX. PRESS. 77 kg/cm2g DOWN STREAM OF CHOKE (COMPOSITION CASE-2 & ASTM OBJECT-II)
MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE + MIN. PRESS. 30 kg/cm2g DOWNSTREAM OF CHOKE (COMPOSITION CASE-1 & ASTM OBJECT-II)
MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE AND MIN. PRESS. 30 kg/cm2g DOWN STREAM OF CHOKE (COMPOSITION CASE-1 & ASTM OBJECT-II)
MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE + MIN. PRESS. 30 kg/cm2g DOWNSTREAM OF CHOKE (COMPOSITION CASE-2 & ASTM OBJECT-II)
MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE AND MIN. PRESS. 30 kg/cm2g DOWN STREAM OF CHOKE (COMPOSITION CASE-2 & ASTM OBJECT-II)
MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE + MAX. PRESS. 77 kg/cm2g DOWN STREAM OF CHOKE (COMPOSITION CASE-1 & ASTM OBJECT-III)
+ MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE AND MAX. PRESS. 77 kg/cm2g DOWN STREAM OF CHOKE (COMPOSITION CASE-1 & ASTM OBJECT-III)
MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE + MAX. PRESS. 77 kg/cm2g DOWN STREAM OF CHOKE (COMPOSITION CASE-2 & ASTM OBJECT-III)
+ MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE AND MAX. PRESS. 77 kg/cm2g DOWN STREAM OF CHOKE (COMPOSITION CASE-2 & ASTM OBJECT-III)
+ MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE + MIN. PRESS. 30 kg/cm2g DOWN STREAM OF CHOKE (COMPOSITION CASE-1 & ASTM OBJECT-III)
+ MAX. PRESS 217 kg/cm2g UPSTREAM OF CHOKE AND MIN. PRESS. 30 kg/cm2g DOWN STREAM OF CHOKE (COMPOSITION CASE-1 & ASTM OBJECT-III)
MAX. PRESS 217 kg/cm^{2}g UPSTREAM OF CHOKE + MIN. PRESS. 30 kg/cm^{2}g DOWN STREAM OF CHOKE (COMPOSITION CASE-2 & ASTM OBJECT-III)
+ MAX. PRESS 217 kg/cm^{2}g UPSTREAM OF CHOKE AND MIN. PRESS. 30 kg/cm^{2}g DOWN STREAM OF CHOKE (COMPOSITION CASE-2 & ASTM OBJECT-III)

27.2760	27.2760	27.2760	27.2380	115.4900	115.4900	115.49[illegible]	20.4200	27.3810	27.3810	27.3810	27.3810	27.3430	119.1600	115.1600	119.
202.0400	151.5400	95.0600	94.9100	808.7000	808.7000	816.6000	1.0285	239.1600	186.1300	139.0700	87.2300	87.0900	797.8000	797.8000	806.
-28306.0000	-28306.0000	-28306.0000	-50900.0000	-520.3000	-200.8200	-199.6400	-24242.0000	-28215.0000	-28215.0000	-28215.0000	-28215.0000	-50740.0000	-501.4000	-192.2000	-191.
0.0000	0.0000	0.0000	0.0000	5.2240	5.2240	5.1040	0.0112	0.0000	0.0000	0.0000	0.0000	0.0000	4.5440	4.5440	4.45
820.7000	822.6000	829.6000	1493.6000	0.0000	0.0000	0.0000	885.0000	839.1000	835.2000	835.9000	841.5000	1515.0000	0.0000	0.0000	0.00
17625.0000	17159.0000	16940.0000	30497.0000	0.0000	0.0000	0.0000	18071.0000	19247.0000	18491.0000	17972.0000	17709.0000	31880.0000	0.0000	0.0000	0.00
17194.0000	23455.0000	38440.0000	69190.0000	0.0000	0.0000	0.0000	2652500.0000	15303.0000	19041.0000	25952.0000	42340.0000	76220.0000	0.0000	0.0000	0.00
465700.0000	466800.0000	470800.0000	847500.0000	0.0000	0.0000	0.0000	502200.0000	476200.0000	473900.0000	474400.0000	477500.0000	859700.0000	0.0000	0.0000	0.00
21.4760	20.8580	20.4200	20.4190	31.9700	31.9700	0.0000	20.4190	22.9370	22.1390	21.4990	21.0450	21.0450	37.2700	37.2700	0.00
2.8512	2.6927	2.4360	2.4361	1.6765	1.6765	0.0000	1.8826	2.8466	2.7679	2.6190	2.3969	2.3969	1.6925	1.6925	0.00
154.7400	110.4400	66.5300	66.5400	1.5207	1.5207	0.0000	1.0284	189.8600	146.5900	104.5400	63.1300	63.1400	1.6724	1.6724	0.00
0.0557	0.0480	0.0414	0.0414	0.0252	0.0252	0.0000	0.0293	0.0633	0.0560	0.0491	0.0432	0.0432	0.0255	0.0255	0.00
0.0203	0.0172	0.0147	0.0147	0.0110	0.0110	0.0000	0.0112	0.0239	0.0204	0.0176	0.0153	0.0153	0.0113	0.0113	0.00
0.8137	0.8256	0.8615	0.8614	0.9918	0.9918	0.0000	0.9961	0.8439	0.8387	0.8500	0.8816	0.8816	0.9905	0.9905	0.00
1.6781	1.6216	1.5119	1.5120	1.1904	1.1904	0.0000	1.2818	1.6091	1.5934	1.5416	1.4516	1.4517	1.1582	1.1582	0.00
106.0000	103.7900	96.4900	172.7700	7.4040	2.8575	2.8575	0.0037	88.0600	91.9900	91.2300	85.5400	153.1000	7.0440	2.7000	2.700
7651.0000	8113.0000	8326.0000	14900.0000	855.0000	330.0000	330.0000	0.5909	6141.0000	6897.0000	7415.0000	7676.0000	13731.0000	839.3000	321.7000	321.7
1691.5000	1729.6000	1699.3000	3041.5000	159.6000	61.6000	61.0000	0.1025	1420.9000	1549.2000	1605.4000	1591.0000	2846.7000	158.8100	60.8700	60.21
2.1414	2.0843	2.0060	2.0060	1.8232	1.8232	1.8251	1.6912	2.2531	2.2127	2.1591	2.0857	2.0857	1.9032	1.9032	1.903
682.8000	708.1000	739.6000	739.5000	808.7000	808.7000	816.6000	870.7000	652.4000	672.0000	697.2000	728.3000	728.1000	797.8000	797.8000	806.6
0.0932	0.0978	0.1047	0.1047	0.1308	0.1308	0.1300	0.1527	0.0893	0.0927	0.0972	0.1039	0.1039	0.1278	0.1278	0.127
0.9857	1.2658	1.7667	1.7645	5.2240	5.2240	5.1040	18.3340	0.7433	0.9083	1.1554	1.5901	1.5884	4.5440	4.5440	4.456
11.1740	13.0030	15.6320	15.6290	24.4250	24.4250	24.1120	30.6400	9.3890	10.7580	12.5010	14.9620	14.9590	23.0210	23.0210	22.70
0.0000	0.2424	0.6148	1.1133	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1523	0.2869	0.0000	0.0000	0.000
0.0000	4.3750	11.0930	20.0860	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.7473	5.1750	0.0000	0.0000	0.000
0.0000	0.6726	1.6958	3.0706	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4268	0.8039	0.0000	0.0000	0.000
0.0000	4.3070	4.3070	4.3070	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.3300	4.3300	0.0000	0.0000	0.000
0.0000	981.8000	987.5000	987.5000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	971.7000	971.8000	0.0000	0.0000	0.000
0.0000	0.6582	0.6471	0.6471	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6661	0.6661	0.0000	0.0000	0.000
0.0000	0.4645	0.5389	0.5393	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3751	0.3752	0.0000	0.0000	0.000
0.0000	65.1200	66.8200	66.8200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	63.2200	63.2300	0.0000	0.0000	0.000
106.0000	104.0400	97.1000	173.8900	7.4040	2.8575	2.8575	0.0037	88.0600	91.9900	91.2300	85.6900	153.3900	7.0440	2.7000	2.7000
7651.0000	8118.0000	8337.0000	14920.0000	855.0000	330.0000	330.0000	0.5909	6141.0000	6897.0000	7415.0000	7678.0000	13736.0000	839.3000	321.7000	321.7
1691.5000	1730.2000	1701.0000	3044.6000	159.6000	61.6000	61.0000	0.1025	1420.9000	1549.2000	1605.4000	1591.4000	2847.5000	158.8100	60.8700	60.210
-2553.0000	-2484.9000	-2410.5000	-2411.0000	-2190.8000	-2190.8000	-2177.9000	-2205.7000	-2550.8000	-2477.5000	-2402.5000	-2324.7000	-2325.2000	-2150.7000	-2150.7000	-2137.
2.1414	2.0855	2.0090	2.0091	1.8232	1.8232	1.8251	1.6912	2.2531	2.2127	2.1591	2.0865	2.0866	1.9032	1.9032	1.9035
682.8000	708.2000	739.9000	739.8000	808.7000	808.7000	816.6000	870.7000	652.4000	672.0000	697.2000	728.3000	728.2000	797.8000	797.8000	806.60
0.0932	0.0979	0.1049	0.1049	0.1308	0.1308	0.1300	0.1527	0.0893	0.0927	0.0972	0.1039	0.1039	0.1278	0.1278	0.1270
0.9857	1.2675	1.7731	1.7710	5.2240	5.2240	5.1040	18.3340	0.7433	0.9083	1.1554	1.5916	1.5900	4.5440	4.5440	4.4560
11.1740	0.0000	0.0000	0.0000	24.4250	24.4250	24.1120	30.6400	9.3890	10.7580	12.5010	0.0000	0.0000	23.0210	23.0210	22.708
0.7613	0.7813	0.7613	0.7616	0.0024	0.0024	0.0024	0.8278	0.7547	0.7547	0.7547	0.7547	0.7550	0.0020	0.0020	0.0020
0.0440	0.0440	0.0440	0.0440	0.0026	0.0026	0.0026	0.0449	0.0442	0.0442	0.0442	0.0442	0.0442	0.0017	0.0017	0.0017
0.0159	0.0159	0.0159	0.0159	0.0084	0.0084	0.0084	0.0144	0.0161	0.0161	0.0161	0.0161	0.0161	0.0039	0.0039	0.0039
0.0025	0.0025	0.0025	0.0025	0.0032	0.0032	0.0032	0.0020	0.0025	0.0025	0.0025	0.0025	0.0025	0.0019	0.0019	0.0019
0.0038	0.0038	0.0038	0.0038	0.0075	0.0075	0.0075	0.0027	0.0039	0.0039	0.0039	0.0039	0.0039	0.0047	0.0047	0.0047
0.0010	0.0010	0.0010	0.0010	0.0043	0.0043	0.0043	0.0005	0.0010	0.0010	0.0010	0.0010	0.0010	0.0029	0.0029	0.0029
0.0012	0.0012	0.0012	0.0012	0.0068	0.0068	0.0068	0.0006	0.0013	0.0013	0.0013	0.0013	0.0013	0.0049	0.0049	0.0049
0.0014	0.0014	0.0014	0.0014	0.0130	0.0130	0.0130	0.0004	0.0015	0.0015	0.0015	0.0015	0.0014	0.0112	0.0112	0.0112
0.0008	0.0008	0.0008	0.0008	0.0090	0.0090	0.0090	0.0001	0.0008	0.0008	0.0008	0.0008	0.0008	0.0089	0.0089	0.0089
0.0663	0.0663	0.0863	0.0863	0.0014	0.0014	0.0014	0.0699	0.0677	0.0677	0.0677	0.0677	0.0677	0.0009	0.0009	0.0009
0.0189	0.0189	0.0189	0.0189	0.0000	0.0000	0.0000	0.0208	0.0186	0.0186	0.0186	0.0186	0.0186	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0033	0.0033	0.0033	0.0033	0.0003	0.0003	0.0003	0.0028	0.0065	0.0065	0.0065	0.0065	0.0065	0.0002	0.0002	0.0002
0.0060	0.0060	0.0060	0.0060	0.0342	0.0342	0.0342	0.0029	0.0062	0.0062	0.0062	0.0062	0.0062	0.0252	0.0252	0.0252
0.0081	0.0081	0.0081	0.0081	0.0453	0.0453	0.0453	0.0024	0.0064	0.0064	0.0064	0.0064	0.0063	0.0360	0.0360	0.0360
0.0066	0.0066	0.0066	0.0066	0.0597	0.0597	0.0597	0.0020	0.0069	0.0069	0.0069	0.0069	0.0068	0.0512	0.0512	0.0512
0.0075	0.0075	0.0075	0.0075	0.0791	0.0791	0.0791	0.0018	0.0078	0.0078	0.0078	0.0078	0.0078	0.0728	0.0728	0.0728
0.0086	0.0086	0.0086	0.0086	0.1008	0.1008	0.1008	0.0015	0.0090	0.0090	0.0090	0.0090	0.0089	0.0985	0.0985	0.0985
0.0091	0.0091	0.0091	0.0091	0.1150	0.1150	0.1150	0.0012	0.0094	0.0094	0.0094	0.0094	0.0094	0.1178	0.1178	0.1178
0.0068	0.0068	0.0068	0.0068	0.0906	0.0906	0.0906	0.0006	0.0070	0.0070	0.0070	0.0070	0.0070	0.0960	0.0960	0.0960
0.0047	0.0047	0.0047	0.0047	0.0646	0.0646	0.0646	0.0003	0.0048	0.0048	0.0048	0.0048	0.0048	0.0702	0.0702	0.0702

31.8200	31.8200	31.8200	31.7800	102.4300	102.4300	102.4300	24.2980	32.0500	32.0500	32.0500	32.0500	32.0200	108.0600	108.0600	108.0
275.7000	208.4700	129.3600	129.1700	807.3000	807.3000	814.0000	1.2936	305.3600	252.1300	189.1400	117.0900	116.9300	800.4000	800.4000	807.8
-30724.0000	-30724.0000	-30724.0000	-55250.0000	-539.8000	-210.0300	-208.8500	-26305.0000	-30706.0000	-30706.0000	-30706.0000	-30706.0000	-55220.0000	-510.6000	-199.9200	-199.
0.0000	0.0000	0.0000	0.0000	5.1830	5.1830	5.0550	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.7500	4.7500	4.649
755.2000	748.6000	762.1000	1372.4000	0.0000	0.0000	0.0000	884.9000	830.4000	791.5000	782.1000	791.8000	1425.7000	0.0000	0.0000	0.000
20031.0000	18820.0000	18517.0000	33340.0000	0.0000	0.0000	0.0000	21494.0000	24494.0000	21802.0000	20471.0000	20062.0000	36130.0000	0.0000	0.0000	0.000
13676.0000	18726.0000	31930.0000	57490.0000	0.0000	0.0000	0.0000	2509400.0000	13254.0000	15710.0000	21443.0000	36160.0000	65090.0000	0.0000	0.0000	0.000
428500.0000	424800.0000	432500.0000	778800.0000	0.0000	0.0000	0.0000	502200.0000	471200.0000	449200.0000	443800.0000	449300.0000	809000.0000	0.0000	0.0000	0.000
26.5250	25.1410	24.2980	24.2970	34.3400	34.3400	0.0000	24.2900	29.4980	27.5450	26.1750	25.3390	25.3380	37.1300	37.1300	0.000
3.0572	2.8977	2.5055	2.5058	1.6113	1.6113	0.0000	1.7208	2.9547	2.9568	2.7831	2.4429	2.4431	1.6509	1.6509	0.000
221.1000	151.7100	87.5300	87.5500	1.8074	1.8074	0.0000	1.2930	278.9700	209.4800	144.1200	83.7600	83.7800	1.8255	1.8255	0.000
0.0592	0.0484	0.0391	0.0391	0.0201	0.0201	0.0000	0.0247	0.0687	0.0582	0.0486	0.0403	0.0403	0.0212	0.0212	0.000
0.0253	0.0194	0.0154	0.0154	0.0094	0.0094	0.0000	0.0105	0.0327	0.0249	0.0196	0.0158	0.0158	0.0097	0.0097	0.000
0.7039	0.7267	0.7861	0.7860	0.9872	0.9872	0.0000	0.9937	0.7386	0.7315	0.7542	0.8087	0.8087	0.9875	0.9875	0.000
1.8157	1.7760	1.6008	1.6010	1.1866	1.1866	0.0000	1.2560	1.6683	1.7114	1.6607	1.5155	1.5157	1.1653	1.1653	0.000
173.4500	179.5500	165.4200	296.5100	8.2050	3.1930	3.1930	0.0788	98.9200	137.7800	146.6900	136.1900	244.0000	7.6620	3.0000	3.000
9517.0000	10719.0000	11010.0000	19720.0000	846.8000	329.5000	329.5000	9.3510	5294.0000	7986.0000	9308.0000	9702.0000	17368.0000	827.9000	324.2000	324.2
2502.3000	2668.2000	2543.7000	4558.0000	158.3900	61.6300	61.1200	1.7012	1471.6000	2125.1000	2330.6000	2244.5000	4019.0000	156.1500	61.1400	60.58
2.3634	2.2890	2.1707	2.1711	1.7270	1.7270	1.7303	1.6635	2.4616	2.4154	2.3405	2.2231	2.2235	1.8018	1.8018	1.80
574.1000	606.4000	653.4000	653.2000	807.0000	807.0000	813.7000	829.7000	543.1000	567.3000	602.9000	652.5000	652.3000	800.4000	800.4000	807.8
0.0807	0.0845	0.0910	0.0910	0.1318	0.1318	0.1310	0.1422	0.0769	0.0798	0.0838	0.0905	0.0905	0.1294	0.1294	0.128
0.3743	0.4760	0.6476	0.6462	5.1600	5.1600	5.0320	7.8060	0.3015	0.3777	0.4906	0.7056	0.7043	4.7500	4.7500	4.648
7.0480	8.5520	10.9210	10.9150	25.2460	25.2460	24.9120	28.8790	5.7830	6.9490	8.4810	10.8830	10.8770	24.2460	24.2460	23.91
0.0000	0.5044	1.1504	2.0769	0.0744	0.0289	0.0289	0.0000	0.0000	0.0000	0.5340	1.3490	2.4398	0.0000	0.0000	0.000
0.0000	9.1080	20.7660	37.4900	1.3396	0.5212	0.5200	0.0000	0.0000	0.0000	9.6390	24.3420	44.0300	0.0000	0.0000	0.000
0.0000	1.3991	3.1670	5.7170	0.1981	0.0771	0.0769	0.0000	0.0000	0.0000	1.5031	3.7700	6.8180	0.0000	0.0000	0.000
0.0000	4.3050	4.3040	4.3040	4.3200	4.3200	4.3100	0.0000	0.0000	0.0000	4.3290	4.3230	4.3230	0.0000	0.0000	0.000
0.0000	982.7000	989.8000	989.8000	1020.9000	1020.9000	1020.9000	0.0000	0.0000	0.0000	968.0000	974.7000	974.8000	0.0000	0.0000	0.000
0.0000	0.6548	0.6436	0.6436	0.5812	0.5812	0.5866	0.0000	0.0000	0.0000	0.6705	0.6624	0.6624	0.0000	0.0000	0.000
0.0000	0.4720	0.5647	0.5650	1.4239	1.4239	1.3058	0.0000	0.0000	0.0000	0.3557	0.4177	0.4180	0.0000	0.0000	0.000
0.0000	65.2900	67.3100	67.3200	75.2300	75.2300	74.7100	0.0000	0.0000	0.0000	61.8800	63.8800	63.8900	0.0000	0.0000	0.000
173.4500	180.0500	166.5700	298.5900	8.2800	3.2220	3.2220	0.0788	98.9200	137.7800	147.2200	137.5400	246.4400	7.6620	3.0000	3.000
9517.0000	10728.0000	11031.0000	19758.0000	848.1000	330.0000	330.0000	9.3510	5294.0000	7986.0000	9317.0000	9726.0000	17412.0000	827.9000	324.2000	324.2
2502.3000	2669.6000	2546.8000	4563.0000	158.5900	61.7100	61.2000	1.7012	1471.6000	2125.1000	2332.1000	2248.2000	4026.0000	156.1500	61.1400	60.58
-2852.8000	-2752.1000	-2634.8000	-2635.6000	-2291.3000	-2291.3000	-2278.4000	-2253.9000	-2857.4000	-2746.2000	-2642.1000	-2528.9000	-2529.8000	-2220.1000	-2220.1000	-2207
2.3634	2.2907	2.1747	2.1752	1.7311	1.7311	1.7343	1.6635	2.4616	2.4154	2.3426	2.2284	2.2288	1.8018	1.8018	1.804
574.1000	606.6000	653.8000	653.6000	807.3000	807.3000	814.0000	829.7000	543.1000	567.3000	603.1000	653.1000	652.8000	800.4000	800.4000	807.8
0.0807	0.0846	0.0911	0.0911	0.1320	0.1320	0.1312	0.1422	0.0769	0.0798	0.0839	0.0907	0.0907	0.1294	0.1294	0.128
0.3743	0.4769	0.6505	0.6491	5.1830	5.1830	5.0550	7.8060	0.3015	0.3777	0.4918	0.7099	0.7086	4.7500	4.7500	4.648
7.0480	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	28.8790	5.7830	6.9490	0.0000	0.0000	0.0000	24.2460	24.2460	23.91
0.5677	0.5677	0.5677	0.5680	0.0019	0.0019	0.0019	0.6522	0.5563	0.5563	0.5563	0.5563	0.5567	0.0015	0.0015	0.001
0.1173	0.1173	0.1173	0.1173	0.0082	0.0082	0.0082	0.1201	0.1187	0.1187	0.1187	0.1187	0.1187	0.0052	0.0052	0.005
0.0864	0.0884	0.0864	0.0864	0.0439	0.0439	0.0439	0.0738	0.0889	0.0889	0.0889	0.0889	0.0888	0.0256	0.0256	0.025
0.0120	0.0120	0.0120	0.0120	0.0191	0.0191	0.0191	0.0084	0.0124	0.0124	0.0124	0.0124	0.0124	0.0115	0.0115	0.011
0.0168	0.0168	0.0168	0.0168	0.0407	0.0407	0.0407	0.0105	0.0175	0.0175	0.0175	0.0175	0.0175	0.0255	0.0255	0.025
0.0027	0.0027	0.0027	0.0027	0.0130	0.0130	0.0130	0.0012	0.0028	0.0028	0.0028	0.0028	0.0028	0.0095	0.0095	0.009
0.0026	0.0026	0.0026	0.0026	0.0150	0.0150	0.0150	0.0010	0.0027	0.0027	0.0027	0.0027	0.0027	0.0116	0.0116	0.011
0.0008	0.0008	0.0008	0.0008	0.0067	0.0067	0.0067	0.0002	0.0008	0.0008	0.0008	0.0008	0.0008	0.0064	0.0064	0.006
0.0002	0.0002	0.0002	0.0002	0.0018	0.0018	0.0018	0.0000	0.0002	0.0002	0.0002	0.0002	0.0002	0.0019	0.0019	0.001
0.0797	0.0797	0.0797	0.0797	0.0018	0.0018	0.0018	0.0867	0.0819	0.0819	0.0819	0.0819	0.0820	0.0012	0.0012	0.001
0.0266	0.0266	0.0266	0.0267	0.0000	0.0000	0.0000	0.0316	0.0254	0.0254	0.0254	0.0254	0.0254	0.0000	0.0000	0.000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
0.0036	0.0036	0.0036	0.0036	0.0092	0.0092	0.0092	0.0025	0.0069	0.0069	0.0069	0.0069	0.0069	0.0004	0.0004	0.000
0.0068	0.0068	0.0068	0.0068	0.0403	0.0403	0.0403	0.0026	0.0071	0.0071	0.0071	0.0071	0.0070	0.0320	0.0320	0.032
0.0068	0.0068	0.0068	0.0068	0.0503	0.0503	0.0503	0.0022	0.0072	0.0072	0.0072	0.0072	0.0071	0.0438	0.0438	0.043
0.0073	0.0073	0.0073	0.0073	0.0625	0.0625	0.0625	0.0018	0.0077	0.0077	0.0077	0.0077	0.0076	0.0591	0.0591	0.059
0.0083	0.0083	0.0083	0.0083	0.0786	0.0786	0.0786	0.0016	0.0087	0.0087	0.0087	0.0087	0.0087	0.0797	0.0797	0.079
0.0095	0.0095	0.0095	0.0094	0.0981	0.0961	0.0981	0.0014	0.0099	0.0099	0.0099	0.0099	0.0098	0.1028	0.1028	0.102
0.0099	0.0099	0.0099	0.0099	0.1060	0.1060	0.1060	0.0011	0.0103	0.0103	0.0103	0.0103	0.0103	0.1178	0.1178	0.117
0.0074	0.0074	0.0074	0.0073	0.0814	0.0814	0.0814	0.0006	0.0076	0.0076	0.0076	0.0076	0.0076	0.0928	0.0928	0.092
0.0050	0.0050	0.0050	0.0050	0.0566	0.0566	0.0566	0.0003	0.0051	0.0051	0.0051	0.0051	0.0051	0.0658	0.0658	0.065

27.2690	27.2690	27.2690	27.2380	112.3400	112.3100	112.3400	20.2870	27.3810	27.3810	27.3810	27.3810	27.3430	116.0600	116.0600	116.0
186.1700	113.4000	37.0700	37.0200	807.9000	807.9000	811.1000	0.9949	22[illegible].1600	171.2800	104.0500	34.1900	34.1400	79[illegible].8000	794.8000	798.5
-28300.0000	-28300.0000	-28300.0000	-50900.0000	-505.9000	-199.3200	-198.8400	-24201.0000	-28215.0000	-28215.0000	-28215.0000	-28215.0000	-50740.0000	-494.5000	-191.2800	-190.3
0.0000	0.0000	0.0000	0.0000	5.1840	5.1840	5.1290	0.0115	0.0000	0.0000	0.0000	0.0000	0.0000	4.3980	4.3980	4.351
820.9000	826.8000	843.6000	1518.6000	0.0000	0.0000	0.0000	885.0000	839.1000	834.9000	839.1000	854.3000	1537.8000	0.0000	0.0000	0.003
17450.0000	16979.0000	17115.0000	30808.0000	0.0000	0.0000	0.0000	17954.0000	19247.0000	18296.0000	17759.0000	17904.0000	32230.0000	0.0000	0.0000	0.000
18779.0000	31920.0000	101330.0000	182370.0000	0.0000	0.0000	0.0000	2724100.0000	15303.0000	20800.0000	35230.0000	110610.0000	199070.0000	0.0000	0.0000	0.000
465800.0000	469200.0000	478700.0000	861800.0000	0.0000	0.0000	0.0000	502200.0000	476200.0000	473800.0000	476200.0000	484800.0000	872700.0000	0.0000	0.0000	0.000
21.2560	20.5350	20.2880	20.2870	32.6000	32.6000	0.0000	20.2870	22.9370	21.9130	21.1640	20.9580	20.9570	38.6300	38.6300	0.000
2.8106	2.5267	2.1195	2.1195	1.6521	1.6521	0.0000	1.9039	2.8466	2.7274	2.4743	2.1245	2.1245	1.6752	1.6752	0.000
140.2700	80.2900	25.4980	25.5010	1.5761	1.5761	0.0000	0.9949	189.8600	132.7900	76.1000	24.4360	24.4390	1.7477	1.7477	0.000
0.0532	0.0433	0.0350	0.0350	0.0239	0.0239	0.0000	0.0304	0.0633	0.0537	0.0450	0.0373	0.0373	0.0246	0.0246	0.000
0.0192	0.0155	0.0127	0.0127	0.0107	0.0107	0.0000	0.0115	0.0239	0.0194	0.0160	0.0134	0.0134	0.0110	0.0110	0.000
0.8153	0.8471	0.9284	0.9284	0.9911	0.9911	0.0000	0.9964	0.8439	0.8405	0.8691	0.9385	0.9385	0.9896	0.9896	0.000
1.6657	1.5518	1.3707	1.3708	1.1899	1.1899	0.0000	1.2797	1.6091	1.5807	1.4837	1.3379	1.3380	1.1541	1.1541	0.000
105.7000	99.2900	82.3800	147.7000	7.3280	2.8875	2.8875	0.0000	88.0600	92.2400	87.9200	72.9000	130.5200	7.1090	2.7500	2.750
7818.0000	8280.0000	8142.0000	14590.0000	824.6000	324.9000	324.9000	0.0000	6141.0000	7091.0000	7626.0000	7483.0000	13390.0000	825.0000	319.2000	319.2
1709.2000	1714.8000	1577.2000	2826.6000	154.0900	60.7100	60.4700	0.0000	1420.9000	1575.0000	1603.9000	1472.3000	2634.8000	156.7000	60.6200	60.34
2.1245	2.0337	1.8937	1.8936	1.8079	1.8079	1.8086	0.0000	2.2531	2.1969	2.1116	1.9789	1.9788	1.8989	1.8989	1.898
690.5000	728.9000	779.2000	779.2000	807.8000	807.8000	811.1000	0.0000	652.4000	679.6000	717.8000	767.2000	767.2000	794.8000	794.8000	798.5
0.0945	0.1022	0.1169	0.1169	0.1307	0.1307	0.1303	0.0000	0.0893	0.0940	0.1014	0.1152	0.1152	0.1270	0.1270	0.126
1.0622	1.5769	3.1217	3.1187	5.1800	5.1800	5.1250	0.0000	0.7433	0.9768	1.4205	2.6855	2.6826	4.3980	4.3980	4.361
11.7160	14.6740	19.9730	19.9720	24.4980	24.4980	24.3670	0.0000	9.3890	11.2730	14.0720	18.9500	18.9480	22.8570	22.8570	22.72
0.0000	0.5076	0.6125	1.1118	0.0141	0.0056	0.0055	0.0000	0.0000	0.0000	0.1213	0.0000	0.0000	0.0000	0.0000	0.000
0.0000	9.1600	11.0450	20.0490	0.2539	0.1000	0.0989	0.0000	0.0000	0.0000	2.1875	0.0000	0.0000	0.0000	0.0000	0.000
0.0000	1.4033	1.6727	3.0363	0.0382	0.0151	0.0149	0.0000	0.0000	0.0000	0.3405	0.0000	0.0000	0.0000	0.0000	0.000
0.0000	4.3070	4.3080	4.3080	4.3130	4.3130	4.3090	0.0000	0.0000	0.0000	4.3310	0.0000	0.0000	0.0000	0.0000	0.000
0.0000	985.4000	996.7000	996.8000	1003.3000	1003.3000	1003.3000	0.0000	0.0000	0.0000	969.8000	0.0000	0.0000	0.0000	0.0000	0.000
0.0000	0.6505	0.6322	0.6322	0.6189	0.6189	0.6206	0.0000	0.0000	0.0000	0.6684	0.0000	0.0000	0.0000	0.0000	0.000
0.0000	0.5107	0.6445	0.6451	0.7897	0.7897	0.7693	0.0000	0.0000	0.0000	0.3600	0.0000	0.0000	0.0000	0.0000	0.000
0.0000	66.2100	69.3500	69.3600	71.1500	71.1500	70.9400	0.0000	0.0000	0.0000	62.6400	0.0000	0.0000	0.0000	0.0000	0.000
105.7000	99.8000	83.0000	148.8200	7.3430	2.8930	2.8930	0.0000	88.0600	92.2400	88.0400	72.9000	130.5200	7.1090	2.7500	2.7500
7818.0000	8289.0000	8153.0000	14610.0000	824.9000	325.0000	325.0000	0.0000	6141.0000	7091.0000	7628.0000	7483.0000	13390.0000	825.0000	319.2000	319.20
1709.2000	1716.2000	1578.9000	2829.7000	154.1300	60.7300	60.4800	0.0000	1420.9000	1575.0000	1604.2000	1472.3000	2634.8000	156.7000	60.6200	60.340
-2529.5000	-2435.8000	-2309.6000	-2310.0000	-2207.8000	-2207.8000	-2202.5000	0.0000	-2550.8000	-2453.4000	-2350.8000	-2229.0000	-2229.3000	-2157.6000	-2157.6000	-2152.
2.1245	2.0362	1.8970	1.8969	1.8087	1.8087	1.8093	0.0000	2.2531	2.1969	2.1123	1.9789	1.9788	1.8989	1.8989	1.8987
690.5000	729.1000	779.5000	779.4000	807.9000	807.9000	811.1000	0.0000	652.4000	679.6000	717.8000	767.2000	767.2000	794.8000	794.8000	798.50
0.0945	0.1023	0.1171	0.1171	0.1307	0.1307	0.1304	0.0000	0.0893	0.0940	0.1015	0.1152	0.1152	0.1270	0.1270	0.1267
1.0622	1.5816	3.1336	3.1308	5.1840	5.1840	5.1290	0.0000	0.7433	0.9768	1.4216	2.6855	2.6826	4.3980	4.3980	4.3610
11.7160	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9.3890	11.2730	0.0000	18.9500	18.9480	22.8570	22.8570	22.724
0.7613	0.7613	0.7613	0.7616	0.0022	0.0022	0.0022	0.8277	0.7547	0.7547	0.7547	0.7547	0.7550	0.0019	0.0019	0.0019
0.0440	0.0440	0.0440	0.0440	0.0033	0.0033	0.0033	0.0460	0.0442	0.0442	0.0442	0.0442	0.0442	0.0021	0.0021	0.0021
0.0159	0.0159	0.0159	0.0159	0.0094	0.0094	0.0094	0.0151	0.0161	0.0161	0.0161	0.0161	0.0161	0.0053	0.0053	0.0053
0.0025	0.0025	0.0025	0.0025	0.0046	0.0046	0.0046	0.0020	0.0025	0.0025	0.0025	0.0025	0.0025	0.0027	0.0027	0.0027
0.0038	0.0038	0.0038	0.0038	0.0105	0.0105	0.0105	0.0028	0.0039	0.0039	0.0039	0.0039	0.0039	0.0064	0.0064	0.0064
0.0010	0.0010	0.0010	0.0010	0.0054	0.0054	0.0054	0.0005	0.0010	0.0010	0.0010	0.0010	0.0010	0.0038	0.0038	0.0038
0.0012	0.0012	0.0012	0.0012	0.0083	0.0083	0.0083	0.0006	0.0013	0.0013	0.0013	0.0013	0.0013	0.0061	0.0061	0.0061
0.0014	0.0014	0.0014	0.0014	0.0141	0.0141	0.0141	0.0003	0.0015	0.0015	0.0015	0.0015	0.0014	0.0125	0.0125	0.0125
0.0008	0.0008	0.0008	0.0008	0.0091	0.0091	0.0091	0.0001	0.0008	0.0008	0.0008	0.0008	0.0008	0.0093	0.0093	0.0093
0.0663	0.0663	0.0683	0.0663	0.0015	0.0015	0.0015	0.0709	0.0677	0.0677	0.0677	0.0677	0.0677	0.0010	0.0010	0.0010
0.0189	0.0189	0.0189	0.0189	0.0000	0.0000	0.0000	0.0206	0.0186	0.0186	0.0186	0.0186	0.0186	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0033	0.0033	0.0033	0.0033	0.0025	0.0025	0.0025	0.0028	0.0065	0.0065	0.0065	0.0065	0.0065	0.0001	0.0001	0.0001
0.0060	0.0060	0.0060	0.0060	0.0408	0.0408	0.0408	0.0028	0.0062	0.0062	0.0062	0.0062	0.0062	0.0306	0.0306	0.0306
0.0061	0.0061	0.0061	0.0061	0.0512	0.0512	0.0512	0.0022	0.0064	0.0064	0.0064	0.0064	0.0063	0.0417	0.0417	0.0417
0.0066	0.0066	0.0066	0.0066	0.0645	0.0645	0.0645	0.0017	0.0069	0.0069	0.0069	0.0069	0.0068	0.0569	0.0569	0.0569
0.0075	0.0075	0.0075	0.0075	0.0822	0.0822	0.0822	0.0014	0.0078	0.0078	0.0078	0.0078	0.0078	0.0778	0.0778	0.0778
0.0086	0.0086	0.0086	0.0086	0.1017	0.1017	0.1017	0.0011	0.0090	0.0090	0.0090	0.0090	0.0089	0.1019	0.1019	0.1019
0.0091	0.0091	0.0091	0.0091	0.1132	0.1132	0.1132	0.0007	0.0094	0.0094	0.0094	0.0094	0.0094	0.1186	0.1186	0.1186
0.0068	0.0068	0.0068	0.0068	0.0876	0.0876	0.0876	0.0004	0.0070	0.0070	0.0070	0.0070	0.0070	0.0945	0.0945	0.0945
0.0047	0.0047	0.0047	0.0047	0.0614	0.0614	0.0614	0.0001	0.0048	0.0048	0.0048	0.0048	0.0048	0.0678	0.0678	0.0678

31.8200	31.8200	31.8200	31.7800	97.6600	97.6600	97.6600	24.1620	32.0500	32.0500	32.0500	32.0500	32.0200	103.2600	103.2600	10
255.2100	155.3000	48.7200	48.6500	798.7000	798.7000	801.5000	1.2386	305.3600	232.7400	140.5500	44.3900	44.3200	793.2000	793.2000	79
-30724.0000	-30724.0000	-30724.0000	-55250.0000	-542.8000	-206.8900	-206.4100	-26251.0000	-30706.0000	-30706.0000	-30706.0000	-30706.0000	-55220.0000	-519.6000	-200.8200	-20
0.0000	0.0000	0.0000	0.0000	4.6350	4.6350	4.5880	0.0108	0.0000	0.0000	0.0000	0.0000	0.0000	4.3830	4.3830	4.3
750.5000	755.8000	796.8000	1434.6000	0.0000	0.0000	0.0000	885.0000	830.4000	786.0000	786.8000	820.4000	1477.0000	0.0000	0.0000	0.0
19522.0000	18519.0000	19255.0000	34660.0000	0.0000	0.0000	0.0000	21383.0000	24494.0000	21250.0000	20097.0000	20684.0000	37230.0000	0.0000	0.0000	0.0
14882.0000	26109.0000	89390.0000	160900.0000	0.0000	0.0000	0.0000	2606200.0000	13254.0000	17088.0000	29693.0000	99400.0000	178910.0000	0.0000	0.0000	0.0
425900.0000	428900.0000	452200.0000	814100.0000	0.0000	0.0000	0.0000	502200.0000	471200.0000	446000.0000	446500.0000	465600.0000	838200.0000	0.0000	0.0000	0.0
26.0130	24.5030	24.1640	24.1620	37.1800	37.1800	0.0000	24.1620	29.4980	27.0370	25.5420	25.2110	25.2090	40.2100	40.2100	0.0
3.0333	2.6476	2.0382	2.0383	1.5906	1.5906	0.0000	1.7503	2.9547	2.9216	2.5632	2.0439	2.0439	1.6418	1.6418	0.0
198.0300	107.0700	32.5200	32.5200	1.9768	1.9768	0.0000	1.2386	278.9700	187.7200	102.1700	31.4120	31.4160	1.9850	1.9850	0.0
0.0556	0.0416	0.0314	0.0314	0.0187	0.0187	0.0000	0.0260	0.0687	0.0550	0.0425	0.0331	0.0331	0.0199	0.0199	0.0
0.0231	0.0165	0.0125	0.0125	0.0089	0.0089	0.0000	0.0108	0.0327	0.0229	0.0169	0.0131	0.0131	0.0093	0.0093	0.0
0.7076	0.7630	0.8878	0.8877	0.9844	0.9844	0.0000	0.9944	0.7386	0.7355	0.7878	0.9000	0.8999	0.9850	0.9850	0.0
1.8184	1.6673	1.3786	1.3788	1.1743	1.1743	0.0000	1.2516	1.6683	1.7068	1.5689	1.3374	1.3375	1.1531	1.1531	0.0
178.0400	171.9200	130.1100	233.3000	8.4530	3.2220	3.2220	0.0000	98.9200	143.3200	141.3700	107.1100	191.9600	7.9160	3.0597	3.05
10024.0000	11012.0000	10263.0000	18385.0000	836.9000	319.0000	319.0000	0.0000	5294.0000	8538.0000	9671.0000	9073.0000	16245.0000	826.3000	319.4000	319.
2595.1000	2610.0000	2150.8000	3854.0000	158.2800	60.3300	60.1200	0.0000	1471.6000	2232.4000	2297.9000	1902.2000	3407.0000	157.3400	60.8100	60.5
2.3429	2.2140	1.9803	1.9805	1.7348	1.7348	1.7358	0.0000	2.4616	2.3948	2.2658	2.0385	2.0386	1.8117	1.8117	1.81
583.1000	636.9000	720.3000	720.1000	798.2000	798.2000	801.0000	0.0000	543.1000	577.4000	635.3000	720.0000	719.8000	792.8000	792.8000	795.
0.0818	0.0885	0.1047	0.1047	0.1301	0.1301	0.1297	0.0000	0.0769	0.0810	0.0879	0.1043	0.1043	0.1277	0.1277	0.12
0.4021	0.5854	1.2299	1.2270	4.5960	4.5960	4.5490	0.0000	0.3015	0.4086	0.6195	1.3525	1.3497	4.3550	4.3550	4.31
7.4850	10.0230	15.7290	15.7220	24.5820	24.5820	24.4390	0.0000	5.7830	7.3980	9.9750	15.6400	15.6350	23.6650	23.6650	23.5
0.1094	0.9445	1.6912	3.0524	0.1431	0.0546	0.0545	0.0000	0.0000	0.0110	1.0981	1.7527	3.1730	0.1042	0.0403	0.04
1.9763	17.0510	30.5080	55.0600	2.5790	0.9830	0.9825	0.0000	0.0000	0.1992	19.8170	31.6070	57.2200	1.8771	0.7255	0.724
0.3045	2.6075	4.5950	8.2920	0.3808	0.1451	0.1451	0.0000	0.0000	0.0312	3.0769	4.8340	8.7520	0.2815	0.1088	0.105
4.3050	4.3040	4.3050	4.3050	4.3210	4.3210	4.3170	0.0000	0.0000	4.3300	4.3250	4.3150	4.3150	4.3130	4.3130	4.309
979.7000	987.1000	1002.4000	1002.4000	1022.4000	1022.4000	1022.4000	0.0000	0.0000	965.1000	972.2000	987.0000	987.0000	1006.6000	1006.6000	1006.
0.6595	0.6479	0.6227	0.6227	0.5776	0.5776	0.5799	0.0000	0.0000	0.6738	0.6655	0.6468	0.6467	0.6125	0.6125	0.614
0.4350	0.5283	0.7445	0.7454	1.5118	1.5118	1.4552	0.0000	0.0000	0.3298	0.3938	0.5152	0.5156	0.8703	0.8703	0.845
64.3200	66.5800	70.6000	70.8100	75.5700	75.5700	75.3500	0.0000	0.0000	60.9100	63.1600	67.1100	67.1200	71.9200	71.9200	71.70
178.1500	172.8600	131.8000	238.3500	8.5960	3.2770	3.2770	0.0000	98.9200	143.3300	142.4700	108.8700	195.1300	8.0200	3.1000	3.100
10025.0000	11029.0000	10293.0000	18440.0000	839.5000	320.0000	320.0000	0.0000	5294.0000	8538.0000	9691.0000	9104.0000	16302.0000	828.2000	320.1000	320.1
2595.4000	2612.6000	2155.4000	3862.0000	158.6600	60.4800	60.2700	0.0000	1471.6000	2232.4000	2301.0000	1907.0000	3416.0000	157.6200	60.9200	60.68
-2820.3000	-2674.8000	-2478.7000	-2479.5000	-2327.5000	-2327.5000	-2322.2000	0.0000	-2857.4000	-2710.1000	-2566.8000	-2387.8000	-2388.7000	-2258.4000	-2258.4000	-2253.
2.3433	2.2172	1.9872	1.9874	1.7428	1.7428	1.7438	0.0000	2.4616	2.3948	2.2700	2.0464	2.0466	1.8173	1.8173	1.817
583.1000	637.3000	720.9000	720.7000	798.7000	798.7000	801.5000	0.0000	543.1000	577.4000	635.8000	720.7000	720.5000	793.2000	793.2000	796.3
0.0818	0.0886	0.1050	0.1050	0.1305	0.1305	0.1301	0.0000	0.0769	0.0810	0.0881	0.1047	0.1047	0.1280	0.1280	0.127
0.4022	0.5875	1.2394	1.2365	4.6350	4.6350	4.5880	0.0000	0.3015	0.4086	0.6225	1.3649	1.3622	4.3830	4.3830	4.344
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5.7830	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
0.5677	0.5677	0.5677	0.5680	0.0014	0.0014	0.0014	0.6486	0.5563	0.5563	0.5563	0.5563	0.5567	0.0010	0.0010	0.0010
0.1173	0.1173	0.1173	0.1173	0.0093	0.0093	0.0093	0.1246	0.1187	0.1187	0.1187	0.1187	0.1187	0.0053	0.0053	0.0053
0.0864	0.0864	0.0864	0.0864	0.0608	0.0608	0.0608	0.0776	0.0889	0.0889	0.0889	0.0889	0.0888	0.0324	0.0324	0.0324
0.0120	0.0120	0.0120	0.0120	0.0264	0.0264	0.0264	0.0085	0.0124	0.0124	0.0124	0.0124	0.0124	0.0154	0.0154	0.0154
0.0168	0.0168	0.0168	0.0168	0.0538	0.0538	0.0538	0.0103	0.0175	0.0175	0.0175	0.0175	0.0175	0.0336	0.0336	0.0336
0.0027	0.0027	0.0027	0.0027	0.0153	0.0153	0.0153	0.0011	0.0028	0.0028	0.0028	0.0028	0.0028	0.0117	0.0117	0.0117
0.0026	0.0026	0.0026	0.0026	0.0169	0.0169	0.0169	0.0008	0.0027	0.0027	0.0027	0.0027	0.0027	0.0138	0.0138	0.0138
0.0008	0.0008	0.0008	0.0008	0.0068	0.0068	0.0068	0.0001	0.0008	0.0008	0.0008	0.0008	0.0008	0.0068	0.0068	0.0065
0.0002	0.0002	0.0002	0.0002	0.0017	0.0017	0.0017	0.0000	0.0002	0.0002	0.0002	0.0002	0.0002	0.0019	0.0019	0.0019
0.0797	0.0797	0.0797	0.0797	0.0017	0.0017	0.0017	0.0883	0.0819	0.0819	0.0819	0.0819	0.0820	0.0011	0.0011	0.0011
0.0266	0.0266	0.0266	0.0267	0.0000	0.0000	0.0000	0.0309	0.0254	0.0254	0.0254	0.0254	0.0254	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0036	0.0036	0.0036	0.0036	0.0168	0.0168	0.0168	0.0019	0.0069	0.0069	0.0069	0.0069	0.0069	0.0135	0.0135	0.0135
0.0068	0.0068	0.0068	0.0068	0.0449	0.0449	0.0449	0.0022	0.0071	0.0071	0.0071	0.0071	0.0070	0.0376	0.0376	0.0376
0.0068	0.0068	0.0068	0.0068	0.0530	0.0530	0.0530	0.0016	0.0072	0.0072	0.0072	0.0072	0.0071	0.0487	0.0487	0.0487
0.0073	0.0073	0.0073	0.0073	0.0630	0.0630	0.0630	0.0012	0.0077	0.0077	0.0077	0.0077	0.0076	0.0627	0.0627	0.0627
0.0083	0.0083	0.0083	0.0083	0.0767	0.0767	0.0767	0.0009	0.0087	0.0087	0.0087	0.0087	0.0087	0.0812	0.0812	0.0812
0.0095	0.0095	0.0095	0.0094	0.0913	0.0913	0.0913	0.0007	0.0099	0.0099	0.0099	0.0099	0.0098	0.1013	0.1013	0.1013
0.0099	0.0099	0.0099	0.0099	0.0987	0.0987	0.0987	0.0005	0.0103	0.0103	0.0103	0.0103	0.0103	0.1132	0.1132	0.1132
0.0074	0.0074	0.0074	0.0073	0.0746	0.0748	0.0748	0.0002	0.0076	0.0076	0.0076	0.0076	0.0076	0.0873	0.0873	0.0873
0.0050	0.0050	0.0050	0.0050	0.0512	0.0512	0.0512	0.0001	0.0051	0.0051	0.0051	0.0051	0.0051	0.0607	0.0607	0.0607

[illegible]	[illegible]	27.6520	27.6530	110.8900	110.8900	110.8900	20.5930	27.8090	27.8090	27.8090	27.8090	27.7710	115.1700	115.1700	115.1700
207.8100	155.8700	97.7100	97.5600	813.3000	813.3000	820.9000	1.0393	235.5000	191.4000	143.0300	89.6600	89.5200	803.7000	803.7000	812.1000
-28406.0000	-28406.0000	-28406.0000	-51080.0000	-505.9000	-183.4000	-182.3400	-24246.0000	-28308.0000	-28308.0000	-28308.0000	-28308.0000	-50910.0000	-497.1000	-193.6600	-192.4900
0.0000	0.0000	0.0000	0.0000	5.5670	5.5670	5.4360	0.0112	0.0000	0.0000	0.0000	0.0000	0.0000	4.8980	4.8980	4.7970
811.0000	813.2000	821.0000	1478.1000	0.0000	0.0000	0.0000	885.0000	831.5000	827.2000	828.2000	834.6000	1502.5000	0.0000	0.0000	0.0000
17606.0000	17122.0000	16906.0000	30438.0000	0.0000	0.0000	0.0000	18224.0000	19336.0000	18534.0000	18002.0000	17749.0000	31950.0000	0.0000	0.0000	0.0000
16857.0000	23043.0000	37890.0000	68210.0000	0.0000	0.0000	0.0000	2647100.0000	15029.0000	18709.0000	25543.0000	41790.0000	75220.0000	0.0000	0.0000	0.0000
460200.0000	461500.0000	465900.0000	838800.0000	0.0000	0.0000	0.0000	502200.0000	471800.0000	469400.0000	470000.0000	473600.0000	852600.0000	0.0000	0.0000	0.0000
21.7090	21.0540	20.5930	20.5930	32.8400	32.8400	0.0000	20.5920	23.2550	22.4060	21.7350	21.2670	21.2670	37.9700	37.9700	0.0000
2.8800	2.6989	2.4360	2.4361	1.6410	1.6410	0.0000	1.8725	2.8523	2.7749	2.6234	2.3956	2.3957	1.6559	1.6559	0.0000
157.6600	112.1600	67.3500	67.3600	1.5788	1.5788	0.0000	1.0392	194.2100	149.5500	106.3900	64.1200	64.1300	1.7238	1.7238	0.0000
0.0559	0.0481	0.0413	0.0413	0.0243	0.0243	0.0000	0.0291	0.0636	0.0561	0.0491	0.0431	0.0431	0.0246	0.0246	0.0000
0.0205	0.0173	0.0148	0.0148	0.0107	0.0107	0.0000	0.0112	0.0242	0.0206	0.0177	0.0153	0.0153	0.0109	0.0109	0.0000
0.8072	0.8204	0.8580	0.8579	0.9909	0.9909	0.0000	0.9960	0.8365	0.8320	0.8444	0.8775	0.8774	0.9896	0.9896	0.0000
1.6880	1.6294	1.5155	1.5157	1.1898	1.1898	0.0000	1.2608	1.6177	1.6022	1.5486	1.4552	1.4553	1.1593	1.1593	0.0000
116.9200	114.4500	106.3600	190.4600	7.4630	2.7053	2.7053	0.0036	96.8900	101.1300	100.1100	93.6500	167.6700	7.1880	2.8000	2.8000
8090.0000	8570.0000	8779.0000	15713.0000	827.6000	300.0000	300.0000	0.5693	6480.0000	7282.0000	7814.0000	8065.0000	14431.0000	827.8000	322.5000	322.5000
1808.3000	1841.9000	1800.9000	3224.0000	153.6000	55.6800	55.1700	0.0981	1519.2000	1652.2000	1703.7000	1677.9000	3002.8000	155.4900	60.5700	59.9400
2.1401	2.0807	1.9996	1.9996	1.7946	1.7946	1.7964	1.6691	2.2524	2.2093	2.1530	2.0763	2.0764	1.8700	1.8700	1.8704
675.3000	702.3000	735.8000	735.7000	813.3000	813.3000	820.9000	876.2000	643.9000	665.3000	692.4000	725.6000	725.5000	803.7000	803.7000	812.1000
0.0926	0.0972	0.1040	0.1040	0.1308	0.1308	0.1301	0.1536	0.0888	0.0922	0.0966	0.1032	0.1032	0.1283	0.1283	0.1276
0.9712	1.2593	1.7753	1.7731	5.5670	5.5670	5.4360	19.3590	0.7304	0.9040	1.1628	1.6194	1.6178	4.8980	4.8980	4.7970
10.9560	12.7570	15.3410	15.3380	24.5080	24.5080	24.1890	30.9820	9.1950	10.5560	12.2770	14.7110	14.7080	23.2720	23.2720	22.9530
0.0000	0.2074	0.5825	1.0552	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1309	0.2481	0.0000	0.0000	0.0000
0.0000	3.7420	10.5100	19.0380	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.3618	4.4750	0.0000	0.0000	0.0000
0.0000	0.5754	1.6068	2.9106	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3669	0.6951	0.0000	0.0000	0.0000
0.0000	4.3080	4.3080	4.3070	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	4.3300	4.3300	0.0000	0.0000	0.0000
0.0000	981.8000	987.4000	987.4000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	971.8000	971.8000	0.0000	0.0000	0.0000
0.0000	0.6563	0.6472	0.6472	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6660	0.6660	0.0000	0.0000	0.0000
0.0000	0.4641	0.5383	0.5386	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3756	0.3757	0.0000	0.0000	0.0000
0.0000	65.1100	66.8000	66.8100	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	63.2400	63.2500	0.0000	0.0000	0.0000
116.9200	114.6600	106.9400	191.5200	7.4630	2.7053	2.7053	0.0036	96.8900	101.1300	100.1100	93.7800	167.9100	7.1880	2.8000	2.8000
8090.0000	8573.0000	8789.0000	15732.0000	827.6000	300.0000	300.0000	0.5693	6480.0000	7282.0000	7814.0000	8067.0000	14435.0000	827.8000	322.5000	322.5000
1808.3000	1842.5000	1802.5000	3227.0000	153.6000	55.6800	55.1700	0.0981	1519.2000	1652.2000	1703.7000	1678.2000	3003.5000	155.4900	60.5700	59.9400
-2574.4000	-2501.5000	-2422.5000	-2423.0000	-2200.9000	-2200.9000	-2188.0000	-2209.5000	-2574.4000	-2496.6000	-2418.1000	-2336.1000	-2336.6000	-2162.0000	-2162.0000	-2149.0000
2.1401	2.0817	2.0024	2.0024	1.7946	1.7946	1.7964	1.6691	2.2524	2.2093	2.1530	2.0770	2.0771	1.8700	1.8700	1.8704
675.3000	702.4000	738.1000	738.0000	813.3000	813.3000	820.9000	876.2000	643.9000	665.3000	692.4000	725.6000	725.5000	803.7000	803.7000	812.1000
0.0926	0.0972	0.1042	0.1042	0.1308	0.1308	0.1301	0.1536	0.0888	0.0922	0.0966	0.1032	0.1032	0.1283	0.1283	0.1276
0.9712	1.2607	1.7810	1.7789	5.5670	5.5670	5.4360	19.3590	0.7304	0.9040	1.1628	1.6207	1.6191	4.8980	4.8980	4.7970
10.9580	0.0000	0.0000	0.0000	24.5080	24.5080	24.1890	30.9820	9.1950	10.5560	12.2770	0.0000	0.0000	23.2720	23.2720	22.9530
0.7510	0.7510	0.7510	0.7513	0.0024	0.0024	0.0024	0.8238	0.7443	0.7443	0.7443	0.7443	0.7446	0.0019	0.0019	0.0019
0.0436	0.0436	0.0438	0.0436	0.0026	0.0026	0.0026	0.0445	0.0438	0.0438	0.0438	0.0438	0.0438	0.0017	0.0017	0.0017
0.0163	0.0158	0.0158	0.0158	0.0065	0.0065	0.0065	0.0142	0.0160	0.0160	0.0160	0.0160	0.0160	0.0039	0.0039	0.0039
0.0025	0.0025	0.0025	0.0025	0.0032	0.0032	0.0032	0.0019	0.0025	0.0025	0.0025	0.0025	0.0025	0.0020	0.0020	0.0020
0.0038	0.0038	0.0038	0.0038	0.0076	0.0076	0.0076	0.0027	0.0039	0.0039	0.0039	0.0039	0.0039	0.0047	0.0047	0.0047
0.0010	0.0010	0.0010	0.0010	0.0042	0.0042	0.0042	0.0005	0.0010	0.0010	0.0010	0.0010	0.0010	0.0030	0.0030	0.0030
0.0013	0.0013	0.0013	0.0013	0.0068	0.0068	0.0068	0.0006	0.0013	0.0013	0.0013	0.0013	0.0013	0.0049	0.0049	0.0049
0.0014	0.0014	0.0014	0.0014	0.0127	0.0127	0.0127	0.0004	0.0015	0.0015	0.0015	0.0015	0.0015	0.0112	0.0112	0.0112
0.0008	0.0008	0.0008	0.0008	0.0088	0.0088	0.0088	0.0001	0.0008	0.0008	0.0008	0.0008	0.0008	0.0088	0.0088	0.0088
0.0656	0.0656	0.0658	0.0656	0.0013	0.0013	0.0013	0.0695	0.0669	0.0669	0.0669	0.0669	0.0669	0.0009	0.0009	0.0009
0.0186	0.0186	0.0186	0.0186	0.0000	0.0000	0.0000	0.0208	0.0183	0.0183	0.0183	0.0183	0.0183	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0033	0.0033	0.0033	0.0033	0.0003	0.0003	0.0003	0.0028	0.0064	0.0064	0.0064	0.0064	0.0064	0.0002	0.0002	0.0002
0.0024	0.0024	0.0024	0.0023	0.0049	0.0049	0.0049	0.0016	0.0024	0.0024	0.0024	0.0024	0.0024	0.0032	0.0032	0.0032
0.0025	0.0025	0.0025	0.0024	0.0081	0.0081	0.0081	0.0015	0.0025	0.0025	0.0025	0.0025	0.0025	0.0055	0.0055	0.0055
0.0036	0.0036	0.0036	0.0036	0.0167	0.0167	0.0167	0.0018	0.0037	0.0037	0.0037	0.0037	0.0037	0.0120	0.0120	0.0120
0.0073	0.0073	0.0073	0.0073	0.0462	0.0462	0.0462	0.0031	0.0076	0.0076	0.0076	0.0076	0.0076	0.0358	0.0358	0.0358
0.0112	0.0112	0.0112	0.0112	0.0868	0.0868	0.0868	0.0038	0.0117	0.0117	0.0117	0.0117	0.0117	0.0722	0.0722	0.0722
0.0091	0.0091	0.0091	0.0090	0.0845	0.0845	0.0845	0.0023	0.0094	0.0094	0.0094	0.0094	0.0094	0.0765	0.0765	0.0765
0.0082	0.0082	0.0082	0.0081	0.0863	0.0863	0.0863	0.0016	0.0085	0.0085	0.0085	0.0085	0.0085	0.0836	0.0836	0.0836
0.0076	0.0076	0.0076	0.0075	0.0870	0.0870	0.0870	0.0010	0.0078	0.0078	0.0078	0.0078	0.0078	0.0890	0.0890	0.0890
0.0065	0.0065	0.0065	0.0065	0.0798	0.0798	0.0798	0.0006	0.0067	0.0067	0.0067	0.0067	0.0067	0.0850	0.0850	0.0850
0.0054	0.0054	0.0054	0.0054	0.0691	0.0691	0.0691	0.0004	0.0056	0.0056	0.0056	0.0056	0.0055	0.0758	0.0758	0.0758
0.0049	0.0048	0.0048	0.0048	0.0636	0.0636	0.0636	0.0002	0.0050	0.0050	0.0050	0.0050	0.0049	0.0710	0.0710	0.0710

32.2500	32.2500	32.2500	32.2100	98.3400	98.3400	98.3400	24.3880	32.5000	32.5000	32.5000	32.5000	32.4600	104.1900	104.1900	104.1900
283.8600	214.7900	133.1500	132.9400	810.1000	810.1000	816.5000	1.2977	314.4600	459.7000	194.9600	120.5900	120.4200	805.1000	805.1000	812.2000
-30812.0000	-30812.0[illegible]	[illegible]812.0000	-55410.0000	-545.3000	-210.7000	-209.5200	-26274.0000	-30784.0000	-30784.0000	-30784.0000	-30784.0000	-55360.0000	-510.5000	-200.1100	-198.9400
0.0000	0.0000	0.0000	0.0000	5.4300	5.4300	5.2930	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5.0720	5.0720	4.9580
734.7000	729.8000	746.4000	1344.2000	0.0000	0.0000	0.0000	884.9000	820.5000	775.6000	766.9000	778.9000	1402.6000	0.0000	0.0000	0.0000
19648.0000	18441.0000	18203.0000	32780.0000	0.0000	0.0000	0.0000	21574.0000	24596.0000	21571.0000	20214.0000	19855.0000	35750.0000	0.0000	0.0000	0.0000
13181.0000	18167.0000	31256.0000	56280.0000	0.0000	0.0000	0.0000	2510600.0000	12919.0000	15231.0000	20875.0000	35430.0000	63790.0000	0.0000	0.0000	0.0000
416900.0000	414100.0000	423500.0000	762800.0000	0.0000	0.0000	0.0000	502200.0000	465600.0000	440100.0000	435200.0000	442000.0000	795900.0000	0.0000	0.0000	0.0000
26.7430	25.2680	24.3880	24.3880	34.5300	34.5300	0.0000	24.3790	29.9770	27.8110	26.3570	25.4920	25.4920	37.4500	37.4500	0.0000
3.0689	2.9074	2.5058	2.5061	1.5917	1.5917	0.0000	1.7159	2.9573	2.9708	2.7955	2.4463	2.4464	1.6246	1.6246	0.0000
225.0100	153.2300	87.9100	87.9300	1.8315	1.8315	0.0000	1.2972	287.3900	213.7900	146.1700	84.5900	84.6100	1.8602	1.8602	0.0000
0.0597	0.0485	0.0391	0.0391	0.0198	0.0198	0.0000	0.0247	0.0697	0.0587	0.0487	0.0403	0.0403	0.0207	0.0207	0.0000
0.0257	0.0195	0.0154	0.0154	0.0093	0.0093	0.0000	0.0105	0.0337	0.0253	0.0197	0.0159	0.0159	0.0096	0.0096	0.0000
0.6971	0.7226	0.7845	0.7844	0.9867	0.9867	0.0000	0.9936	0.7286	0.7236	0.7485	0.6052	0.8051	0.9868	0.9868	0.0000
1.8269	1.7852	1.6031	1.6034	1.1883	1.1883	0.0000	1.2558	1.6747	1.7238	1.6718	1.5206	1.5207	1.1672	1.1672	0.0000
195.0800	199.5300	182.3300	326.9000	8.6160	3.3290	3.3290	0.0787	109.8900	154.7800	163.0300	150.2600	269.2500	7.9090	3.1000	3.1000
10336.0000	11535.0000	11762.0000	21068.0000	852.8000	329.5000	329.5000	9.3630	5639.0000	8663.0000	10013.0000	10356.0000	18543.0000	824.1000	323.0000	323.0000
2762.8000	2904.3000	2735.9000	4903.0000	158.9700	61.4200	60.9400	1.6842	1594.7000	2343.6000	2534.5000	2411.4000	4319.0000	154.5100	60.5600	60.0300
2.3777	2.2975	2.1735	2.1739	1.7064	1.7064	1.7094	1.6420	2.4815	2.4274	2.3467	2.2238	2.2241	1.7744	1.7744	1.7764
564.7000	599.6000	649.0000	648.7000	809.8000	809.8000	816.3000	839.2000	533.7000	558.0000	596.4000	648.3000	648.1000	805.1000	805.1000	812.2000
0.0804	0.0843	0.0907	0.0906	0.1317	0.1317	0.1308	0.1436	0.0764	0.0795	0.0835	0.0901	0.0901	0.1297	0.1297	0.1288
0.3635	0.4716	0.6538	0.6524	5.4070	5.4070	5.2710	8.9000	0.2871	0.3690	0.4888	0.7130	0.7118	5.0720	5.0720	4.9580
6.8890	8.4050	10.7660	10.7590	25.1680	25.1680	24.8270	29.3060	5.5810	6.7850	8.3220	10.6970	10.6910	24.3390	24.3390	24.0010
0.0000	0.4401	1.0733	1.9382	0.0694	0.0268	0.0268	0.0000	0.0000	0.0000	0.4409	1.2501	2.2617	0.0000	0.0000	0.0000
0.0000	7.9470	19.3740	34.9800	1.2511	0.4834	0.4822	0.0000	0.0000	0.0000	7.9590	22.5570	40.8100	0.0000	0.0000	0.0000
0.0000	1.2209	2.9558	5.3370	0.1847	0.0714	0.0712	0.0000	0.0000	0.0000	1.2414	3.4940	6.3210	0.0000	0.0000	0.0000
0.0000	4.3050	4.3040	4.3040	4.3210	4.3210	4.3120	0.0000	0.0000	0.0000	4.3290	4.3240	4.3240	0.0000	0.0000	0.0000
0.0000	982.5000	989.4000	989.5000	1022.4000	1022.4000	1022.4000	0.0000	0.0000	0.0000	967.9000	974.6000	974.6000	0.0000	0.0000	0.0000
0.0000	0.6551	0.6441	0.6441	0.5776	0.5776	0.5831	0.0000	0.0000	0.0000	0.6706	0.6626	0.6626	0.0000	0.0000	0.0000
0.0000	0.4701	0.5605	0.5608	1.5103	1.5103	1.3806	0.0000	0.0000	0.0000	0.3550	0.4164	0.4166	0.0000	0.0000	0.0000
0.0000	65.2500	67.2300	67.2400	75.5700	75.5700	75.0400	0.0000	0.0000	0.0000	61.8600	63.8500	63.8500	0.0000	0.0000	0.0000
195.0800	199.9700	183.4100	328.8000	8.6850	3.3560	3.3560	0.0787	109.8900	154.7800	163.4700	151.5100	271.5100	7.9090	3.1000	3.1000
10336.0000	11543.0000	11781.0000	21103.0000	854.1000	330.0000	330.0000	9.3630	5639.0000	8663.0000	10021.0000	10379.0000	18584.0000	824.1000	323.0000	323.0000
2762.8000	2905.5000	2738.9000	4908.0000	159.1500	61.4900	61.0100	1.6842	1594.7000	2343.6000	2535.7000	2414.9000	4325.0000	154.5100	60.5600	60.0300
-2879.7000	-2769.3000	-2644.1000	-2645.0000	-2298.6000	-2298.6000	-2285.7000	-2254.1000	-2895.6000	-2771.4000	-2657.4000	-2537.6000	-2538.5000	-2230.3000	-2230.3000	-2217.4000
2.3777	2.2988	2.1770	2.1774	1.7102	1.7102	1.7132	1.6420	2.4815	2.4274	2.3483	2.2283	2.2287	1.7744	1.7744	1.7764
564.7000	599.7000	649.3000	649.1000	810.1000	810.1000	816.5000	839.2000	533.7000	558.0000	596.5000	648.8000	648.6000	805.1000	805.1000	812.2000
0.0804	0.0843	0.0908	0.0908	0.1318	0.1318	0.1310	0.1436	0.0764	0.0795	0.0836	0.0903	0.0903	0.1297	0.1297	0.1288
0.3635	0.4723	0.6564	0.6550	5.4300	5.4300	5.2930	8.9000	0.2871	0.3690	0.4897	0.7167	0.7155	5.0720	5.0720	4.9580
6.8890	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	29.3060	5.5810	6.7850	0.0000	0.0000	0.0000	24.3390	24.3390	24.0010
0.5584	0.5584	0.5584	0.5587	0.0019	0.0019	0.0019	0.6510	0.5470	0.5470	0.5470	0.5470	0.5474	0.0015	0.0015	0.0015
0.1157	0.1157	0.1157	0.1157	0.0084	0.0084	0.0084	0.1187	0.1171	0.1171	0.1171	0.1171	0.1171	0.0053	0.0053	0.0053
0.0858	0.0858	0.0858	0.0858	0.0447	0.0447	0.0447	0.0723	0.0881	0.0881	0.0881	0.0881	0.0881	0.0264	0.0264	0.0264
0.0120	0.0120	0.0120	0.0119	0.0192	0.0192	0.0192	0.0082	0.0123	0.0123	0.0123	0.0123	0.0123	0.0118	0.0118	0.0118
0.0168	0.0168	0.0168	0.0168	0.0406	0.0406	0.0406	0.0102	0.0175	0.0175	0.0175	0.0175	0.0174	0.0261	0.0261	0.0261
0.0027	0.0027	0.0027	0.0027	0.0127	0.0127	0.0127	0.0012	0.0028	0.0028	0.0028	0.0028	0.0028	0.0096	0.0096	0.0096
0.0026	0.0026	0.0026	0.0026	0.0146	0.0146	0.0146	0.0010	0.0027	0.0027	0.0027	0.0027	0.0027	0.0117	0.0117	0.0117
0.0008	0.0008	0.0008	0.0008	0.0064	0.0064	0.0064	0.0002	0.0008	0.0008	0.0008	0.0008	0.0008	0.0063	0.0063	0.0063
0.0002	0.0002	0.0002	0.0002	0.0017	0.0017	0.0017	0.0000	0.0002	0.0002	0.0002	0.0002	0.0002	0.0019	0.0019	0.0019
0.0786	0.0786	0.0786	0.0786	0.0019	0.0019	0.0019	0.0862	0.0807	0.0807	0.0807	0.0807	0.0808	0.0012	0.0012	0.0012
0.0263	0.0263	0.0263	0.0263	0.0000	0.0000	0.0000	0.0318	0.0250	0.0250	0.0250	0.0250	0.0250	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0035	0.0035	0.0035	0.0035	0.0082	0.0082	0.0082	0.0026	0.0068	0.0068	0.0068	0.0068	0.0068	0.0004	0.0004	0.0004
0.0027	0.0027	0.0027	0.0027	0.0064	0.0064	0.0064	0.0016	0.0028	0.0028	0.0028	0.0028	0.0028	0.0043	0.0043	0.0043
0.0028	0.0028	0.0028	0.0028	0.0102	0.0102	0.0102	0.0014	0.0029	0.0029	0.0029	0.0029	0.0029	0.0073	0.0073	0.0073
0.0041	0.0041	0.0041	0.0040	0.0201	0.0201	0.0201	0.0017	0.0042	0.0042	0.0042	0.0042	0.0042	0.0156	0.0156	0.0156
0.0082	0.0082	0.0082	0.0082	0.0519	0.0519	0.0519	0.0028	0.0086	0.0086	0.0086	0.0086	0.0086	0.0442	0.0442	0.0442
0.0125	0.0125	0.0125	0.0125	0.0922	0.0922	0.0922	0.0034	0.0131	0.0131	0.0131	0.0131	0.0130	0.0851	0.0851	0.0851
0.0100	0.0100	0.0100	0.0100	0.0842	0.0842	0.0842	0.0021	0.0104	0.0104	0.0104	0.0104	0.0104	0.0846	0.0846	0.0846
0.0090	0.0090	0.0090	0.0089	0.0820	0.0820	0.0820	0.0014	0.0093	0.0093	0.0093	0.0093	0.0093	0.0874	0.0874	0.0874
0.0082	0.0082	0.0082	0.0082	0.0795	0.0795	0.0795	0.0009	0.0085	0.0085	0.0085	0.0085	0.0085	0.0887	0.0887	0.0887
0.0070	0.0070	0.0070	0.0070	0.0708	0.0708	0.0708	0.0006	0.0073	0.0073	0.0073	0.0073	0.0073	0.0814	0.0814	0.0814
0.0058	0.0058	0.0058	0.0058	0.0598	0.0598	0.0598	0.0003	0.0060	0.0060	0.0060	0.0060	0.0059	0.0701	0.0701	0.0701
0.0051	0.0051	0.0051	0.0051	0.0538	0.0538	0.0538	0.0002	0.0052	0.0052	0.0052					

27.6920	27.6920	27.6920	27.6530	107.6300	107.6300	107.6300	20.5440	27.8090	27.8090	27.8090	27.8090	[illegible]	111.9400	111.9400	111.9400
191.5700	116.6400	[illegible]	37.9900	811.2000	811.2000	814.3000	1.0007	235.5000	[illegible]	106.9800	35.1000	35.0400	799.7000	799.7000	803.2000
-28406.0000	-28406.0000	-28406.0000	-51080.0000	-532.3000	-199.9700	-199.4900	-24236.0000	-28308.0000	-28308.0000	-28308.0000	-28308.0000	-50910.0000	-488.9000	-195.4100	-194.9300
0.0000	0.0000	0.0000	0.0000	5.4500	5.4500	5.3920	0.0116	0.0000	0.0000	0.0000	0.0000	0.0000	4.6930	4.6930	4.6510
811.2000	817.8000	836.7000	1506.3000	0.0000	0.0000	0.0000	885.0000	831.5000	827.0000	831.9000	849.1000	1528.5000	0.0000	0.0000	0.0000
17421.0000	16940.0000	17131.0000	30838.0000	0.0000	0.0000	0.0000	18181.0000	19336.0000	18333.0000	17792.0000	18006.0000	32410.0000	0.0000	0.0000	0.0000
18421.0000	31430.0000	100280.0000	180480.0000	0.0000	0.0000	0.0000	2742500.0000	15029.0000	20446.0000	34730.0000	109510.0000	197090.0000	0.0000	0.0000	0.0000
460300.0000	464100.0000	474800.0000	654800.0000	0.0000	0.0000	0.0000	502200.0000	471800.0000	469300.0000	472100.0000	481800.0000	867400.0000	0.0000	0.0000	0.0000
21.4760	20.7140	20.4740	20.4720	33.8600	33.8600	0.0000	20.5440	23.2550	22.1680	21.3880	21.2050	21.2040	39.9400	39.9400	0.0000
2.8190	2.5287	2.1132	2.1132	1.6162	1.6162	0.0000	1.8968	2.8523	2.7340	2.4750	2.1161	2.1161	1.6367	1.6367	0.0000
142.7600	81.3600	25.7900	25.7930	1.6487	1.6487	0.0000	1.0007	194.2100	135.3500	77.3300	24.8210	24.8240	1.8238	1.8238	0.0000
0.0533	0.0433	0.0349	0.0349	0.0230	0.0230	0.0000	0.0305	0.0636	0.0538	0.0449	0.0370	0.0370	0.0235	0.0235	0.0000
0.0193	0.0155	0.0127	0.0127	0.0104	0.0104	0.0000	0.0116	0.0242	0.0195	0.0160	0.0134	0.0134	0.0106	0.0106	0.0000
0.8091	0.8430	0.9265	0.9265	0.9900	0.9900	0.0000	0.9964	0.8365	0.8341	0.8644	0.9361	0.9361	0.9883	0.9883	0.0000
1.6752	1.5568	1.3709	1.3710	1.1871	1.1871	0.0000	1.2766	1.6177	1.5891	1.4885	1.3383	1.3384	1.1531	1.1531	0.0000
116.7100	109.5900	90.5500	162.1900	8.0260	3.0148	3.0149	0.0000	96.8900	101.3400	96.3500	79.2500	141.9100	7.2560	2.9000	2.9000
8275.0000	8747.0000	8553.0000	15312.0000	865.0000	324.9000	324.9000	0.0000	6480.0000	7483.0000	8022.0000	7810.0000	13979.0000	812.2000	324.6000	324.6000
1827.5000	1822.5000	1658.8000	2969.9000	160.9600	60.4600	60.2300	0.0000	1519.2000	1677.2000	1695.2000	1535.9000	2749.3000	153.3300	61.2800	61.0100
2.1225	2.0283	1.8827	1.8826	1.7852	1.7852	1.7857	0.0000	2.2524	2.1926	2.1034	1.9641	1.9640	1.8706	1.8706	1.8704
683.5000	724.4000	778.4000	778.3000	811.2000	811.2000	814.3000	0.0000	643.9000	673.5000	714.3000	767.6000	767.5000	799.7000	799.7000	803.2000
0.0940	0.1015	0.1161	0.1161	0.1304	0.1304	0.1300	0.0000	0.0888	0.0935	0.1008	0.1146	0.1146	0.1272	0.1272	0.1269
1.0501	1.5796	3.1880	3.1850	5.4460	5.4460	5.3880	0.0000	0.7304	0.9757	1.4409	2.7897	2.7871	4.6930	4.6930	4.6510
11.4920	14.3990	19.6600	19.6580	24.4070	24.4070	24.2730	0.0000	9.1950	11.0650	13.8290	18.7270	18.7250	22.9570	22.9570	22.8220
0.0000	0.4735	0.6045	1.0997	0.0125	0.0047	0.0046	0.0000	0.0000	0.0000	0.0893	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	8.5430	10.9010	19.8290	0.2245	0.0843	0.0833	0.0000	0.0000	0.0000	1.6102	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	1.3089	1.6508	3.0028	0.0337	0.0127	0.0125	0.0000	0.0000	0.0000	0.2506	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	4.3080	4.3080	4.3080	4.3130	4.3130	4.3090	0.0000	0.0000	0.0000	4.3310	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	985.3000	996.8000	996.8000	1004.7000	1004.7000	1004.7000	0.0000	0.0000	0.0000	969.9000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.6506	0.6321	0.6320	0.6162	0.6162	0.6180	0.0000	0.0000	0.0000	0.6684	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	0.5100	0.6455	0.6461	0.8223	0.8223	0.8003	0.0000	0.0000	0.0000	0.3603	0.0000	0.0000	0.0000	0.0000	0.0000
0.0000	66.2000	69.3600	69.3700	71.4800	71.4800	71.2600	0.0000	0.0000	0.0000	62.6500	0.0000	0.0000	0.0000	0.0000	0.0000
116.7100	110.0600	91.1500	163.2800	8.0380	3.0195	3.0195	0.0000	96.8900	101.3400	96.4400	79.2500	141.9100	7.2560	2.9000	2.9000
8275.0000	8755.0000	8564.0000	15332.0000	865.2000	325.0000	325.0000	0.0000	6480.0000	7483.0000	8024.0000	7810.0000	13979.0000	812.2000	324.6000	324.6000
1827.5000	1823.9000	1660.4000	2972.9000	160.9900	60.4800	60.2500	0.0000	1519.2000	1677.2000	1695.5000	1535.9000	2749.3000	153.3300	61.2800	61.0100
-2549.6000	-2449.3000	-2317.6000	-2318.1000	-2215.1000	-2215.1000	-2209.8000	0.0000	-2574.4000	-2471.4000	-2363.1000	-2237.8000	-2238.1000	-2167.0000	-2167.0000	-2161.6000
2.1225	2.0305	1.8858	1.8858	1.7859	1.7859	1.7864	0.0000	2.2524	2.1926	2.1039	1.9641	1.9640	1.8706	1.8706	1.8704
683.5000	724.6000	778.6000	778.5000	811.2000	811.2000	814.3000	0.0000	643.9000	673.5000	714.4000	767.6000	767.5000	799.7000	799.7000	803.2000
0.0940	0.1016	0.1163	0.1163	0.1304	0.1304	0.1301	0.0000	0.0888	0.0935	0.1008	0.1146	0.1146	0.1272	0.1272	0.1269
1.0501	1.5836	3.1990	3.1960	5.4500	5.4500	5.3920	0.0000	0.7304	0.9757	1.4417	2.7897	2.7871	4.6930	4.6930	4.6510
11.4920	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	9.1950	11.0650	0.0000	18.7270	18.7250	22.9570	22.9570	22.8220
0.7510	0.7510	0.7510	0.7513	0.0021	0.0021	0.0021	0.8217	0.7443	0.7443	0.7443	0.7443	0.7446	0.0017	0.0017	0.0017
0.0436	0.0436	0.0436	0.0436	0.0032	0.0032	0.0032	0.0458	0.0438	0.0438	0.0438	0.0438	0.0438	0.0020	0.0020	0.0020
0.0158	0.0158	0.0158	0.0158	0.0093	0.0093	0.0093	0.0151	0.0160	0.0160	0.0160	0.0160	0.0160	0.0052	0.0052	[illegible]
0.0025	0.0025	0.0025	0.0025	0.0045	0.0045	0.0045	0.0021	0.0025	0.0025	0.0025	0.0025	0.0025	0.0027	0.0027	0.0027
0.0038	0.0038	0.0038	0.0038	0.0103	0.0103	0.0103	0.0028	0.0039	0.0039	0.0039	0.0039	0.0039	0.0063	0.0063	0.0063
0.0010	0.0010	0.0010	0.0010	0.0052	0.0052	0.0052	0.0005	0.0010	0.0010	0.0010	0.0010	0.0010	0.0037	0.0037	0.0037
0.0013	0.0013	0.0013	0.0013	0.0080	0.0080	0.0080	0.0006	0.0013	0.0013	0.0013	0.0013	0.0013	0.0060	0.0060	0.0060
0.0014	0.0014	0.0014	0.0014	0.0135	0.0135	0.0135	0.0003	0.0015	0.0015	0.0015	0.0015	0.0015	0.0123	0.0123	0.0123
0.0008	0.0008	0.0008	0.0008	0.0088	0.0088	0.0088	0.0001	0.0008	0.0008	0.0008	0.0008	0.0008	0.0091	0.0091	0.0091
0.0656	0.0656	0.0656	0.0656	0.0015	0.0015	0.0015	0.0707	0.0669	0.0669	0.0669	0.0669	0.0669	0.0010	0.0010	0.0010
0.0186	0.0186	0.0186	0.0186	0.0000	0.0000	0.0000	0.0205	0.0183	0.0183	0.0183	0.0183	0.0183	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0033	0.0033	0.0033	0.0033	0.0021	0.0021	0.0021	0.0032	0.0064	0.0064	0.0064	0.0064	0.0064	0.0001	0.0001	0.0001
0.0024	0.0024	0.0024	0.0023	0.0065	0.0065	0.0065	0.0017	0.0024	0.0024	0.0024	0.0024	0.0024	0.0042	0.0042	0.0042
0.0025	0.0025	0.0025	0.0024	0.0102	0.0102	0.0102	0.0016	0.0025	0.0025	0.0025	0.0025	0.0025	0.0070	0.0070	0.0070
0.0036	0.0036	0.0036	0.0036	0.0201	0.0201	0.0201	0.0019	0.0037	0.0037	0.0037	0.0037	0.0037	0.0148	0.0148	0.0148
0.0073	0.0073	0.0073	0.0073	0.0526	0.0526	0.0526	0.0030	0.0076	0.0076	0.0076	0.0076	0.0076	0.0420	0.0420	0.0420
0.0112	0.0112	0.0112	0.0112	0.0948	0.0948	0.0948	0.0036	0.0117	0.0117	0.0117	0.0117	0.0117	0.0813	0.0813	0.0813
0.0091	0.0091	0.0091	0.0090	0.0882	0.0882	0.0882	0.0020	0.0094	0.0094	0.0094	0.0094	0.0094	0.0824	0.0824	0.0824
0.0082	0.0082	0.0082	0.0081	0.0871	0.0871	0.0871	0.0012	0.0085	0.0085	0.0065	0.0085	0.0085	0.0868	0.0868	0.0868
0.0076	0.0076	0.0076	0.0075	0.0854	0.0854	0.0854	0.0007	0.0078	0.0078	0.0078	0.0078	0.0078	0.0897	0.0897	0.0897
0.0065	0.0065	0.0065	0.0065	0.0768	0.0768	0.0768	0.0004	0.0067	0.0067	0.0067	0.0067	0.0067	0.0836	0.0836	0.0836
0.0054	0.0054	0.0054	0.0054	0.0655	0.0655	0.0655	0.0002	0.0056	0.0056	0.0056	0.0056	0.0055	0.0730	0.0730	0.0730
0.0049	0.0049	0.0049	0.0048	0.0595	0.0595	0.0595	[illegible]	[illegible]	[illegible]	[illegible]					

[illegible]	32.2500	32.2500	32.2100	93.8900	93.8900	[illegible]	[illegible]	32.5000	[illegible]	32.5000	32.5000	32.4600	99.5700	99.5700	95.5700
[illegible]	159.9200	[illegible]	49.9600	800.7000	800.7000	803.4000	1.2420	314.4500	[illegible]	144.8100	45.6000	45.5400	797.1000	[illegible]	800.1000
-30812.0000	-30812.0000	-30812.0000	-55410.0000	-539.8000	-210.3600	-209.8700	-26237.0000	-30784.0000	-30784.0000	-30784.0000	-30784.0000	-55360.0000	-533.2000	[illegible]	-203.1300
0.0000	0.0000	0.0000	0.0000	4.8210	4.8210	4.7710	0.0108	0.0000	0.0000	0.0000	0.0000	0.0000	4.6430	4.6430	4.6000
730.3000	739.0000	785.1000	1413.5000	0.0000	0.0000	0.0000	685.0000	820.5000	770.0000	773.1000	[illegible]	1460.2000	0.0000	0.0000	0.0000
19128.0000	16160.0000	19053.0000	34300.0000	0.0000	0.0000	0.0000	21476.0000	24596.0000	20996.0000	19869.0000	20596.0000	37080.0000	0.0000	0.0000	0.0000
14365.0000	[illegible]	88160.0000	158690.0000	0.0000	0.0000	0.0000	2610200.0000	12919.0000	16582.0000	29036.0000	98060.0000	176500.0000	0.0000	0.0000	0.0000
414400.0000	419400.0000	445500.0000	802100.0000	0.0000	0.0000	0.0000	502200.0000	465600.0000	437000.0000	438700.0000	460300.0000	828600.0000	0.0000	0.0000	0.0000
26.1920	24.6000	24.2690	24.2660	37.4400	37.4400	0.0000	24.2660	29.9770	27.2670	25.7000	25.3930	25.3910	40.6800	40.6800	0.0000
3.0462	2.6504	2.0354	2.0355	1.5725	1.5725	0.0000	1.7464	2.9573	2.9364	2.5695	2.0402	2.0402	1.6147	1.6147	0.0000
201.0100	107.6900	32.6200	32.6300	1.9998	1.9998	0.0000	1.2420	287.3900	191.1400	103.3000	31.7100	31.7100	2.0252	2.0252	0.0000
0.0559	0.0417	0.0314	0.0314	0.0184	0.0184	0.0000	0.0260	0.0697	0.0553	0.0425	0.0330	0.0330	0.0194	0.0194	0.0000
[illegible]	0.0165	0.0125	0.0125	0.0088	0.0088	0.0000	0.0108	0.0337	0.0232	0.0169	0.0131	0.0131	0.0091	0.0091	0.0000
[illegible]	0.7607	0.8871	0.8870	0.9839	0.9839	0.0000	0.9943	0.7286	0.7283	0.7836	0.8979	0.8979	0.9841	0.9841	0.0000
[illegible]	1.6716	1.3784	1.3785	1.1754	1.1754	0.0000	1.2509	1.6747	1.7196	1.5758	1.3383	1.3384	1.1545	1.1545	0.0000
199.4200	189.8900	143.0900	256.5800	8.7550	3.4120	3.4120	0.0000	109.8900	160.3900	156.2600	117.6100	210.8100	8.4120	3.2120	3.2120
10855.0000	11788.0000	10902.0000	19532.0000	831.7000	324.1000	324.1000	0.0000	5639.0000	9238.0000	10347.0000	9608.0000	17207.0000	845.6000	322.9000	322.9000
2851.8000	2816.9000	2291.7000	4107.0000	156.9000	61.1400	60.9400	0.0000	1594.7000	2450.2000	2477.7000	2018.7000	3616.0000	160.2200	61.1800	60.9500
2.3552	2.2186	1.9770	1.9772	1.7187	1.7187	1.7196	0.0000	2.4815	2.4048	2.2683	2.0318	2.0319	1.7879	1.7879	1.7883
574.6000	631.7000	718.1000	717.9000	800.2000	800.2000	802.9000	0.0000	533.7000	569.2000	630.4000	718.4000	718.3000	796.7000	796.7000	799.8000
0.0815	0.0882	0.1042	0.1042	0.1298	0.1298	0.1294	0.0000	0.0764	0.0807	0.0875	0.1038	0.1038	0.1277	0.1277	0.1273
0.3933	0.5928	1.2554	1.2525	4.7830	4.7830	4.7330	0.0000	0.2871	0.4022	0.6236	1.3847	1.3821	4.6150	4.6150	4.5720
[illegible]	9.8730	15.5150	15.5080	24.4150	24.4150	24.2680	0.0000	5.5810	7.2380	9.8010	15.4010	15.3960	23.6510	23.6510	23.5080
0.0525	0.8715	1.6116	2.9090	0.1282	0.0500	0.0499	0.0000	0.0000	0.0000	1.0002	1.6909	3.0615	0.0995	0.0380	0.0379
0.9472	15.7320	29.0710	52.4800	2.3104	0.9004	0.8998	0.0000	0.0000	0.0000	18.0510	30.4920	55.2100	1.7922	0.6844	0.6833
0.1460	2.4065	4.3800	7.9060	0.3409	0.1328	0.1328	0.0000	0.0000	0.0000	2.8032	4.6640	8.4440	0.2683	0.1025	0.1023
4.3050	4.3040	4.3050	4.3050	4.3220	4.3220	4.3180	0.0000	0.0000	0.0000	4.3260	4.3150	4.3150	4.3130	4.3130	4.3100
979.6000	986.8000	1001.9000	1002.0000	1023.2000	1023.2000	1023.2000	0.0000	0.0000	0.0000	972.1000	986.9000	986.9000	1008.3000	1008.3000	1008.3000
0.6597	0.6483	0.6235	0.6234	0.5755	0.5755	0.5779	0.0000	0.0000	0.0000	0.6657	0.6468	0.6468	0.6091	0.6091	0.6111
0.4340	0.5250	0.7360	0.7369	1.5632	1.5632	1.5032	0.0000	0.0000	0.0000	0.3926	0.5147	0.5152	0.9167	0.9167	0.8895
64.3000	66.5100	70.5100	70.5200	75.7600	75.7600	75.5400	0.0000	0.0000	0.0000	63.1300	67.1000	67.1100	72.3200	72.3200	72.0900
[illegible]	190.7600	144.7000	259.4900	8.8830	3.4620	3.4620	0.0000	109.8900	160.3900	157.2600	119.3100	213.8700	8.5110	3.2500	3.2500
10856.0000	11804.0000	10931.0000	19585.0000	834.0000	325.0000	325.0000	0.0000	5639.0000	9238.0000	10365.0000	9638.0000	17262.0000	847.4000	323.6000	323.6000
2851.9000	2819.3000	2296.1000	4115.0000	157.2400	61.2700	61.0700	0.0000	1594.7000	2450.2000	2480.5000	2023.4000	3625.0000	160.4900	61.2800	61.0500
-2843.3000	-2686.6000	-2481.8000	-2482.6000	-2330.1000	-2330.1000	-2324.7000	0.0000	-2895.6000	-2732.2000	-2577.4000	-2392.5000	-2393.3000	-2265.2000	-2265.2000	-2259.9000
2.3564	2.2214	1.9832	1.9834	1.7259	1.7259	1.7268	0.0000	2.4815	2.4048	2.2719	2.0390	2.0392	1.7933	1.7933	1.7936
574.6000	632.0000	718.7000	718.5000	800.7000	800.7000	803.4000	0.0000	533.7000	569.2000	630.8000	719.1000	718.9000	797.1000	797.1000	800.1000
0.0815	0.0883	0.1045	0.1045	0.1301	0.1301	0.1297	0.0000	0.0764	0.0807	0.0877	0.1042	0.1041	0.1280	0.1280	0.1276
0.2934	0.5946	1.2640	1.2612	4.8210	4.8210	4.7710	0.0000	0.2871	0.4022	0.6261	1.3963	1.3938	4.6430	4.6430	4.6000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5.5810	7.2380	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.5584	0.5584	0.5564	0.5587	0.0014	0.0014	0.0014	0.6468	0.5470	0.5470	0.5470	0.5470	0.5474	0.0010	0.0010	0.0010
0.1157	0.1157	0.1157	0.1157	0.0094	0.0094	0.0094	0.1237	0.1171	0.1171	0.1171	0.1171	0.1171	0.0053	0.0053	0.0053
0.0858	0.0858	0.0858	0.0858	0.0607	0.0607	0.0607	0.0764	0.0881	0.0881	0.0881	0.0881	0.0881	0.0328	0.0328	0.0328
0.0120	0.0120	0.0120	0.0119	0.0259	0.0259	0.0259	0.0083	0.0123	0.0123	0.0123	0.0123	0.0123	0.0155	0.0155	0.0155
0.0168	0.0168	0.0168	0.0168	0.0523	0.0523	0.0523	0.0100	0.0175	0.0175	0.0175	0.0175	0.0174	0.0338	0.0338	0.0338
0.0027	0.0027	0.0027	0.0027	0.0146	0.0146	0.0146	0.0010	0.0028	0.0028	0.0028	0.0028	0.0028	0.0116	0.0116	0.0116
0.0026	0.0026	0.0026	0.0026	0.0160	0.0160	0.0160	0.0008	0.0027	0.0027	0.0027	0.0027	0.0027	0.0136	0.0136	0.0136
0.0008	0.0006	0.0008	0.0008	0.0064	0.0064	0.0064	0.0001	0.0008	0.0008	0.0008	0.0008	0.0008	0.0066	0.0066	0.0066
0.0002	0.0002	0.0002	0.0002	0.0016	0.0016	0.0016	0.0000	0.0002	0.0002	0.0002	0.0002	0.0002	0.0018	0.0018	0.0018
0.0786	0.0788	0.0786	0.0786	0.0017	0.0017	0.0017	0.0880	0.0807	0.0807	0.0807	0.0807	0.0808	0.0011	0.0011	0.0011
0.0263	0.0263	0.0263	0.0263	0.0000	0.0000	0.0000	0.0309	0.0250	0.0250	0.0250	0.0250	0.0250	0.0000	0.0000	0.0000
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.0035	0.0035	0.0035	0.0035	0.0146	0.0146	0.0146	0.0020	0.0068	0.0068	0.0068	0.0068	0.0068	0.0121	0.0121	0.0121
0.0027	0.0027	0.0027	0.0027	0.0082	0.0082	0.0082	0.0016	0.0028	0.0028	0.0028	0.0028	0.0028	0.0055	0.0055	0.0055
0.0028	0.0028	0.0028	0.0028	0.0122	0.0122	0.0122	0.0013	0.0029	0.0029	0.0029	0.0029	0.0029	0.0090	0.0090	0.0090
0.0041	0.0041	0.0041	0.0040	0.0226	0.0226	0.0226	0.0015	0.0042	0.0042	0.0042	0.0042	0.0042	0.0185	0.0185	0.0185
0.0082	0.0082	0.0082	0.0082	0.0552	0.0552	0.0552	0.0022	0.0086	0.0086	0.0086	0.0086	0.0086	0.0497	0.0497	0.0497
0.0125	0.0125	0.0125	0.0125	0.0940	0.0940	0.0940	0.0024	0.0131	0.0131	0.0131	0.0131	0.0130	0.0914	0.0914	0.0914
0.0100	0.0100	0.0100	0.0100	0.0825	0.0825	0.0825	0.0013	0.0104	0.0104	0.0104	0.0104	0.0104	0.0866	0.0866	0.0866
0.0090	0.0090	0.0090	0.0089	0.0780	0.0780	0.0780	0.0008	0.0093	0.0093	0.0093	0.0093	0.0093	0.0864	0.0864	0.0864
0.0082	0.0082	0.0082	0.0082	0.0741	0.0741	0.0741	0.0004	0.0085	0.0085	0.0085	0.0085	0.0085	0.0852	0.0852	0.0852
0.0070	0.0070	0.0070	0.0070	0.0649	0.0649	0.0649	0.0002	0.0073	0.0073	0.0073	0.0073	0.0073	0.0764	0.0764	0.0764
0.0058	0.0058	0.0058	0.0058	0.0541	0.0541	0.0541	0.0001	0.0060	0.0060	0.0060	0.0060	0.0059	0.0646	0.0646	0.0646