

LIST

DRAWING NO. B6423-000 REVISION
 AS BUILT PAGE 1
 CUSTOMER ULSTER PETROLEUMS LTD. CUSTOMER REF.
 F-2186
 AGENT SIGMA 3 ENGINEERING LTD. JOB NO.
 B6423-00
 PROJECT SOUR GAS PROCESSING FACILITY OFFER NO. C08036
 PREPARED BY DARREN T. STARCHUK DATE 99 08 10
 TYPE DESIGN CONDITIONS DATE
 ISSUED/REVISED* 1999 11 18

MARK / QTY. / DESCRIPTION

WELLSITE FLARE KNOCKOUT PACKAGE
 LELAND
 LSD 07-02-59-26 W5M

DESIGN BASIS

INLET GAS COMPOSITION

MOLE %

H _e	Trace	
H ₂	Trace	
N ₂	1.0	
CO ₂	6.7	
H ₂ S		26.3
C ₁	65.0	
C ₂	1.0	
C ₃	Trace	
iC ₄	Trace	
nC ₄	Trace	
iC ₅	Trace	
nC ₅	Trace	
nC ₆	Trace	
nC ₇₊	Trace	

100.00

Flowrate	30 MMscfd
Specific Gravity	0.812
Inlet Pressure	8.5 psig
Inlet Flowing Temperature	100°F
Liquid Flowrate	600 bbl/day

PRODUCT SPECIFICATION

Approved By Date Reviewed By Date

LIST

Residue Gas, micron (max) 210

ELECTRICAL CLASSIFICATION

Class 1, Division 1, Groups C & D

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B-1050	1	BUILDING (SUB-JOB -86) <ul style="list-style-type: none"> - self framing building gable roof - 16'0" wide x 18'6" long x 16'6" eave - 22 gauge prepainted steel exterior (walls and roof: Mist Green, Trim: Cloverdale Dark Green enamel #74792) - roof slope: 4:12 - roof insulated with fibreglass (R12) c/w 6 mil vapour barrier - walls insulated with fibreglass (R12) c/w 6 mil vapour barrier - roof and walls lined with 24 gauge White fluted aluminum - (1) - 3' x 7' all metal insulated door c/w: <ul style="list-style-type: none"> - lockset, checkchain, weatherstripping - aluminum thresholds - 2' x 2' window double glazed (IWG) - panic hardware - hydraulic door closure - reinforced canopy over door (1.2 m projection) - (2) - 36" x 36" horizontal sliding windows (IWG) double glazed - full length ridge vent: sectioned extruded aluminum (10' section) - (2) - 24" x 24" adjustable wall louvres c/w manual controls, rain - Z type base flashing - ice rakes - SST screws only
S-1050	1	STRUCTURAL STEEL SKID (SUB JOB -10) <ul style="list-style-type: none"> - 16'0" wide x 26'0" long - W12 @ 26 lbs/ft main members - 1/4" thick checkerplate floor (building section) - 2" thick urethane skid insulation under building only (fire retardant) - checkerplate perimeter to be stitch welded - checkerplate seams to be welded - (1) 2" flanged floor drain piped to skid edge c/w 12" x 16" x 4" deep sump c/w DB grating - four (4) lifting lugs

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BH-1065 1 CATALYTIC STYLE BUILDING HEATER
 - Catadyne Model BX24X48 Series "X" explosion proof heater
 - Duty Rating: 48,000 BTU/hr infra-red gas heater
 - SSOV, TCV, PRV's
 - personnel protection grill
 - 12 VDC start-up element c/w 30'0" SOW start-up cable and leads
 - vent hood and piping to skid edge
 - wired to skid edge per "Electrical Protection Branch" regulations

P-1060 2 TRANSFER PUMPS
 P-1061 - Texsteam Model 6121
 - single ended pump
 - 2 3/4" plunger
 - cast steel fluid end
 - SST trim, Viton packing and O-Rings
 - maximum discharge flowrate: 1800 psig
 - maximum discharge pressure: 3.0 Usgpm
 - required instrument gas pressure: 250 psig @ max conditions
 - instrument gas consumption: 10,000 scfh (approx)
 - c/w drip tray

V-1051 1 FUEL GAS SCRUBBER (SUB JOB -21)
 (R2) - Size: 6 5/8" OD x 3'0" long
 - Design: 250 psig @ 200/-20°F MDMT
 - C.A.: 1/16"
 - Radiography: None

Vessel Specifics:

- Service: Sweet
- internals: inlet deflector
- registered and inspected for use in Alberta

Material:

Shell: 6" sch std pipe SA-106B
 Heads: 6 5/8" OD x 3/8" SA-234-WPB
 Nozzles: SA-105

Nozzles:

Inlet: 1" NPT 3000# coupling
 Gas Out: 2" NPT 3000# coupling

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Drain: 1" NPT 3000# coupling

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MARK	QTY.	DESCRIPTION
V-1050	1	<p>FLARE KNOCK-OUT DRUM (SUB JOB -20)</p> <ul style="list-style-type: none"> - Size: 72" I.D. x 20'0" S/S - Design: 50 psig @ 200/-40° F MDMT - C.A.: 3/16" - Radiography: Spot per RT-3 - P.W.H.T.: None <p>Vessel Specifics:</p> <ul style="list-style-type: none"> - Service: Corrosive - internals: inlet deflector - saddles c/w wear plates - lift lugs - 24" OD x 3'0" long boot - insulated O/S the building c/w 1 1/2" AF-530 fiberglass insulation and - Select Chemistry: As per Construction Specifications - registered and inspected for use in Alberta <p>Material:</p> <p>Shell: 72" I.D. x 3/8" thick SA-516-70N Heads: 72" I.D. x 3/8" NOM 2:1 SE SA-516-70N Pipe: SA-333-GR6 Nozzles: SA-350-LF2 Bolting: SA-193-B7M/SA-194-2HM Gaskets: 1/8" thick spiral wound 316 SS</p> <p>Nozzles:</p> <p>Gas Inlet: (1) - 16" 150# ANSI RFWN Gas Outlet: (1) - 16" 150# ANSI RFWN Cond. Out: 3" 150# ANSI RFWN LT: 4" 150# ANSI RFWN c/w blind drilled & tapped to 3/4" NPT Bridle:(2) - 3" 150# ANSI RFWN Manway: 20" OD 150# ANSI RF on head c/w blind and davit assembly Handhole on Boot: 8" 150# ANSI RF c/w blind</p>

***Note: Over-pressure protection is to be included with off-skid piping.**

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MARK	/ QTY. /	DESCRIPTION
LG-1050	1	PENBERTHY 3TM9-N-X TRANSPARENT GAUGE GLASS ASSEMBLY (OR EQUAL) - NACE / low temp service - 40 7/8" visible glass (1000 psig @ 100° F) - 1 1/2" 150# RF connections (low temp)
LSHH-1050	1	4" 150# RF SOR ELECTRIC LEVEL SWITCH - Model 1510C-G4C-S-W9-ES-CSNCWF - SPST, CSA, Class 1. Division 1, Groups A, B, C and D - 316 SST body, polypropylene float, low temperature NACE service - 285 psig MAWP @ 100°F - minimum specific gravity: 0.4 (with no extension) - direct mount into bridle
LT-1050	1	ROSEMOUNT APEX RADAR LEVEL TRANSMITTER MODEL APEXBC1D1SC4N04A102E6 B - standard software C - 24-26 GHz frequency sweep 1 - 4-20 mA with digital signal based on HART protocol D - 18-36 VDC power supply (24 VDC) 1 - 3/4" -14 NPT conduit threads S - flange / antenna: 316 SST C - cone type antenna 4 - 4" cone N - no extension 04 - 4" flange A1 - 150# ANSI E6 - CSA approved - c/w teflon process seal - 4" 150# ANSI RF flanged spool piece 12" F/F must be fabricated for
HLSD-1051 (R2)	1	2" NPT ENARDO HIGH LEVEL SHUTDOWN - fuel gas scrubber - standard service

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PI-1050	1	4" WIKA MODEL 233.54 LIQUID FILLED PRESSURE GAUGE - 0 to 50 psig range (dual scale) - 1/2" NPT bottom connection, 316 SS bourdon tube/socket
PI-1060 PI-1061	2	4" WIKA MODEL 233.54 LIQUID FILLED PRESSURE GAUGES - 0 to 3000 psig range (dual scale) - 1/2" NPT bottom connection, 316 SS bourdon tube/socket
I/G	3	1/4" NPT FISHER 67AFR PRESSURE REGULATORS - standard body and trim - 0 to 35 psig range
PRV-1060 PRV-1061 (R1)	2	1" NPT FISHER 630-1002 PRESSURE REGULATORS - cast iron body , SST trim - 200 to 275 psig spring range - set at 250 psig outlet pressure (maximum) - 1/4" trim - pump fuel gas supply
PSV-1050	1	CROSBY MODEL 972103MA PRESSURE RELIEF VALVE - 1" NPT x x 1 1/2" NPT connections - 316 SST body and internals, CS bonnet and cap, standard service - 17-4 SST spring - "E" orifice (0.196 in ²) - set at 250 psig
PSV-1060 PSV-1061	2	CROSBY MODEL JLT-JOS-E-54 PRESSURE RELIEF VALVES - 1 1/2" 900# ANSI RTJ inlet x 2" 300# ANSI RF outlet - 316 SST body/bonnet, carbon steel cap, NACE trim (primary and - Inconel spring - "D" orifice (0.110") - set at 1800 psig - liquid service
PRV-1050	1	1" NPT FISHER 630 PRESSURE REGULATOR - steel body, SST trim - 200 to 275 psig spring range - set at 250 psig outlet pressure (max) - 1/4" trim
SDV-1060 SDV-1061	2	1" NPT FISHER 128-PQC CONTROL VALVES - fail closed, sweet service - 3/8" taper trim

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- 0 to 20 psi, air to open

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SOV-1060	2	ASCO THREE WAY SOLENOID VALVES
SOV-1061		- Model EF8320G202
		- 24 VDC
		- SST body, explosion proof

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MARK	/ QTY. /	DESCRIPTION
BA-100 (R2)	8	1" NPT 3000# WKM REGULAR PORT BALL VALVES - Model B136-CS-03-CS - CS body, standard trim
BA-100SL (R1)	9	1" NPT 3000# WKM REGULAR PORT BALL VALVES - Model B136-CS3-03-S2 - CS body, NACE trim, low temperature material
BAFF-151SL (R1)	19	1 1/2" 150# RF PBV FULL PORT BALL VALVES - Model S6410-01-3600-GTNL - 316 SST body, 316 SST NACE trim, low temp material - glass filled TFE seats - top and bottom grease fittings
BAFF-159SL	4	1 1/2" 900# ANSI RTJ FRONTIER FULL PORT BALL VALVES - Model XB215J09AESC - A-350-LF2 body, NACE trim, low temperature trim - peek seats - body grease and stem injection fittings
BAF-201SL	4	2" 150# PBV RF REGULAR PORT BALL VALVES - Model C6410-31-2536-GLNL - LCB body, 316 SST NACE trim, low temperature material - glass filled TFE seats - top and bottom grease fittings
BAF-301SL	2	3" 150# PBV RF REGULAR PORT BALL VALVES - Model C6410-31-2536-GLNL - LCB body, 316 SST NACE trim, low temperature material - glass filled TFE seats - top and bottom grease fittings
BAF-209SL	2	2" 900# RTJ WKM REGULAR PORT BALL VALVES - Model 370E-4, 37-PB-23 - A-352, GR LCC body, NACE trim, low temp material
CH-100SL (R2)	9	1" NPT CLASS 1500 CROWN SWING CHECK VALVES - Model 1S-10SSR30-A7F - A-351, GR CF8M body, NACE trim, low temperature material - viton clapper seal, 316 SS clapper and cap

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MARK	/ QTY. /	DESCRIPTION
CHF-209SL	2	2" 900# RTJ CROWN FULL BODY CHECK VALVES - Model 2S-51LCCT21-A7DFIX - A-352-GR LCC body, 316 SS NACE trim, low temperature material - 316 SS clapper, modified viton clapper seal, 316 SS overlay on seat
GL-100SL	4	1" NPT CLASS 1500 DSI GLOBE VALVES - Model 6221-F12-18 - A-350-LF2 body, NACE trim, low temperature material - OS&Y, bolted bonnet
GLF-151SL	2	1 1/2" 150# RF BONNEY FORGE GLOBE VALVES - Model L1-307-7LF - A-350-LF2 body, NACE trim, low temperature material - OS&Y, bolted bonnet
NV-025	3	1/4" NPT PGI NEEDLE VALVES - Model V-502-CCT - carbon steel body, teflon seat - instrument regulator isolator
NV-050SL	4	1/2" MNPT X 1/2" FNPT PGI NEEDLE VALVES - Model V-506-SCG - SST body, NACE trim, low temperature trim - metal seats, graphoil packing
NV-076SL	3	3/4" MNPT X 1/2" FNPT PGI NEEDLE VALVES - Model V-518-SCG - SST body, NACE trim, low temperature trim - metal seats, graphoil packing - 3/4" M x (3) 1/2" F connections - block and bleed - c/w 1/2" 316 SST plug
BSF-201SL	2	2" 150# RF RADAFAB IN-LINE BASKET STRAINERS - MAWP: 260 psig @ 200/-40°F - CS body, NACE trim, low temp material, select chemistry: CE ≤ 0.45 - two (2) 1 1/2" 150# RF drain and vent connections - one (1) 1/8" dia. perforated 316 SST formed basket - Radiography: 100% per RT-1, PWHT - CA: 3/16" - registered and inspected for use in Alberta
SB-201SL	1	2" 150# ANSI RF SPECTACLE BLIND

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(R1)

- low temp materials

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TYPE _____ PRESSURE VESSELS (SOUR) _____ DATE ISSUED/REVISED* 1999
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- all pressure vessels will be designed and registered in accordance with ASME Section VIII, Division 1
- in addition to description provided, pressure vessels will incorporate the following additional requirements:
 - $$C.E. = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15} \leq 0.45$$
 - U.T. on Category D weld
 - flush nozzle inside projection for drain connections
 - the inside internal projection shall be rounded to a 1/8" radius
 - U.T. on a 6" grid per ASME Section V and within 2" of plate edges
 - maximum hardness will not exceed BHN 200 and shall be performed on the base metal, weld metal and HAZ. The hardness checks will be performed as follows:
 - one circumferential weld
 - one longitudinal weld
 - one nozzle (random)
 - one attachment (random)
- impact testing required as per UCS-66 TO UG-85

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SWEET PIPING MATERIAL (1/16" C.A.)

	150# ASME "A"	600# ASME "C"
<u>WELDED</u>		
	sch 40	2" - 10" sch 80
Piping	A-106B smls	A-106-B smls
Flanges	A-105, RF	A-105, RF
Fittings	A-234-WPB	A-234-WPB
Boltings	B7M studs, 2HM nuts	B7M studs, 2HM nuts
Gaskets	T316 flexitallic	T316 flexitallic

THREADED (1/2" - 1 1/2")

Pipes	A-106B smls sch 80	A-106B smls sch 160
Fittings	3000# F.S. A-105	3000# F.S. A-105
Nipples	A-106B smls sch 80	A-106B sch 160

RADIOGRAPHY

2" and larger butt welded	10%	50%
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P.W.H.T.

2" and larger butt welded	not provided	not provided
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HARDNESS

2" and larger butt welded	N/A	N/A
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LOW TEMP SWEET PIPING MATERIAL (1/16" C.A.)

	150# ASME "AL"	600# ASME "CL"
<u>WELDED</u>		
	2" sch 40	2" - 10" sch 80
Piping	A-333-6 smls	A-333-6 smls
Flanges	A-350-LF2 FS, RF	A-350-LF2 FS, RF
Fittings	A-420-WPL6 FS	A-420-WPL6 FS
Boltings	B7M studs, 2HM nuts	B7M studs, 2HM nuts
Gaskets	T316 flexitallic	T316 flexitallic
<u>THREADED (NIL C.A.)</u>		
Pipes	A-333-6 smls sch 80	A-333-6 smls sch 160
Fittings	3000# F.S. A-350-LF2	3000# F.S. A-350-LF2
Nipples	A-333-6 smls sch 80	A-333-6 smls sch 160
<u>RADIOGRAPHY</u>		
2" and larger butt welded	10%	50%
<u>P.W.H.T.</u>		
2" and larger butt welded	not provided	not provided
<u>HARDNESS</u>		
2" and larger butt welded	N/A	N/A

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LOW TEMP SOUR PIPING MATERIAL (1/8" C.A.)

<u>WELDED</u>	150# ASME "ASL"	900# ASME "DSL"
Piping	3/4" - 1 1/2" sch 80	3/4" - 3" sch 160
Flanges	2" sch 80	4" -10" sch 120
Fittings	3" - 10" sch 40	A-333-GR6
Boltings	A-333-GR6 smls	A-350-LF2, RTJ
Gaskets	A-350-LF2 RF	A-420-WPL6 / 6000# FS
	A-420-WPL6 / 3000# FS	B7M studs, 2HM nuts
	B7M studs, 2HM nuts	316 SS oval ring
	316 SS flexitallic	

RADIOGRAPHY

2" and larger butt welded	100%	100%
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P.W.H.T.

2" and larger butt welded	Yes	Yes
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HARDNESS

2" and larger butt welded	BHN 200 (5% Production)	BHN 200 (5% Production)
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SELECT CHEMISTRY

$$C.E. = C + \frac{Mn}{6} + \frac{(Cr + Mo + V)}{5} + \frac{(Ni + Cu)}{15} \leq 0.45$$

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PIPING GENERAL NOTES

- piping designed per ANSI B31.3
- all on-skid piping assembled and tie-in extended to skid edge and terminated with appropriate fittings
- all 2" and larger piping to be welded construction with buttweld fittings and weldneck flanges
- all insulated piping shall be on pipe shoes

VENTING

- venting due to over pressure and/or diaphragm breakage is not included in Sweet Fuel Gas Service
- venting of sour gas instruments under normal operating conditions is included

INSTRUMENT DRAINS

- all level instrument drains (LG, LC, etc.) shall be tied into appropriate drain or flare header.

PRESSURE TESTING

- hydrotesting of 2" and larger butt welded process piping only has been included
- piping smaller than 2" will be pressure tested pneumatically to 1.1 x design pressure or hydrotested to 1.5 x design pressure per ASME B31.3 Code

FLARE AND DRAIN PIPING

- low pressure flare piping (D/S of PSV) including flare header and low pressure drain piping (D/S of

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TUBING

	Process	Instruments	Vents/Drains	Chemical	
Size	150 - 900#	3/8" (.035")	3/8" (.035")	3/8" (.035")	3/8" (.035")
Tubing Mtl	316 stainless steel	316 stainless steel	316 stainless steel	316 stainless steel	
Fitting Mtl	Swagelok		Swagelok	Swagelok	Swagelok

NOTES

- all pneumatic instruments are to have individual Fisher 67AFR instrument supply regulators. Pressur

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PAINTING SPECIFICATIONS

<u>EQUIPMENT</u>	<u>SURFACE PREPARATION</u>	<u>PRIMER</u>	<u>FINISH</u> <u>(2 coats)</u>
STRUCTURAL STEEL	Commercial Sandblast SSPC-SP6	Zinc Phosphate	Warm Grey
SKID FLOOR	Commercial Sandblast SSPC-SP6	Zinc Phosphate	Warm Grey
VESSELS	Commercial Sandblast SSPC-SP6	Zinc Phosphate	Warm Grey
PIPING	Commercial Sandblast SSPC-SP6	Zinc Phosphate	Warm Grey

PAINTING NOTES

- sandblasting shall not be conducted on surfaces that are less than 3 degrees above dewpoint, or when

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INSULATION/FIREPROOFING

- insulation included is limited to the vessel and piping and does not include insulation of the following
 - vessel manways or flanges
 - piping unions, flanges or valves
 - level control cages
 - level gauges or associated piping
 - vessel skirts, saddles or bottom heads

- no provision is included in PRESSON scope of supply for fireproofing of vessel skirts, saddles or any s

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- 1) All instruments, regulators, equipment, gauges, and valves to be provided are explicitly detailed, numbered and tagged in the main body of Equipment/Instrumentation List. Only items specifically described will be included in the final product. Please refer to the marked P&ID for reference.
- 2) Equipment offered is based on PRESSON's in-house specifications and procedures for hydrotesting, welding, vessel calculations, etc. These will meet or exceed applicable Code
- 3) Six (6) PRESSON Standard Maintenance Manuals have been included which consist of the
 - Equipment/Instrumentation List
 - Manufacturer's Product Literature
 - General Arrangement Drawing (As-Built)
 - Process and Instrument Drawing (As-Built)
- 4) Three (3) PRESSON standard Quality Control Manuals have been included which consist of
 - Vessel Data Reports
 - Piping Data Reports
 - Travel Sheets
 - Testing and NDE Reports

Note: Material test reports for all pressure parts are kept on file at PRESSON for five (5)
- 5) Three (3) copies of the following drawings will be "Issued for Approval":
 - P&ID, Instrument List, General Arrangement
- 6) The following has not been provided for:
 - transportation, offloading and re-assembly
 - start-up assistance
 - electrical work