



LONG RUN EXPLORATION

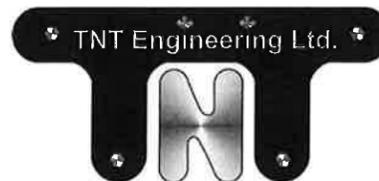
REDWATER

2-12-58-23 W4M

2-12 MULTI-WELL BATTERY

MECHANICAL DRAWINGS

PROJECT # 3080

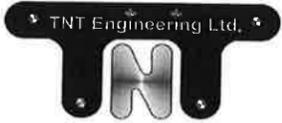


TNT ENGINEERING LTD.
SUITE 600, 639 - 5TH AVE SW
CALGARY, AB, T2P 0M9
PHONE (403) 387-2500
FAX (403) 387-2535

**RE-ISSUED FOR
CONSTRUCTION**



DRAWING INDEX

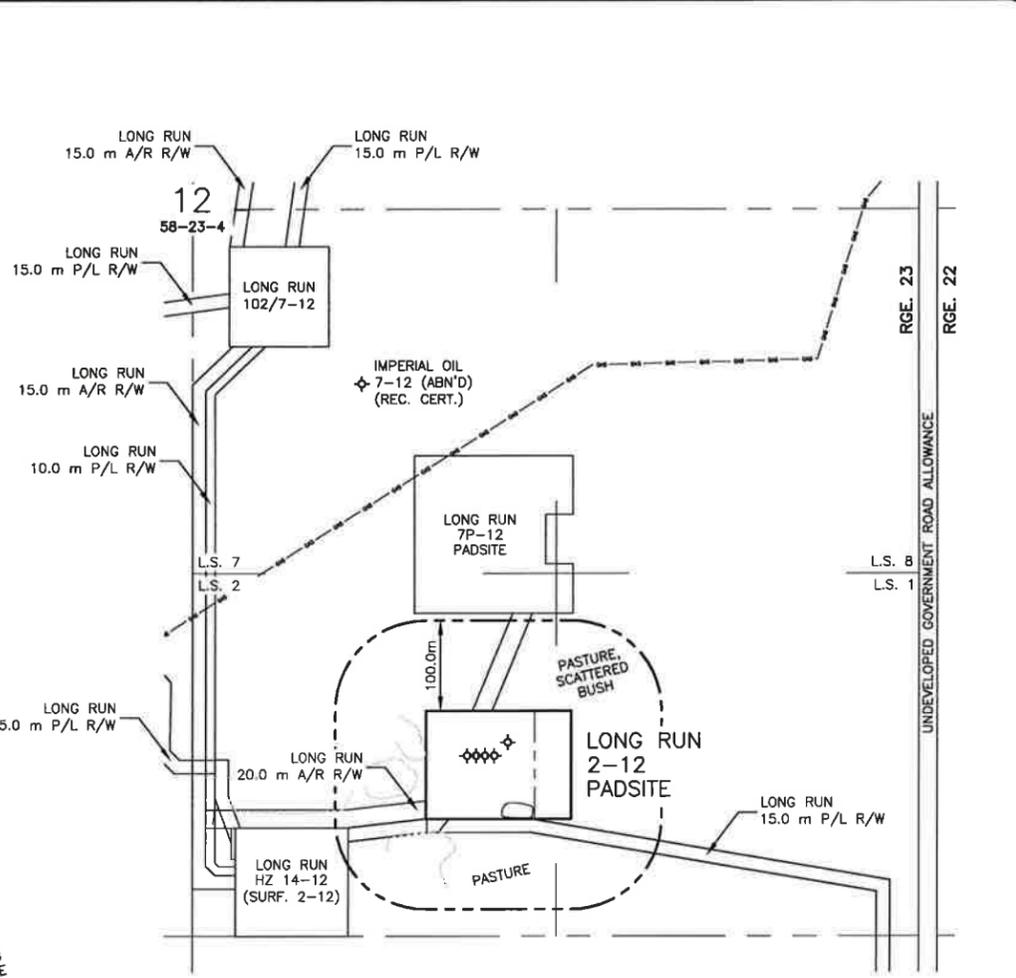
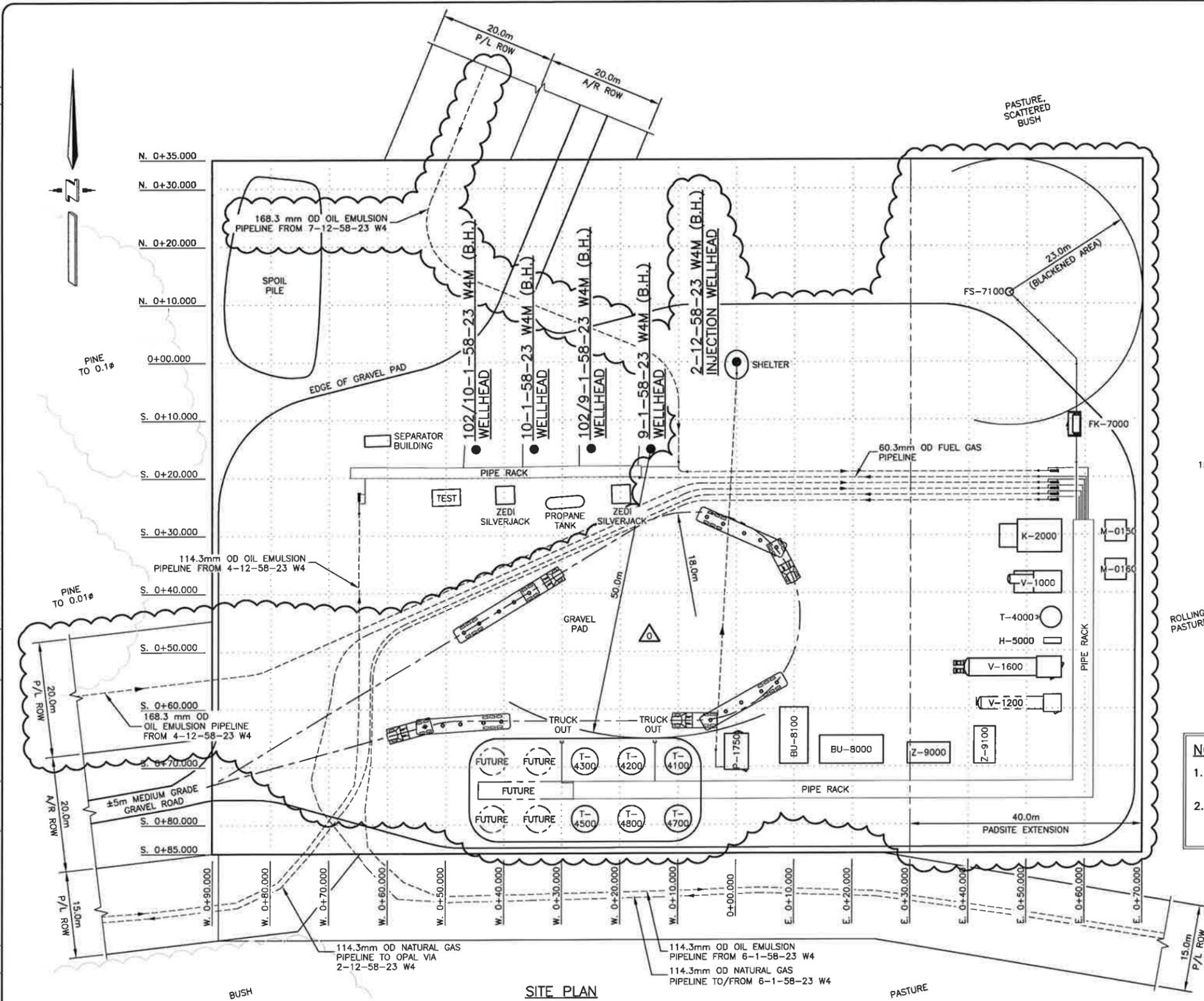


STRIKE AREA	SURFACE LOCATION	BOTTOM HOLE LOCATION	DRAWING	DRAWING TYPE	COMMENTS	REV.
REDWATER	02-12-058-23 W4M	-	-	COVER PAGE	2-12 MULTI-WELL BATTERY	-
REDWATER	02-12-058-23 W4M	-	0212058234.0000/01	SITE PLAN AND LOCATION PLAN	MULTI-WELL BATTERY	0
REDWATER	02-12-058-23 W4M	-	0212058234.1000/01	PROCESS FLOW DIAGRAM	MULTI-WELL BATTERY	0
REDWATER	02-12-058-23 W4M	-	0212058234.1001/01	PROCESS FLOW DIAGRAM	MULTI-WELL BATTERY	0
REDWATER	02-12-058-23 W4M	-	0212058234.1002/01	PROCESS FLOW DIAGRAM	MULTI-WELL BATTERY	0
-	-	-	-	TNT ENGINEERING PIPING SPECIFICATION	ASME PIPING CLASS A	6
-	-	-	-	TNT ENGINEERING PIPING SPECIFICATION	ASME PIPING CLASS AF	2
-	-	-	-	TNT ENGINEERING PIPING SPECIFICATION	ASME PIPING CLASS B	6
-	-	-	-	TNT ENGINEERING PIPING SPECIFICATION	CSA PIPING CLASS BZ	2
-	-	-	-	TNT ENGINEERING PIPING SPECIFICATION	ASME PIPING CLASS C	6
-	-	-	-	TNT ENGINEERING PIPING SPECIFICATION	ASME PIPING CLASS D	4
REDWATER	02-12-058-23 W4M	-	0212058234.1500/01	LINE LIST	MULTI-WELL BATTERY	1
REDWATER	02-12-058-23 W4M	-	0212058234.1500/02	LINE LIST	MULTI-WELL BATTERY	1
REDWATER	02-12-058-23 W4M	-	0212058234.1500/03	LINE LIST	MULTI-WELL BATTERY	1
REDWATER	02-12-058-23 W4M	-	0212058234.1500/04	LINE LIST	MULTI-WELL BATTERY	1
REDWATER	02-12-058-23 W4M	-	0212058234.1500/05	LINE LIST	MULTI-WELL BATTERY	1
-	-	-	-	TNT SYMBOL SHEET	TYPICAL FLOW SHEET SYMBOLS AND STANDARDS	F
REDWATER	02-12-058-23 W4M	-	0212058234.2100/01	PIPING AND INSTRUMENTATION DIAGRAM	WELLHEAD TIE-IN AREA	0
REDWATER	02-12-058-23 W4M	-	0212058234.2100/02	PIPING AND INSTRUMENTATION DIAGRAM	INLET RISER AREA	0
REDWATER	02-12-058-23 W4M	-	0212058234.2101D/01	PIPING AND INSTRUMENTATION DIAGRAM	INLET SEPARATOR (V-1000) AREA (DEMOLITION DRAWING)	A
REDWATER	02-12-058-23 W4M	-	0212058234.2101/01	PIPING AND INSTRUMENTATION DIAGRAM	INLET SEPARATOR (V-1000) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2102/01	PIPING AND INSTRUMENTATION DIAGRAM	TREATER (V-1600) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2102/02	PIPING AND INSTRUMENTATION DIAGRAM	TREATER (V-1600) AREA	0
REDWATER	02-12-058-23 W4M	-	0212058234.2103D/01	PIPING AND INSTRUMENTATION DIAGRAM	SALES COMPRESSOR (K-2000) AREA (DEMOLITION DRAWING)	A
REDWATER	02-12-058-23 W4M	-	0212058234.2103/01	PIPING AND INSTRUMENTATION DIAGRAM	SALES COMPRESSOR (K-2000) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2103/02	PIPING AND INSTRUMENTATION DIAGRAM	SALES COMPRESSOR (K-2000) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2103/03	PIPING AND INSTRUMENTATION DIAGRAM	SALES COMPRESSOR (K-2000) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2104/01	PIPING AND INSTRUMENTATION DIAGRAM	SALES COMPRESSOR (K-2000) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2104D/02	PIPING AND INSTRUMENTATION DIAGRAM	SALES METER BUILDING (M-0150) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2104/02	PIPING AND INSTRUMENTATION DIAGRAM	SLIPSTREAM METER BUILDING (M-0160) AREA (DEMOLITION DRAWING)	A
REDWATER	02-12-058-23 W4M	-	0212058234.2104/01	PIPING AND INSTRUMENTATION DIAGRAM	SLIPSTREAM METER BUILDING (M-0160) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2105/01	PIPING AND INSTRUMENTATION DIAGRAM	OUTLET RISER AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2106/01	PIPING AND INSTRUMENTATION DIAGRAM	FKOD AND FLARE STACK AREA	0
REDWATER	02-12-058-23 W4M	-	0212058234.2107/01	PIPING AND INSTRUMENTATION DIAGRAM	WATER TANK (T-4700/4800) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2108/01	PIPING AND INSTRUMENTATION DIAGRAM	PRODUCTION AND SALES STORAGE TANK AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2109/01	PIPING AND INSTRUMENTATION DIAGRAM	WATER DISPOSAL PUMP (P-1750) AREA	0
REDWATER	02-12-058-23 W4M	-	0212058234.2109/02	PIPING AND INSTRUMENTATION DIAGRAM	WATER DISPOSAL PUMP (P-1750) AREA	1
REDWATER	02-12-058-23 W4M	-	0212058234.2110/01	PIPING AND INSTRUMENTATION DIAGRAM	WATER INJECTION WELLHEAD AREA	0
REDWATER	02-12-058-23 W4M	-	0212058234.2111/01	PIPING AND INSTRUMENTATION DIAGRAM	GARAGE BLDG. (BU-8100) AND MCC BLDG. (Z-9000) AREA	0

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Z:\DRAWING\JOBS\LONG RUN EXPLORATION\REDWATER\02-12-058-23 W4M\SITE PLAN\0212058234.0000 REV 0.DWG

DRAWING SHEET SIZE: 22" x 34"



LOCATION PLAN
1:4000

NOTES:
 1. FIELD LOCATE ALL BURIED PIPELINES, CABLES AND CONDUITS PRIOR TO EXCAVATION.
 2. FIELD TO INSTALL ALL TANK FARM PILES FOR FUTURE TANK INSTALLATION.

EQUIPMENT LIST	
M-0150	LONG RUN SALES METER
M-0160	BAYTEX SALES METER
V-1000	INLET SEPARATOR
V-1200	FREE WATER KNOCK OUT (FUTURE)
V-1600	TREATER
K-2000	SALES COMPRESSOR
P-1750	WATER DISPOSAL PUMP
T-4000	POP TANK
T-4100	PRODUCTION TANK
T-4200	SALES TANK
T-4300	SALES TANK
T-4500	SALES TANK
T-4700	WATER TANK
T-4800	WATER TANK
H-5000	LINE HEATER (FUTURE)
FK-7000	FLARE KNOCK OUT DRUM
FS-7100	FLARE STACK
BU-8000	OFFICE
BU-8100	GARAGE/IA PACKAGE
Z-9000	MCC
Z-9100	GENSET

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature:

Date: Dec 23/16

PERMIT NUMBER: P 11113
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

STAMP

Dec 23/16

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: G. WONG	DATE: 10/17/2016
CHECKED: K. ROBERTS	DATE: 10/17/2016
ENGINEER: T. POMERANZ	DATE: 10/17/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 10/17/2016

TNT Engineering Ltd.

SUITE 600, 639 - 5TH AVE SW
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REDWATER
 2-12-58-23 W4M
 MULTI-WELL BATTERY
 SITE PLAN AND LOCATION PLAN

SCALE: 1:400 DWG: 0212058234.0000/01 REV: 0

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DRAWING SHEET SIZE: 11" x 17"

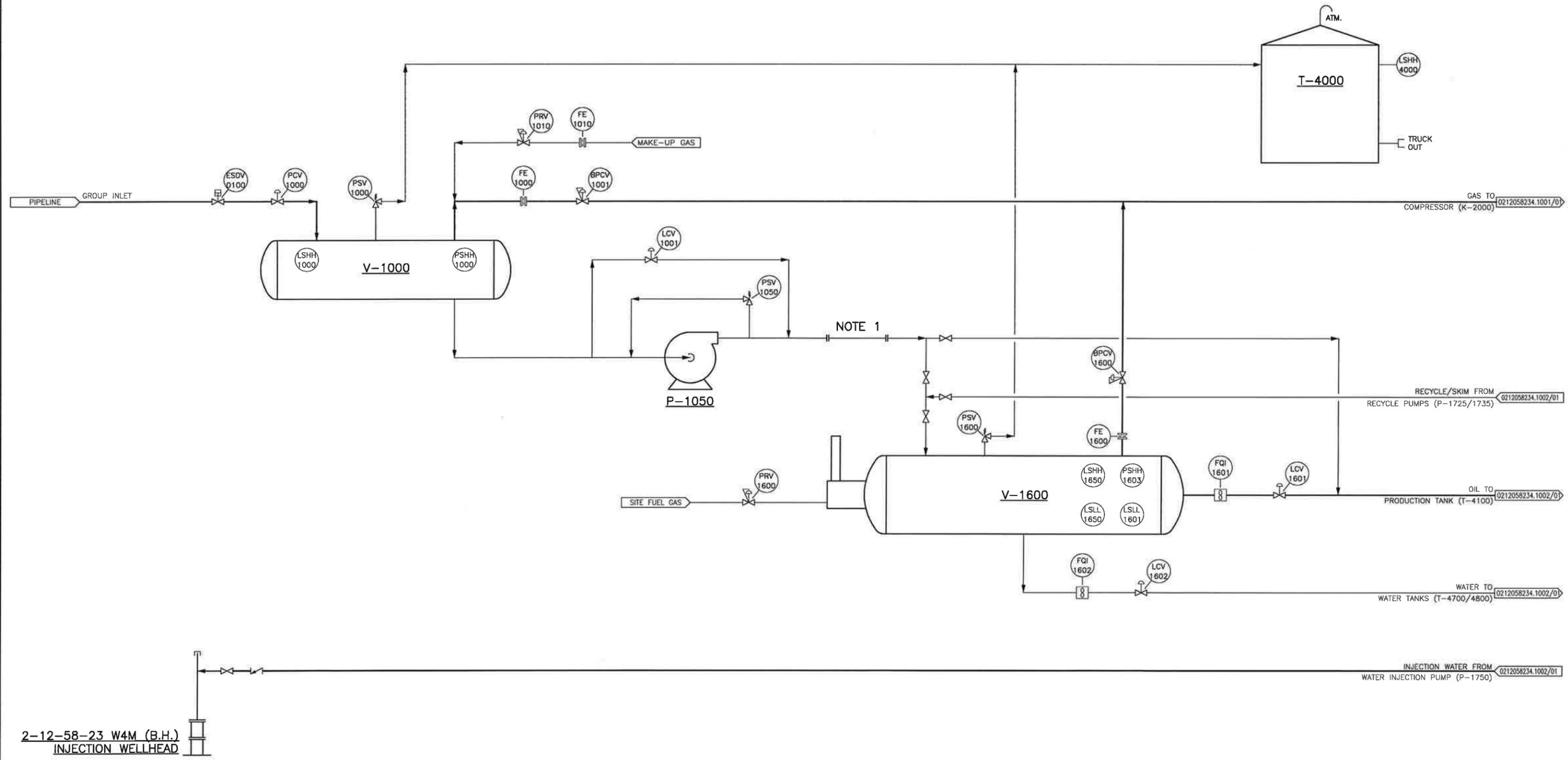
NOTE:
1. FUTURE EMULSION METER FOR BATTERY TRUCK-IN CAPABILITY.

V-1000
INLET SEPARATOR

P-1050
BOOSTER PUMP

V-1600
TREATER

T-4000
POP TANK



2-12-58-23 W4M (B.H.)
INJECTION WELLHEAD

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
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PERMIT	STAMP



LONG RUN EXPLORATION



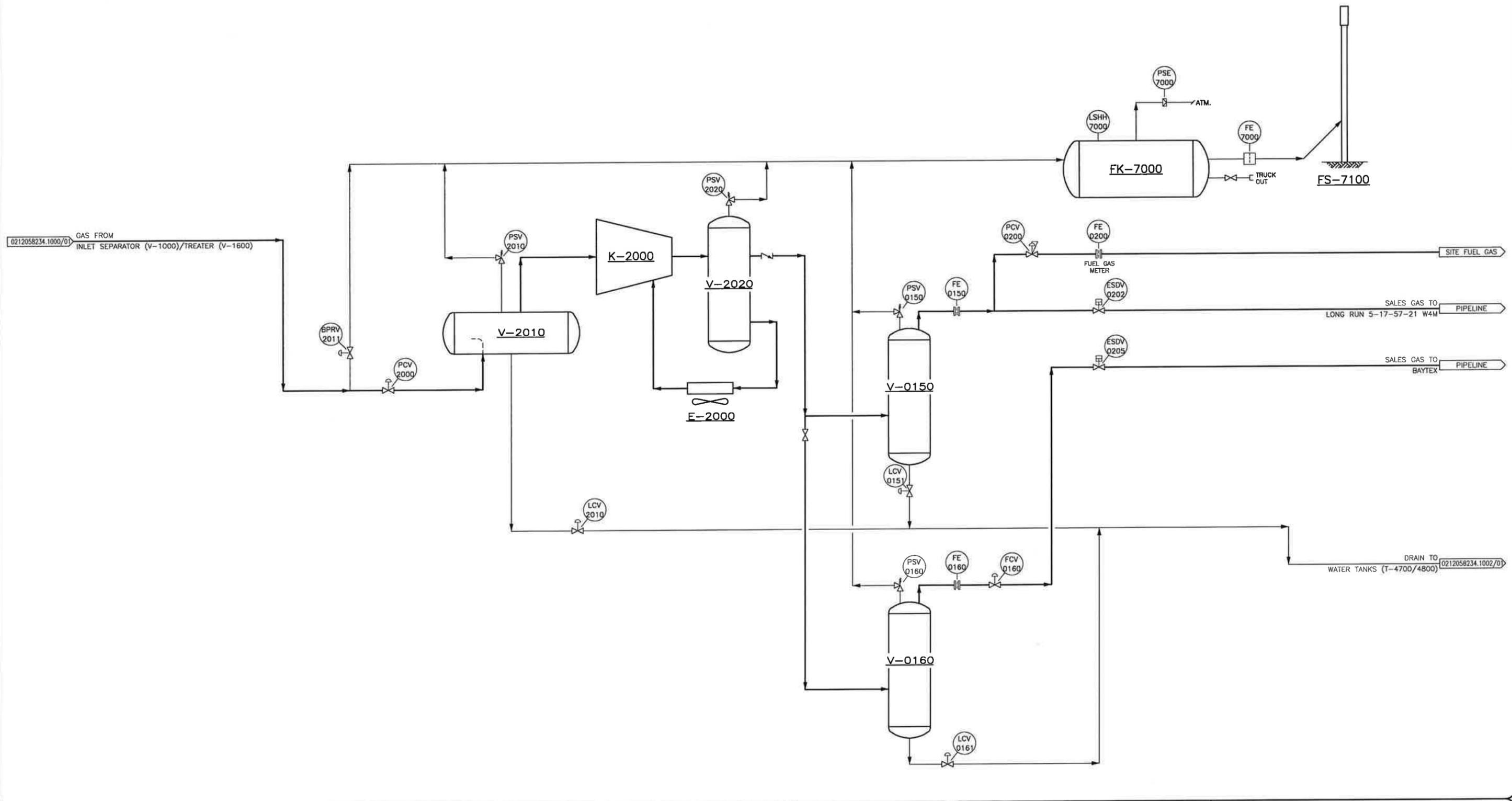
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ENGINEERING RECORD		REDWATER 2-12-58-23 W4M MULTI-WELL BATTERY PROCESS FLOW DIAGRAM	SCALE	NTS	DWG	0212058234.1000/01	REV.	0		
DRAWN:	S. KIM								DATE:	10/17/2016
CHECKED:	K. ROBERTS								DATE:	10/17/2016
ENGINEER:	T. POMERANZ								DATE:	10/17/2016
PROJECT MANAGER:	N. GUNDERMAN	DATE:	10/17/2016							

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V-2010 SUCTION SCRUBBER K-2000 SALES COMPRESSOR V-2020 OIL SEPARATOR F-2000 OIL COOLER V-0150/0160 SALES SCRUBBERS FK-7000 FLARE KNOCK OUT DRUM FS-7100 FLARE STACK



REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
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PERMIT	STAMP

ENGINEERING RECORD
DRAWN: S. KIM DATE: 10/17/2016
CHECKED: K. ROBERTS DATE: 10/17/2016
ENGINEER: T. POMERANZ DATE: 10/17/2016
PROJECT MANAGER: N. GUNDERMAN DATE: 10/17/2016



LONG RUN EXPLORATION



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REDWATER
2-12-58-23 W4M
MULTI-WELL BATTERY
PROCESS FLOW DIAGRAM

SCALE: NTS	DWG: 0212058234.1001/01	REV: 0
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DRAWING SHEET SIZE: 11" x 17"

P-1750
WATER DISPOSAL PUMP

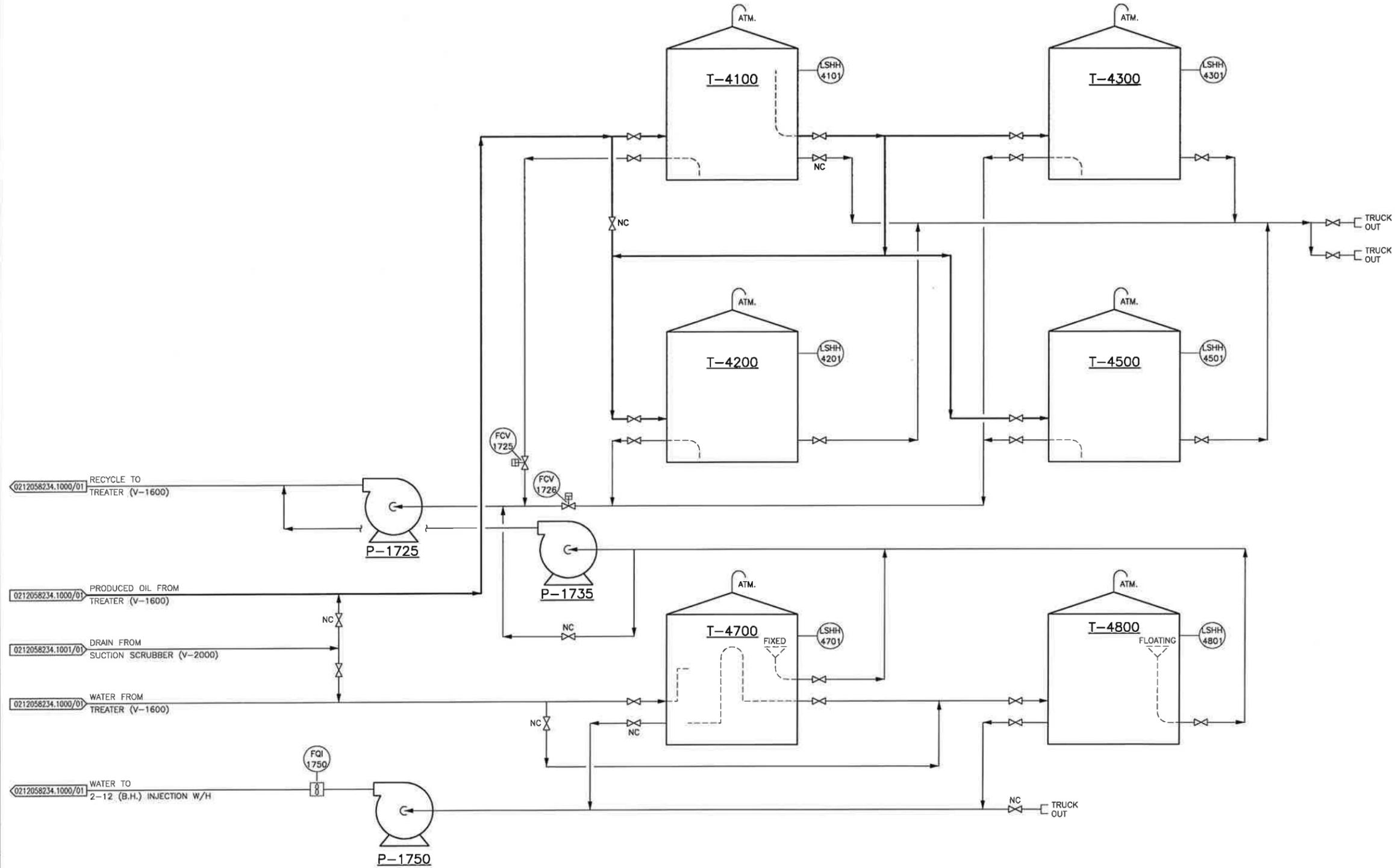
P-1725
RECYCLE PUMP

P-1735
SKIM PUMP

T-4100
PRODUCTION TANK

T-4200/4300/4500
SALES TANKS

T-4700/4800
WATER TANKS



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ENGINEERING RECORD	
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REDWATER
2-12-58-23 W4M
MULTI-WELL BATTERY
PROCESS FLOW DIAGRAM

SCALE: NTS	DWG: 0212058234.1002/01	REV: 0
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ASME PIPING SPECIFICATIONS

SPEC: **A**
 ANSI CLASS: **150**
 REVISION: **06**
 REVISION DATE **Feb 02/2015**

SERVICE:	SWEET PROCESS FLUIDS	CODE:	ASME B31.3
DESIGN PRESSURE:	1,965 kPag (285 psig) @ 38 °C (100 F)	TEST PRESSURE:	2,945 kPag (427 psig)
TEMPERATURE LIMITS:	-29 to 149 °C (-20 to 300 F)	RATING:	ASME/ANSI B16.5
PRESSURE DERATION:	derate for temps above 38 °C (100 F)	PWHT:	if pipe wall thickness > 19 mm
CORROSION ALLOWANCE:	1.6 mm		
RADIOGRAPHY:	10% of all butt welds for each welder to be 100% radiographed		

ITEM	Sizes (NPS)	Rating	Connection	Material/Code	Notes
Pipe	½ to 1 ½	Sch 80	THD/SW	ASTM A 106 Gr. B, Seamless, PE	3
	2 to 10	Sch 40	BW	ASTM A 106 Gr. B, Seamless, BE	
	12	STD	BW	ASTM A 106 Gr. B, Seamless, BE	
Fittings Cap	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
	2 to 10	Sch 40	BW	ASTM A 234 WPB	4
	12	STD	BW	ASTM A 234 WPB	4
Coupling	½ to 1 ½	Class 3000	THD	ASTM A 105 N, full & half	3
Cross	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
Elbow	½ to 1 ½	Class 3000	THD	ASTM A 105 N, 45 & 90	3
	2 to 10	Sch 40	LRBW	ASTM A 234 WPB, 45 & 90, straight & reducing	2, 4
	12	STD	LRBW	ASTM A 234 WPB, 45 & 90, straight & reducing	2, 4
Elbolet	½ to 1 ½	Class 3000	THD	ASTM A 105 N	5
Flange	2 to 10	Class 150	RFWN	ASTM A 105 N, bored to Sch 40 pipe	
	12	Class 150	RFWN	ASTM A 105 N, bored to STD pipe	
Nipple	½ to 1 ½	Sch 80	THD	ASTM A 106 B (SMLS), 100 mm long min, TBE	
Reducer	2 to 10	Sch 40	BW	ASTM A 234 WPB, concentric/eccentric	4
	12	STD	BW	ASTM A 234 WPB, concentric/eccentric	4
Socket	½ to 1 ½	Class 3000	SW	ASTM A 105 N	5
Swage	½ to 1 ½	Sch 80	THD or PE	ASTM A 105 N or A 106 B (SMLS), match pipe & Conn	6
Tee	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
	2 to 10	Sch 40	BW	ASTM A 234 WPB, straight & reducing	4
	12	STD	BW	ASTM A 234 WPB, straight & reducing	4
Threadolet	½ to 1 ½	Class 3000	THD	ASTM A 105 N	5
Union	½ to 1 ½	Class 3000	THD	ASTM A 105 N	7
Weldolet	2 to 4	Sch 40	BW	ASTM A 105 N	5
Valves Ball	< 1 ½	Class 800	THD	A 105 body, cr. plated trim, 2000 # to API 607	9
	2 to 6	Class 150	RF	WCB body, cr. plated trim to API 607/608, lever operator	9
	8 to 12	Class 150	RF	WCB body, cr. plated trim to API 607/608, gear op > 8"	9, 13
Check	< 1 ½	Class 800	THD	A 105 body, trim No. 8 to API 602	9
	2 to 12	Class 150	RF	WCB body, trim No. 8 to API 600	9
Gate	< 1 ½	Class 800	THD	A 105 body, trim No. 8 to API 602, hand wheel	9
	2 to 12	Class 150	RF	WCB body, trim No. 8 to API 600, gear op > 10"	9
Globe	< 1 ½	Class 800	THD	A 105 body, trim No. 8 to API 602, hand wheel	9
	2 to 12	Class 150	RF	WCB body, trim No. 8 to API 600, gear op > 10"	9
Needle	½ to ¾	Class 3000	THD	A 105 body & 316 SS trim	9
Misc. Spectacle Blind	2 to 12	Class 150	RF	ASTM A 516 70 N	8
	2 to 12	Class 150	RF	spiral wound, flexible graphite filler, 316 SS windings, ASME B16.20, carbon steel centering ring	
Nuts				ASTM A 194 2HM, heavy hexagon	
Studs				ASTM A 193 B7M, threaded full length	
Plug	½ to 1 ½	Sch 80	THD	Bull, ASTM A 105 N or A 106 B (SMLS)	6
	½ to 1 ½	Class 3000	THD	Hex Head, ASTM A 105 N	3

- Notes:**
2. short radius elbow and returns shall not be used
 3. forged steel fitting to meet ASME B16.11
 4. butt weld fitting to meet ASME B16.9
 5. forged C.S. branch outlet fittings to MSS SP-97
 6. swage(d) nipples and bull plugs to MSS SP-95
 7. steel pipe unions to MSS SP-83
 8. blanks to API Std. 590
 9. all valves shall meet ASME B16.34 requirements
 13. trunnion mounted ball valve



ASME PIPING SPECIFICATIONS

SPEC: AF
ANSI CLASS: 150
REVISION: 02
REVISION DATE: Jan 12/2017

SERVICE:	CORROSIVE FLUIDS (NON-CYCLIC)	CODE:	ASME B31.3
DESIGN PRESSURE:	1,551 kPag (225 psig)	TEST PRESSURE:	2,327 kPag (338 psig) 30
TEMPERATURE LIMITS:	-29 to 93 °C (-20 to 199 F)	RATING:	ASME/ANSI B16.5
PRESSURE DERATION:	n/a	PWHT:	n/a
CORROSION ALLOWANCE:	0.0 mm		
RADIOGRAPHY:	n/a		

ITEM	Sizes (NPS)	Rating	Connection	Material/Code	Notes	
Pipe	2 to 3		TAB	Red Thread II, ASTM D2996 RTRP-11AF1-2111		
	4		TAB	Red Thread II, ASTM D2996 RTRP-11AH1-2111		
	6		TAB	Red Thread II, ASTM D2996 RTRP-11AH1-2112		
	8		B&S	Red Thread II, ASTM D2996 RTRP-11AH1-2112		
	10		B&S	Red Thread II, ASTM D2996 RTRP-11AH1-2114		
	12		B&S	Red Thread II, ASTM D2996 RTRP-11AH1-2115		
Fittings	Adapters	1 to 8	BELL x NPT	ASTM D5685, Green Thread		
		1 to 8	SPIGOT x NPT	ASTM D5685, Green Thread		
	Cap	1 to 3	BELL	ASTM D5685, Green Thread		
	Cross	1 to 2	BELL/FF	ASTM D5685, Green Thread		
	Elbow	1 to 6		BELL/FF	ASTM D5685, Green Thread	
		8 to 12		BELL/FF	ASTM D5685, Green Thread, FW	
	Flange	2 to 12	Class 150	BELL	ASTM D4024, Green Thread	
	Nipple	1 to 12	same as pipe	SPIGOT	same as pipe	
	Orifice Flanges	2 to 8	Class 150	BELL	ASTM D4024, Green Thread, FW, c/w (2) ½" NPT taps	
	Reducer	2 to 12		BELL	ASTM D5685, Green Thread	
		8 to 12		FF	ASTM D5685, Green Thread	
	Reducer Bushing	1 to 12		BELL/NPT	ASTM D5685, Green Thread	
	Tee	1 to 6		BELL/FF	ASTM D5685, Green Thread	
		8 to 12		BELL/FF	ASTM D5685, Green Thread, FW	
	Saddles	2 to 12		BONDED	ASTM D5685, Green Thread	31
Sleeve Couplings	1 to 12		BELL	ASTM D5685, Green Thread or Red Thread		
Valves	Ball	2 to 6	Class 150	RF	ASTM A351 CF8M, 316 SS trim to API 607/608, lever op	9
		8 to 12	Class 150	RF	ASTM A351 CF8M, 316 SS trim to API 607/608, gear op	9, 13
	Butterfly	3 to 12	Class 150	RF	ASTM A351 CF8M, 316 SS trim to API 607/609, gear op > 8"	9
	Check	2 to 12	Class 150	RF	ASTM A351 CF8M, API TR10 trim to API 594,6D	9
	Gate	2 to 12	Class 150	THD/SW	A 182 F316/316L body, API TR12 trim to API 600	9
	Globe	2 to 12	Class 150	RF	ASTM A351 CF8M body, API TR12 trim	9
	Needle	½ to ¾	Class 6000	THD	A182 F316/316L body, 316 SS trim	9
Misc.	Blind	2 to 3	Class 150		FF, ASTM D4024, Green Thread	
		4 to 6	Class 150	RF	ASTM A182 F316/316L	
		8 to 12	Class 150	RF	ASTM A182 F316/316L	
	Gasket	2 to 12	Class 150	RF	Hi-Grade Neoprene Shore A 80 Durometer Gasket, Ring Style w/Spacer Ring & Steel Backing Ring	
	Nuts				ASTM A 194 2HM, heavy hexagon	
	Studs				ASTM A 193 B7M, threaded full length	

Notes:

9. all valves shall meet ASME B16.34 requirements
13. trunnion mounted ball valve
18. the piping should be pressurized to 1.5 times the operating design pressure ten times. The tenth pressurization should be maintained for 1 - 8 hours and the line inspected for leaks.
19. FRP saddles may be used for high point vents and low point drains (1" off connections only)
20. manufactures guidelines are to be followed for the installation of fiberglass systems.



ASME PIPING SPECIFICATIONS

SPEC: B
ANSI CLASS: 300
REVISION: 06
REVISION DATE: Feb 02/2015

SERVICE: SWEET PROCESS FLUIDS	CODE: ASME B31.3
DESIGN PRESSURE: 5,102 kPag (740 psig) @ 38 °C (100 F)	TEST PRESSURE: 7,654 kPag (1,110 psig)
TEMPERATURE LIMITS: -29 to 149 °C (-20 to 300 F)	RATING: ASME/ANSI B16.5
PRESSURE DERATION: derate for temps above 38 °C (100 F)	PWHT: if pipe wall thickness > 19 mm
CORROSION ALLOWANCE: 1.6 mm	
RADIOGRAPHY: 10% of all butt welds for each welder to be 100% radiographed	

ITEM	Sizes (NPS)	Rating	Connection	Material/Code	Notes
Pipe	½ to 1 ½	Sch 80	THD/SW	ASTM A 106 Gr. B, Seamless, PE	1, 3
	2 to 10	Sch 40	BW	ASTM A 106 Gr. B, Seamless, BE	
	12	STD	BW	ASTM A 106 Gr. B, Seamless, BE	
Fittings Cap	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
	2 to 10	Sch 40	BW	ASTM A 234 WPB	4
	12	STD	BW	ASTM A 234 WPB	4
Coupling	½ to 1 ½	Class 3000	THD	ASTM A 105 N, full & half	3
Cross	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
Elbow	½ to 1 ½	Class 3000	THD	ASTM A 105 N, 45 & 90	3
	2 to 10	Sch 40	LRBW	ASTM A 234 WPB, 45 & 90, straight & reducing	2, 4
	12	STD	LRBW	ASTM A 234 WPB, 45 & 90, straight & reducing	2, 4
Elbolet	½ to 1 ½	Class 3000	THD	ASTM A 105 N	5
Flange	2 to 10	Class 300	RFWN	ASTM A 105 N, bored to Sch 40 pipe	
	12	Class 300	RFWN	ASTM A 105 N, bored to STD pipe	
Nipple	½ to 1 ½	Sch 80	THD	ASTM A 106 B (SMLS), 100 mm long min, TBE	
Reducer	2 to 10	Sch 40	BW	ASTM A 234 WPB, concentric/eccentric	4
	12	STD	BW	ASTM A 234 WPB, concentric/eccentric	4
Socket	½ to 1 ½	Class 3000	SW	ASTM A 105 N	5
Swage	½ to 1 ½	Sch 80	THD or PE	ASTM A 105 N or A 106 B (SMLS), match pipe & Conn	6
Tee	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
	2 to 10	Sch 40	BW	ASTM A 234 WPB, straight & reducing	4
	12	STD	BW	ASTM A 234 WPB, straight & reducing	4
Threadolet	½ to 1 ½	Class 3000	THD	ASTM A 105 N	5
Union	½ to 1 ½	Class 3000	THD	ASTM A 105 N	7
Weldolet	2 to 4	Sch 40	BW	ASTM A 105 N	5
Valves Ball	< 1 ½	Class 800	THD	A 105 body, cr. plated trim, 2000 # to API 607	9
	2 to 4	Class 300	RF	WCB body, cr. plated trim to API 607/608, lever operator	9
	6 to 12	Class 300	RF	WCB body, cr. plated trim to API 607/608, gear op > 6"	9, 13
Check	< 1 ½	Class 800	THD	A 105 body, trim No. 8 to API 602	9
	2 to 12	Class 300	RF	WCB body, trim No. 8 to API 600	9
Gate	< 1 ½	Class 800	THD	A 105 body, trim No. 8 to API 602, hand wheel	9
	2 to 12	Class 300	RF	WCB body, trim No. 8 to API 600, gear op > 8"	9
Globe	< 1 ½	Class 800	THD	A 105 body, trim No. 8 to API 602, hand wheel	9
	2 to 12	Class 300	RF	WCB body, trim No. 8 to API 600, gear op > 8"	9
Needle	½ to ¾	Class 3000	THD	A 105 body & 316 SS trim	9
Misc. Spectacle Blind	2 to 12	Class 300	RF	ASTM A 516 70 N	8
	2 to 12	Class 300	RF	spiral wound, flexible graphite filler, 316 SS windings, ASME B16.20, carbon steel centering ring	
Nuts				ASTM A 194 2HM, heavy hexagon	
Studs				ASTM A 193 B7M, threaded full length	
Plug	½ to 1 ½	Sch 80	THD	Bull, ASTM A 105 N or A 106 B (SMLS)	6
	½ to 1 ½	Class 3000	THD	Hex Head, ASTM A 105 N	3

- Notes:**
- corrosion allowances for threaded connections are reduced
 - short radius elbow and returns shall not be used
 - forged steel fitting to meet ASME B16.11
 - butt weld fitting to meet ASME B16.9
 - forged C.S. branch outlet fittings to MSS SP-97
 - swage(d) nipples and bull plugs to MSS SP-95
 - steel pipe unions to MSS SP-83
 - blanks to API Std. 590
 - all valves shall meet ASME B16.34 requirements
 - trunnion mounted ball valve



CSA Z662 PIPING SPECIFICATIONS

SPEC: BZ
 CSA CLASS: PN 50
 REVISION: 02
 REVISION DATE: Mar 05/2013
 ASME CLASS: 300

SERVICE:	SWEET PROCESS FLUIDS	CODE:	CSA Z662
DESIGN PRESSURE:	4,960 kPag (720 psig) @ 38 °C (100 F)	TEST PRESSURE:	Note 18
TEMPERATURE LIMITS:	-29 to 120 °C (-20 to 248 F)	RATING:	CSA Z245.12
CORROSION ALLOWANCE:	0 mm	PWHT:	N/A
LOCATION FACTOR:	0.625		
RADIOGRAPHY:	15% of all butt welds for each welder to be 100% radiographed		

ITEM	Sizes (NPS)	Rating	Connection	Material/Code	Notes
Pipe	½ to 1 ½	Sch 80	THD/SW	ASTM A 106 Gr. B, Seamless, PE	1, 3
	2 to 10	Sch 40	BW	ASTM A 106 Gr. B, Seamless, PE	
	12	STD	BW	ASTM A 106 Gr. B, Seamless, PE	
Fittings Cap	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
	2 to 10	Sch 40	BW	ASTM A 234 WPB	4
	12	STD	BW	ASTM A 234 WPB	4
Coupling	½ to 1 ½	Class 3000	THD	ASTM A 105 N, full & half	3
Cross	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
Elbow	½ to 1 ½	Class 3000	THD	ASTM A 105 N, 45 & 90	3
	2 to 10	Sch 40	LRBW	ASTM A 234 WPB, 45 & 90, straight & reducing	2, 4
	12	STD	LRBW	ASTM A 234 WPB, 45 & 90, straight & reducing	2, 4
Elbolet	½ to 1 ½	Class 3000	THD	ASTM A 105 N	5
Flange	2 to 10	Class 300	RFWN	ASTM A 105 N, bored to Sch 40 pipe	
	12	Class 300	RFWN	ASTM A 105 N, bored to STD pipe	
Nipple	½ to 1 ½	Sch 80	THD	ASTM A 106 B (SMLS), 100 mm long min, TBE	
Reducer	2 to 10	Sch 40	BW	ASTM A 234 WPB, concentric/eccentric	4
	12	STD	BW	ASTM A 234 WPB, concentric/eccentric	4
Socket	½ to 1 ½	Class 3000	SW	ASTM A 105 N	5
Swage	½ to 1 ½	Sch 80	THD or PE	ASTM A 105 N or A 106 B (SMLS), match pipe & Conn	6
Tee	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
	2 to 10	Sch 40	BW	ASTM A 234 WPB, straight & reducing	4
	12	STD	BW	ASTM A 234 WPB, straight & reducing	4
Threadolet	½ to 1 ½	Class 3000	THD	ASTM A 105 N	5
Union	½ to 1 ½	Class 3000	THD	ASTM A 105 N	7
Weldolet	2 to 4	Sch 40	BW	ASTM A 105 N	5
Valves Ball	< 1 ½	Class 800	THD	A 105 body, cr. plated trim, 2000 # to API 607	9
	2 to 4	Class 300	RF	WCB body, cr. plated trim to API 607/608, lever operator	9
	6 to 12	Class 300	RF	WCB body, cr. plated trim to API 607/608, gear op > 6"	9, 13
Check	< 1 ½	Class 800	THD	A 105 body, trim No. 8 to API 602	9
	2 to 12	Class 300	RF	WCB body, trim No. 8 to API 600	9
Gate	< 1 ½	Class 800	THD	A 105 body, trim No. 8 to API 602, hand wheel	9
	2 to 12	Class 300	RF	WCB body, trim No. 8 to API 600, gear op > 8"	9
Globe	< 1 ½	Class 800	THD	A 105 body, trim No. 8 to API 602, hand wheel	9
	2 to 12	Class 300	RF	WCB body, trim No. 8 to API 600, gear op > 8"	9
Needle	½ to ¾	Class 3000	THD	A 105 body & 316 SS trim	9
Misc. Spectacle Blind	2 to 12	Class 300	RF	ASTM A 516 70 N	8
	2 to 12	Class 300	RF	spiral wound, flexible graphite filler, 316 SS windings, ASME B16.20, carbon steel centering ring	
Nuts				ASTM A 194 2HM, heavy hexagon	
Studs				ASTM A 193 B7M, threaded full length	
Plug	½ to 1 ½	Sch 80	THD	Bull, ASTM A 105 N or A 106 B (SMLS)	6
	½ to 1 ½	Class 3000	THD	Hex Head, ASTM A 105 N	3

- Notes:**
- corrosion allowances for threaded connections are reduced
 - short radius elbow and returns shall not be used
 - forged steel fitting to meet ASME B16.11
 - butt weld fitting to meet ASME B16.9
 - forged C.S. branch outlet fittings to MSS SP-97
 - swage(d) nipples and bull plugs to MSS SP-95
 - steel pipe unions to MSS SP-83
 - blanks to API Std. 590
 - all valves shall meet ASME B16.34, CSA Z245.11, API 6D, API 600 requirements
 - trunnion mounted ball valve
 - refer to linelist for test pressures



ASME PIPING SPECIFICATIONS

SPEC: C
ANSI CLASS: 600
REVISION: 06
REVISION DATE: Feb 02/2015

SERVICE: SWEET PROCESS FLUIDS	CODE: ASME B31.3
DESIGN PRESSURE: 10,205 kPag (1480 psig) @ 38 °C (100 F)	TEST PRESSURE: 15,307 kPag (2,220 psig)
TEMPERATURE LIMITS: -29 to 149 °C (-20 to 300 F)	RATING: ASME/ANSI B16.5
PRESSURE DERATION: derate for temps above 38 °C (100 F)	PWHT: if pipe wall thickness > 19 mm
CORROSION ALLOWANCE: 1.6 mm	
RADIOGRAPHY: 10% of all butt welds for each welder to be 100% radiographed	

ITEM	Sizes (NPS)	Rating	Connection	Material/Code	Notes
Pipe	½ to ¾	Sch 160	THD/SW	ASTM A 106 Gr. B, Seamless, PE	3
	1 to 1 ½	Sch 160	THD/SW	ASTM A 106 Gr. B, Seamless, BE	3
	2 to 6	Sch 80	BW	ASTM A 106 Gr. B, Seamless, BE	
	8 to 12	Sch 80 (calc WT)	BW	ASTM A 333 Gr. 6, Seamless, BE	
Fittings Cap	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
	2 to 6	Sch 80	BW	ASTM A 234 WPB	4
	8 to 12	Sch 80 min.	BW	ASTM A 420 WPL6	4, 12
Coupling	½ to 1 ½	Class 3000	THD	ASTM A 105 N, full & half	3
Cross	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
Elbow	½ to 1 ½	Class 3000	THD	ASTM A 105 N, 45 & 90	3
	2 to 6	Sch 80	LRBW	ASTM A 234 WPB, 45 & 90, straight & reducing	2, 4
	8 to 12	Sch 80 min	LRBW	ASTM A 420 WPL6, 45 & 90, straight & reducing	2, 4, 12
Elbolet	½ to 1 ½	Class 3000	THD	ASTM A 105 N	5
Flange	2 to 6	Class 600	RFWN	ASTM A 105 N, bored to Sch 80 pipe	
	8 to 12	Class 600	RFWN	ASTM A 105 N, bored to Sch 80 min. pipe	12
Nipple	½ to ¾	Sch 160	THD	ASTM A 106 B (SMLS), 100 mm long min, TBE	
	1 to 1 ½	Sch 160	THD	ASTM A 106 B (SMLS), 100 mm long min, TBE	
Reducer	2 to 6	Sch 80	BW	ASTM A 234 WPB, concentric/eccentric	4
	8 to 12	Sch 80 min	BW	ASTM A 420 WPL6, concentric/eccentric	4, 12
Socket	½ to 1 ½	Class 3000	SW	ASTM A 105 N	5
Swage	½ to ¾	Sch 160	THD or PE	ASTM A 105 N or A 106 B (SMLS), match pipe & Conn	6
	1 to 1 ½	Sch 160	THD or PE	ASTM A 105 N or A 106 B (SMLS), match pipe & Conn	6
Tee	½ to 1 ½	Class 3000	THD	ASTM A 105 N	3
	2 to 6	Sch 80	BW	ASTM A 234 WPB, straight & reducing	4
	8 to 12	Sch 80 min	BW	ASTM A 420 WPL6, straight & reducing	4, 12
Threadolet	½ to 1 ½	Class 3000	THD	ASTM A 105 N	5
Union	½ to 1 ½	Class 3000	THD	ASTM A 105 N	7
Weldolet	2 to 4	Sch 80	BW	ASTM A 105 N	5
Valves Ball	< 1 ½	Class 800	THD	A 105 body, cr.plated trim, 2000 # to API 607	9
	2	Class 600	RF	WCB body, cr. plated trim to API 607, lever operator	9
	3 to 6	Class 600	RF	WCB body, cr. plated trim to API 607, gear operator >4"	9, 13
	4 to 12	Class 600	RF	LCC body, 316 SS trim to API 607, gear operator	9, 13
Check	< 1 ½	Class 800	THD	A 105 body, trim No. 12 to API 602	9
	2 to 6	Class 600	RF	WCB body, trim No. 12 to API 600	9
	8 to 12	Class 600	RF	LCC body, trim No. 12 to API 600	9
Gate	< 1 ½	Class 800	THD	A 105 body, trim No. 12 to API 602, handwheel	9
	2 to 6	Class 600	RF	WCB body, trim No. 12 to API 600, handwheel	9
	8 to 12	Class 600	RF	LCC body, trim No. 12 to API 600, gear op	9
Globe	< 1 ½	Class 800	THD	A 105 body, trim No. 12 to API 602, handwheel	9
	2 to 6	Class 600	RF	WCB body, trim No. 12 to API 600, handwheel	9
	8 to 12	Class 600	RF	LCC body, trim No. 12 to API 600, gear op	9
Needle	½ to ¾	Class 6000	THD	A 105 body & 316 SS trim	9
Misc. Spectacle Blind	2 to 6	Class 600	RF	ASTM A 516 70 N	8
	8 to 12	Class 600	RF	ASTM A 516 70 N (impact tested)	8
Gasket	2 to 12	Class 600	RF	spiral wound, flexible graphite filler, 316 SS windings, ASME B16.20, carbon steel centering ring	
Nuts				ASTM A 194 2HM, heavy hexagon	
Studs				ASTM A 193 B7M, threaded full length	
Plug	½ to 1 ½	Sch XXS	THD	Bull, ASTM A 105 N or A 106 B (SMLS)	6
	½ to 1 ½	Class 3000	THD	Hex Head, ASTM A 105 N	3

- Notes:**
- short radius elbow and returns shall not be used
 - forged steel fitting to meet ASME B16.11
 - butt weld fitting to meet ASME B16.9
 - forged C.S. branch outlet fittings to MSS SP-97
 - swage(d) nipples and bull plugs to MSS SP-95
 - steel pipe unions to MSS SP-83
 - blanks to API Std. 590
 - all valves shall meet ASME B16.34 requirements
 - on calculated pipe wall thicknesses, fitting wall thickness to match calculated pipe value
 - trunnion mounted ball valve



ASME PIPING SPECIFICATIONS

SPEC: D
ANSI CLASS: 900
REVISION: 04
REVISION DATE Feb 02/2015

ITEM	Sizes (NPS)	Rating	Connection	Material/Code	Notes
SERVICE: SWEET PROCESS FLUIDS DESIGN PRESSURE: 15,307 kPag (2,220 psig) @ 38 °C (100 F) TEMPERATURE LIMITS: -29 to 149 °C (-20 to 300 F) PRESSURE DERATION: derate for temps above 38 °C (100 F) CORROSION ALLOWANCE: 1.6 mm RADIOGRAPHY: 100% of all butt welds for each welder to be 100% radiographed					
CODE: ASME B31.3 TEST PRESSURE: 22,960 kPag (3,330 psig) RATING: ASME/ANSI B16.5 PWHT: if pipe wall thickness > 19 mm					
Pipe	½ to 1 ½ 2, 3 4 6 to 12	Sch 160 Sch 80 Sch 120 (calc WT) Sch 120 (calc WT)	THD/SW BW/RTJ BW/RTJ BW/RTJ	ASTM A 106 Gr. B, Seamless, PE ASTM A 106 Gr. B, Seamless, BE ASTM A 106 Gr. B, Seamless, BE ASTM A 333 Gr. 6, Seamless, BE	3
Fittings	Cap	½ to 1 ½ 2, 3 4 6 to 12	THD BW BW BW	ASTM A 105 N ASTM A 234 WPB ASTM A 234 WPB ASTM A 420 WPL6	3 4 4, 12 4, 12
	Coupling	½ to 1 ½	THD	ASTM A 105 N, full & half	3
	Cross	½ to 1 ½	THD	ASTM A 105 N	3
	Elbow	½ to 1 ½ 2, 3 4 6 to 12	THD LRBW LRBW LRBW	ASTM A 105 N, 45 & 90 ASTM A 234 WPB, 45 & 90, straight & reducing ASTM A 234 WPB, 45 & 90, straight & reducing ASTM A 420 WPL6, 45 & 90, straight & reducing	3 2, 4 2, 4, 12 2, 4, 12
	Elbolet	½ to 1 ½	THD	ASTM A 105 N	5
	Flange	2, 3 4 6 to 12	RTJWN RTJWN RTJWN	ASTM A 105 N, bored to Sch 80 pipe ASTM A 105 N, bored to Sch 120 min. pipe ASTM A 350 LF2, bored to Sch 120 min. pipe	12 12
	Nipple	½ to 1 ½	THD	ASTM A 106 B (SMLS), 100 mm long min. TBE	5
	Reducer	2, 3 4 6 to 12	BW BW BW	ASTM A 234 WPB, concentric/eccentric ASTM A 234 WPB, concentric/eccentric ASTM A 420 WPL6, concentric/eccentric	4 4, 12 4, 12
	Socket	½ to 1 ½	SW	ASTM A 105 N	5
	Swage	½ to 1 ½	THD or PE	ASTM A 105 N or A 106 B (SMLS), match pipe & Conn	6
	Tee	½ to 1 ½ 2, 3 4 6 to 12	THD BW BW BW	ASTM A 105 N ASTM A 234 WPB, straight & reducing ASTM A 234 WPB, straight & reducing ASTM A 420 WPL6, straight & reducing	3 4 4, 12 4, 12
	Thredolet	½ to 1 ½	THD	ASTM A 105 N	5
	Union	½ to 1 ½	THD	ASTM A 105 N	7
	Weldolet	2, 3 4	BW BW	ASTM A 105 N ASTM A 105 N	5 5, 12
Valves	Ball	< 1 ½ 2 3, 4 6 to 12	THD RTJ RTJ RTJ	A 105 body, cr. plated trim, 3000 # to API 607 WCB body, cr. plated trim to API 607, lever operator WCB body, cr. plated trim to API 607, gear operator >3" LCC body, 316 SS trim to API 607, gear op	9 9 9, 13 9, 13
	Check	< 1 ½ 2 to 4 6 to 12	THD RTJ RTJ	A 105 body, trim No. 8 to API 602 WCB body, trim No. 8 to API 600 LCC body, trim No. 8 to API 600	9 9 9
	Gate	< 1 ½ 2 to 4 6 to 12	THD RTJ RTJ	A 105 body, trim No. 8 to API 602, handwheel WCB body, trim No. 8 to API 600, handwheel LCC body, trim No. 8 to API 600, gear op	9 9 9
	Globe	< 1 ½ 2 to 4 6 to 12	THD RTJ RTJ	A 105 body, trim No. 8 to API 602, handwheel WCB body, trim No. 8 to API 600, handwheel LCC body, trim No. 8 to API 600, gear op	9 9 9
	Needle	½ to ¾	THD	A 105 body & 316 SS trim	9
Misc.	Spectacle Blind	2 to 4 6 to 12	RTJ RTJ	ASTM A 516 70 N ASTM A 516 70 N (Impact tested)	8 8
	Gasket	2 to 12	RTJ	soft iron oval ring, ASME B16.20	
	Nuts			ASTM A 194 2HM, heavy hexagon	
	Studs			ASTM A 193 B7M, threaded full length	
	Plug	½ to 1 ½ ¾ to 1 ½	THD THD	Bull, ASTM A 105 N or A 106 B (SMLS) Hex Head, ASTM A 105 N	6 3
Notes: 2. short radius elbow and returns shall not be used 3. forged steel fitting to meet ASME B16.11 4. butt weld fitting to meet ASME B16.9 5. forged C.S. branch outlet fittings to MSS SP-97 6. swage(d) nipples and bull plugs to MSS SP-95 7. steel pipe unions to MSS SP-83 8. blanks to API Std. 590 9. all valves shall meet ASME B16.34 requirements 12. on calculated pipe wall thicknesses, fitting wall thickness to match calculated pipe value 13. trunnion mounted ball valve					

SIZE	IDENT	SPEC.	NO.	FLUID	FROM	TO	CODE	PIPE SCH	C.A. (mm)	PIPE MATERIAL (smls)	DESIGN			TEST PRESSURE (kPag)	OPERATING		INSULATION		X RAY (min %)	STRESS RELIEF	HARDNESS TESTING (min %)	ASME FLUID SERVICE CATEGORY	RADIOGRAPHY CRITERIA	NOTES	P&ID NO.	LIST REV.	
											PRESS. (kPag)	TEMP. (°C)	MDMT (°C)		PRESS. (kPag)	TEMP. (°C)	THICK. (mm)	HEAT TRACE									
3	- OE - B -		100	Oil Emulsion	T-01	Line 101	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	25H	-	10	-	-	Normal	Normal	2	2100/01	0	
6	- OE - BZ -		101	Oil Emulsion	Pipeline from 7-12-58-23 W4M	Line 102	CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	70	5	38H	-	15	-	-	-	Normal	Normal	1,7,11	2100/01	0
6	- OE - BZ -		102	Oil Emulsion	Line 101	Line 103	CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	70	5	38H	-	15	-	-	-	Normal	Normal	1,7,11	2100/02	0
6	- OE - B -		103	Oil Emulsion	Line 102	Line 114	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	38H	-	10	-	-	Normal	Normal	2	2100/02	0	
8	- OE - BZ -		104	Oil Emulsion	Pig Receiver		CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	70	5	-	-	15	-	-	-	Normal	Normal	11	2100/02	0
4	- OE - B -		105	Oil Emulsion	Line 104	Line 103	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	25H	-	10	-	-	Normal	Normal	2	2100/02	0	
6	- OE - BZ -		106	Oil Emulsion	Pipeline from 4-12-58-23 W4M	Line 107	CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	70	5	38H	-	15	-	-	-	Normal	Normal	1,7,11	2100/02	0
6	- OE - B -		107	Oil Emulsion	Line 106	Line 114	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	38H	-	10	-	-	Normal	Normal	2	2100/02	0	
8	- OE - BZ -		108	Oil Emulsion	Pig Receiver		CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	70	5	-	-	15	-	-	-	Normal	Normal	11	2100/02	0
4	- OE - B -		109	Oil Emulsion	Line 108	Line 107	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	25H	-	10	-	-	Normal	Normal	2	2100/02	0	
4	- OE - BZ -		110	Oil Emulsion	T-03	Line 111	CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	70	5	25H	-	15	-	-	-	Normal	Normal	1,7,11	2100/02	0
4	- OE - B -		111	Oil Emulsion	Line 110	Line 114	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	25H	-	10	-	-	Normal	Normal	2	2100/02	0	
6	- OE - BZ -		112	Oil Emulsion	Pig Receiver		CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	70	5	-	-	15	-	-	-	Normal	Normal	11	2100/02	0
3	- OE - B -		113	Oil Emulsion	Line 112	Line 111	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	25H	-	10	-	-	Normal	Normal	2	2100/02	0	
8	- OE - B -		114	Oil Emulsion	Lines 103/107/111	Line 115	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	38H	-	10	-	-	Normal	Normal	2	2100/02	0	
8	- OE - B -		115	Oil Emulsion	Line 114	V-1000 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	38H	-	10	-	-	Normal	Normal	2	2100/02	0	
3	- OE - B -		116	Oil Emulsion	Line 114	Line 115	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	70	5	25H	-	10	-	-	Normal	Normal	2	2100/02	0	
2	- OE - C -		117	Oil Emulsion	T-05	T-06	ASME B31.3	80	1.6	ASTM A 106 Gr.B	10205	38	-29	15307	70	5	-	-	-	-	-	Normal	-	3	2101/01	0	
6	- OE - A -		118	Oil Emulsion	T-12 / T-14	P-1050 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	70	5	-	-	10	-	-	Normal	Normal	-	2101/01	0	
4	- OE - A -		119	Oil Emulsion	P-1050 Outlet	Line 121	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	275	5	-	-	10	-	-	Normal	Normal	-	2101/01	0	
4	- OE - A -		120	Oil Emulsion	Line 118	Line 119	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	310	5	-	-	10	-	-	Normal	Normal	-	2101/01	0	
4	- OE - A -		121	Oil Emulsion	Lines 119/120	Line 122	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	275	5	25H	-	10	-	-	Normal	Normal	2	2101/01	0	
6	- OE - A -		122	Oil Emulsion	Line 121	V-1600 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	70	5	38H	-	10	-	-	Normal	Normal	2	2102/01	0	
4	- OE - A -		123	Oil Emulsion	Line 121	Line 125	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	275	5	25H	-	10	-	-	Normal	Normal	2	2101/01	0	

- | | | | |
|---|--|---|--|
| <ul style="list-style-type: none"> 1. Insulate pipe sections to first elbow below ground 2. Insulate pipe sections outside building and utilidors 3. NPT piping 4. reduced corrosion allowance 5. Insulate and electric heat trace pipe sections outside buildings and utilidors | <ul style="list-style-type: none"> 6. no pressure test - atmospheric vent or drain 7. pipe sections underground to be coated with Shaw Y11 or equal 8. Internally coated pipe with Devco Devchem 253, 3M Scotchkote 134, or equal 9. reduced design pressure 10. CSA piping - test @ 1.5 x design pressure (ASME pressure test) | <ul style="list-style-type: none"> 11. CSA pressure test 1.25 x design pressure 12. CSA pressure test 1.4 x design pressure 13. increased design temperature 14. valves to be Sour-WCB Body c/w 316SS Ball/Stem 15. slope, do not pocket | <ul style="list-style-type: none"> 16. B31.3 initial service leak test - Category D fluid (test with air) 17. FRP pipe to be Smith Red Thread II with Green Thread Fittings 18. Gaskets to be Trojan G10/Viton elastomeric type F for coated flange connections 19. Internally coated w/ Devco Devchem 253 |
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REV	DESCRIPTION	BY	DATE	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	TP	12/20/2016	TK	NG	3080
1	RE-ISSUED FOR CONSTRUCTION	TP	01/11/2017	TK	NG	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature: 

Date: Jan 16/17

PERMIT NUMBER: P 1113

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

STAMP

PROFESSIONAL ENGINEER
TREVOR KEARNES
ALBERTA



Jan 16/17



LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: T. POMERANZ	DATE: 12/20/2016
CHECKED: T. KEARNES	DATE: 12/20/2016
APPROVED: N. GUNDERMAN	DATE: 12/20/2016
ENGINEER: T. POMERANZ	DATE: 12/20/2016



SUITE 600, 639 - 5th Ave SW
CALGARY, AB T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

REDWATER
02-12-058-23 W4M
LINE LIST
PAGE 1 OF 5

DWG. 0212058234.1500/01

REV. 1

SIZE	IDENT	SPEC.	NO.	FLUID	FROM	TO	CODE	PIPE SCH	C.A. (mm)	PIPE MATERIAL (smIs)	DESIGN			TEST PRESSURE (kPag)	OPERATING		INSULATION		X RAY (mln %)	STRESS RELIEF	HARDNESS TESTING (min %)	ASME FLUID SERVICE CATEGORY	RADIOGRAPHY CRITERIA	NOTES	P&ID NO.	LIST REV.
											PRESS. (kPag)	TEMP. (°C)	MDMT (°C)		PRESS. (kPag)	TEMP. (°C)	THICK. (mm)	HEAT TRACE								
4	- O - A - 130			Oil	Lines 129/131/132/133	Truck Outs	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	10	-	-	10	-	-	Normal	Normal	-	2108/01	0
4	- O - A - 131			Oil	T-4200 Oil Truck-Out	Line 130	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	10	-	-	10	-	-	Normal	Normal	-	2108/01	0
4	- O - A - 132			Oil	T-4500 Oil Truck-Out	Line 130	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	10	-	-	10	-	-	Normal	Normal	-	2108/01	0
4	- O - A - 133			Oil	T-4300 Oil Truck-Out	Line 130	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	10	-	-	10	-	-	Normal	Normal	-	2108/01	0
4	- PW - AF - 135			Produced Water	V-1600 Water Outlet	T-4700 Inlet	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	60	25H	ET	N/A	-	-	Normal	-	5,17	2102/02	0
4	- PW - AF - 136			Produced Water	Line 135	Line 137	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	60	25H	ET	N/A	-	-	Normal	-	5,17	2107/01	0
6	- PW - AF - 137			Produced Water	T-4700 Outlet	T-4800 Inlet	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	15	38H	ET	N/A	-	-	Normal	-	5,17	2107/01	0
4	- PW - AF - 138			Produced Water	T-4800 Outlet	P-1750 Inlet	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	15	25H	ET	N/A	-	-	Normal	-	5,17	2107/01	0
4	- PW - AF - 139			Produced Water	T-4700 Outlet	Line 138	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	15	25H	ET	N/A	-	-	Normal	-	5,17	2107/01	0
3	- PW - C - 140			Produced Water	T-60	T-63	ASME B31.3	80	1.6	ASTM A 106 Gr.B	10205	38	-29	15307	1040	5	-	-	100	-	-	Normal	Severe Cyclic	14, 19	2109/02	0
2	- PW - C - 141			Produced Water	Line 140	Line 140	ASME B31.3	80	1.6	ASTM A 106 Gr.B	10205	38	-29	15307	1040	5	-	-	100	-	-	Normal	Severe Cyclic	14, 19	2109/02	0
3	- PW - D - 142			Produced Water	P-1750 Outlet	Line 143 (Via On-Lease Pipeline)	ASME B31.3	80	1.6	ASTM A 106 Gr.B	15307	38	-29	22960	1020	5	25H	ET	100	-	-	Normal	Severe Cyclic	5,14,18,19	2109/02	0
2	- PW - D - 143			Produced Water	Line 142 (Via On-Lease Pipeline)	15-1 BH Wellhead	ASME B31.3	80	1.6	ASTM A 106 Gr.B	15307	38	-29	22960	1020	5	-	-	100	-	-	Normal	Severe Cyclic	14,18,19	2110/01	0
4	- G - A - 200			Natural Gas	T-08 (V-1000 Gas Outlet)	Line 201	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	241	5	-	-	10	-	-	Normal	Normal	-	2101/01	0
4	- G - A - 201			Natural Gas	Line 200	Line 204	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	70	5	25H	-	10	-	-	Normal	Normal	2	2101/01	0
2	- G - A - 202			Natural Gas	T-22 (V-1600 Gas Outlet)	Line 203	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	70	10	-	-	10	-	-	Normal	Normal	-	2102/02	0
2	- G - A - 203			Natural Gas	Line 202	Line 204	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	70	10	25H	-	10	-	-	Normal	Normal	2	2102/02	0
6	- G - A - 204			Natural Gas	Lines 201/203	K-2000 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	70	10	38H	-	10	-	-	Normal	Normal	2	2103/01	0
1	- G - A - 205			Natural Gas	Line 204	Line 204	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	70	10	25H	-	-	-	-	Normal	-	2,3	2103/01	0
4	- G - B - 206			Natural Gas	K-2000 Outlet	V-0150 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	1379	35	25H	-	10	-	-	Normal	Normal	2	2103/01	0
4	- G - B - 207			Natural Gas	V-0150 Outlet	Line 208	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	1365	35	25H	-	10	-	-	Normal	Normal	2	2104/01	0
4	- G - BZ - 208			Natural Gas	Line 207	T-45 (Pipeline)	CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	1350	35	25H	-	15	-	-	-	Normal	1, 11	2105/01	0
3	- G - B - 209			Natural Gas	Line 207	Line 210	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	1365	35	25H	-	10	-	-	Normal	Normal	2	2105/01	0
6	- G - BZ - 210			Natural Gas	Pig Launcher		CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	1365	35	-	-	15	-	-	-	Normal	11	2105/01	0
3	- G - A - 211			Natural Gas	Line 206	V-0160 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	1379	35	25H	-	10	-	-	Normal	Normal	2	2104/01	0
3	- G - A - 212			Natural Gas	V-0160 Outlet	Line 213	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	1034	32	25H	-	10	-	-	Normal	Normal	2	2104/02	0
4	- G - BZ - 213			Natural Gas	Line 212	T-46 (Pipeline)	CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	1034	32	25H	-	15	-	-	-	Normal	1, 11	2105/01	0
3	- G - B - 214			Natural Gas	Line 212	Line 215	ASME B31.3	40	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	1034	32	25H	-	10	-	-	Normal	Normal	2	2105/01	0
6	- G - BZ - 215			Natural Gas	Pig Launcher		CSA Z662	40	-	ASTM A 106 Gr.B	4960	38	-29	6200	1034	32	-	-	15	-	-	-	Normal	11	2105/01	0
3	- G - C - 216			Natural Gas	T-30	Line 207	ASME B31.3	80	1.6	ASTM A 106 Gr.B	10205	38	-29	15307	7654	35	-	-	10	-	-	Normal	Normal	-	2104/01	0

- | | | | |
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REV	DESCRIPTION	BY	DATE	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	TP	12/20/2016	TK	NG	3080

PERMIT TO WORK

Signature: *[Signature]*

Date: *Dec 22/16*

PERMIT NUMBER: P 11113

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

STAMP

PROFESSIONAL ENGINEER ALBERTA

TREVOR KEARNES

[Signature]

Dec 22/16

LONG RUN EXPLORATION

ENGINEERING RECORD

DRAWN: T. POMERANZ	DATE: 12/20/2016
CHECKED: T. KEARNES	DATE: 12/20/2016
APPROVED: N. GUNDERMAN	DATE: 12/20/2016
ENGINEER: T. POMERANZ	DATE: 12/20/2016

TNT Engineering Ltd.

SUITE 600, 639 - 5th Ave SW
CALGARY, AB T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

REDWATER
02-12-058-23 W4M
LINE LIST
PAGE 2 OF 5

DWG. 0212058234.1500/02

REV. 0

SIZE	IDENT	SPEC.	NO.	FLUID	FROM	TO	CODE	PIPE SCH	C.A. (mm)	PIPE MATERIAL (smls)	DESIGN			TEST PRESSURE (kPag)	OPERATING		INSULATION		X RAY (min %)	STRESS RELIEF	HARDNESS TESTING (min %)	ASME FLUID SERVICE CATEGORY	RADIOGRAPHY CRITERIA	NOTES	P&ID NO.	LIST REV.			
											PRESS. (kPag)	TEMP. (°C)	MDMT (°C)		PRESS. (kPag)	TEMP. (°C)	THICK. (mm)	HEAT TRACE											
3	-	OW	-	AF	-	300	Oil & Water	T-4700 (N3)	Line 302	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	10	25H	ET	N/A	-	-	Normal	-	5,17	2107/01	0
3	-	OW	-	AF	-	301	Oil & Water	T-4800 (N3)	Line 300	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	10	25H	ET	N/A	-	-	Normal	-	5,17	2107/01	0
3	-	OW	-	A	-	302	Oil & Water	Line 300	P-1735 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	10	-	-	10	-	-	Normal	Normal	-	2109/01	0
2	-	OW	-	A	-	303	Oil & Water	P-1735 Outlet	Line 318	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	241	10	-	-	10	-	-	Normal	Normal	-	2109/01	0
3	-	OW	-	A	-	304	Oil & Water	Line 302	Line 316	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	241	10	-	-	10	-	-	Normal	Normal	-	2109/01	0
3	-	OW	-	AF	-	310	Oil & Water	T-4100 (N3)	Line 315	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	10	25H	ET	N/A	-	-	Normal	-	5,17	2108/01	0
3	-	OW	-	AF	-	311	Oil & Water	T-4200 (N3)	Line 314	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	10	25H	ET	N/A	-	-	Normal	-	5,17	2108/01	0
3	-	OW	-	AF	-	312	Oil & Water	T-4300 (N3)	Line 314	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	10	25H	ET	N/A	-	-	Normal	-	5,17	2108/01	0
3	-	OW	-	AF	-	313	Oil & Water	T-4500 (N3)	Line 314	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	10	25H	ET	N/A	-	-	Normal	-	5,17	2108/01	0
3	-	OW	-	AF	-	314	Oil & Water	Lines 311/312/313	Line 315	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	10	25H	ET	N/A	-	-	Normal	-	5,17	2108/01	0
3	-	OW	-	AF	-	315	Oil & Water	Lines 310/314	Line 316	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	10	25H	ET	N/A	-	-	Normal	-	5,17	2108/01	0
3	-	OW	-	A	-	316	Oil & Water	Line 315	P-1725 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	10	-	-	10	-	-	Normal	Normal	-	2109/01	0
2	-	OW	-	A	-	317	Oil & Water	P-1725 Outlet	Line 303	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	241	10	-	-	10	-	-	Normal	Normal	-	2109/01	0
3	-	OW	-	A	-	318	Oil & Water	Lines 303/317	Line 319	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	241	10	-	-	10	-	-	Normal	Normal	-	2109/01	0
3	-	OW	-	AF	-	319	Oil & Water	Line 318	Line 121	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	241	10	25H	ET	N/A	-	-	Normal	-	5,17	2109/01	0
2	-	D	-	A	-	500	Drain	T-11 / T-13 / T-15	Line 501	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	-	-	10	-	-	Normal	Normal	-	2101/01	0
2	-	D	-	AF	-	501	Drain	Line 500	Line 505	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	5	25H	ET	N/A	-	-	Normal	-	5,17	2101/01	0
2	-	D	-	AF	-	502	Drain	V-1600 Drain Outlet	Line 505	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	5	25H	ET	N/A	-	-	Normal	-	5,17	2102/02	0
1	-	D	-	A	-	503	Drain	K-2000 Drain Outlet	Line 505	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	25H	ET	N/A	-	-	Normal	-	3,5	2103/01	0
1	-	D	-	A	-	504	Drain	V-0150 Drain Outlet	Line 505	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	25H	ET	N/A	-	-	Normal	-	3,5	2104/01	0
2	-	D	-	AF	-	505	Drain	Lines 501/502/503	Line 135	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	5	25H	ET	N/A	-	-	Normal	-	5,17	2103/01	0
1	-	D	-	A	-	506	Drain	V-0160 Drain Outlet	Line 505	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	25H	ET	N/A	-	-	Normal	-	3,5	2104/02	0
2	-	D	-	AF	-	507	Drain	Line 505	Line 125	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	5	25H	ET	N/A	-	-	Normal	-	5,17	2107/01	0
1	-	D	-	A	-	508	Drain	Line 317	T-47	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	-	-	N/A	-	-	Normal	-	3	2109/01	0

- | | | | |
|---|--|---|--|
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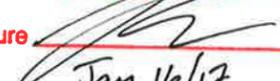
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>REV</th> <th>DESCRIPTION</th> <th>BY</th> <th>DATE</th> <th>CHKD</th> <th>APPD</th> <th>JOB No.</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>ISSUED FOR CONSTRUCTION</td> <td>TP</td> <td>12/20/2016</td> <td>TK</td> <td>NG</td> <td>3080</td> </tr> </tbody> </table>	REV	DESCRIPTION	BY	DATE	CHKD	APPD	JOB No.	0	ISSUED FOR CONSTRUCTION	TP	12/20/2016	TK	NG	3080	<p>PERMIT TO PRACTISE</p> <p>TNT ENGINEERING LTD.</p> <p>Signature: </p> <p>Date: <u>Dec 22/16</u></p> <p>PERMIT NUMBER: P 11113</p> <p>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</p>	<p>STAMP</p>  <p>Dec 22/16</p>	 <p>LONG RUN EXPLORATION</p>	 <p>TNT Engineering Ltd.</p> <p>SUITE 600, 639 - 5th Ave SW CALGARY, AB T2P 0M9 (403) 387-2500 PHONE (403) 387-2535 FAX</p>
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		REV. 0																

SIZE	IDENT	SPEC.	NO.	FLUID	FROM	TO	CODE	PIPE SCH	C.A. (mm)	PIPE MATERIAL (smIs)	DESIGN			TEST PRESSURE (kPag)	OPERATING		INSULATION		X RAY (min %)	STRESS RELIEF	HARDNESS TESTING (min %)	ASME FLUID SERVICE CATEGORY	RADIOGRAPHY CRITERIA	NOTES	P&ID NO.	LIST REV.
											PRESS. (kPag)	TEMP. (°C)	MDMT (°C)		PRESS. (kPag)	TEMP. (°C)	THICK. (mm)	HEAT TRACE								
6	R	A	550	Relief	V-1000 Relief	T-4000	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	-	Atm.	5	-	-	10	-	-	Normal	Normal	6,15	2101/01	0
6	R	A	551	Relief	PSV-1600 Outlet	Line 550	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	-	Atm.	5	-	-	10	-	-	Normal	Normal	6,15	2102/01	1
4	R	A	552	Relief	V-1600 Relief Nozzle	PSV-1600 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1834	80	-29	2945	242	35	25H	-	10	-	-	Normal	Normal	2,9, 13	2102/01	1
4	R	A	560	Relief	Lines 561/562	FK-7000 Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	25H	ET	10	-	-	Normal	Normal	5,15	2103/01	0
2	R	A	561	Relief	Line 204	Line 560	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	25H	ET	10	-	-	Normal	Normal	5,15	2103/01	0
3	R	A	562	Relief	K-2000 Relief Header	Line 560	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	25H	ET	10	-	-	Normal	Normal	5,15	2103/01	0
2	R	A	563	Relief	PSV-0150	Line 565	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	25H	ET	10	-	-	Normal	Normal	5,15	2104/01	0
2	R	A	564	Relief	PSV-0160	Line 565	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	25H	ET	10	-	-	Normal	Normal	5,15	2104/01	0
4	R	A	565	Relief	Lines 563/564	Line 560	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	25H	ET	10	-	-	Normal	Normal	5,15	2104/02	0
4	R	A	566	Relief	FK-7000 Outlet	FS-7100	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	-	-	10	-	-	Normal	Normal	15	2106/01	0
3	R	A	567	Relief	T-51	PSE-7000	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	Atm.	5	-	-	10	-	-	Normal	Normal	-	2106/01	0
2	R	A	568	Relief	T-24 (PSV-2000 Outlet)	Pipe to Above Eave	ASME B31.3	80	1.6	ASTM A 106 Gr.B	Atm.	38	-29	-	Atm.	5	-	-	10	-	-	Normal	Normal	6	2103/03	0
2	R	A	569	Relief	PSV-0200 Outlet	Pipe to Above Eave	ASME B31.3	80	1.6	ASTM A 106 Gr.B	Atm.	38	-29	-	Atm.	5	-	-	-	-	-	Normal	-	3,6	2104/01	0
2	R	AF	570	Relief	P-1750 Relief Outlet	Line 135	ASME B31.3	-	-	Red Thread II	1551	93	-29	2327	Atm.	10	25H	ET	N/A	-	-	Normal	-	5,17	2109/02	0
1.5	R	A	571	Relief	T-65	PSV-2001 Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	413	10	-	-	-	-	-	Normal	-	3	2103/03	1
3	R	A	572	Relief	PSV-2001 Outlet	T-66	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	-	Atm.	10	-	-	10	-	-	Normal	Normal	6	2103/03	1
2.0	R	A	573	Relief	T-67	PSV-1000 Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	70	10	-	-	10	-	-	Normal	Normal	-	2101/01	1
4	R	A	574	Relief	PSV-1000 Outlet	T-68	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	-	Atm.	10	-	-	10	-	-	Normal	Normal	6	2101/01	1
2	FG	C	600	Fuel Gas	Line 216	Line 601	ASME B31.3	80	1.6	ASTM A 106 Gr.B	10205	38	-29	15308	717	10	-	-	10	-	-	Normal	Normal	-	2104/01	0
2	FG	A	601	Fuel Gas	Line 600	Line 602	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	-	-	10	-	-	Normal	Normal	-	2104/01	0
2	FG	A	602	Fuel Gas	Line 601	Line 603	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	10	-	-	Normal	Normal	5	2104/01	0
2	FG	A	603	Fuel Gas	Line 602	Fuel Gas Header	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	10	-	-	Normal	Normal	5	2105/01	0
1	FG	A	604	Fuel Gas	Line 603	M-0165 FG Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	-	-	-	Normal	-	3, 5	2105/01	0
1	FG	A	605	Fuel Gas	Line 602	M-0155 FG Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	-	-	-	Normal	-	3, 5	2104/01	0
2	FG	A	606	Fuel Gas	Line 603	K-2000 FG Inlet	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	10	-	-	Normal	Normal	5	2105/01	0
1	FG	A	607	Fuel Gas	Line 603	V-1600 FG Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	-	-	-	Normal	-	3, 5	2105/01	0
1	FG	A	608	Fuel Gas	Line 603	V-1000 FG Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	-	-	-	Normal	-	3	2101/01	0
1	FG	A	609	Fuel Gas	Line 608	Line 200	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	-	-	-	-	-	Normal	-	3	2106/01	0
1	FG	A	610	Fuel Gas	Line 603	FK-7000 FG Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	-	-	-	Normal	-	3, 5	2106/01	0
0.5	FG	A	611	Fuel Gas	Line 610	Line 567	ASME B31.3	80	1.3	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	-	-	-	-	-	Normal	-	3, 5	2105/01	0
2	FG	A	612	Fuel Gas	Line 603	Tank Farm Area	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	-	-	-	Normal	-	3, 5	2105/01	0
1	FG	A	613	Fuel Gas	Line 603	BU-8100 FG Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	-	-	-	Normal	-	3, 5	2105/01	0
2	FG	A	614	Fuel Gas	Line 603 / On-Lease P/L	T-02	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	-	10	-	-	Normal	Normal	1, 2, 7	2100/01	0
0.5	FG	A	615	Fuel Gas	Line 603	FS-7100	ASME B31.3	80	1.3	ASTM A 106 Gr.B	1965	38	-29	2945	717	10	25H	ET	-	-	-	Normal	-	3, 5	2106/01	0

- 1. insulate pipe sections to first elbow below ground
- 2. insulate pipe sections outside building and utilidors
- 3. NPT piping
- 4. reduced corrosion allowance
- 5. insulate and electric heat trace pipe sections outside buildings and utilidors
- 6. no pressure test - atmospheric vent or drain
- 7. pipe sections underground to be coated with Shaw YJ1 or equal
- 8. internally coated pipe with Devco Devchem 253, 3M Scotchkote 134, or equal
- 9. reduced design pressure
- 10. CSA pipng - test @ 1.5 x design pressure (ASME pressure test)
- 11. CSA pressure test 1.25 x design pressure
- 12. CSA pressure test 1.4 x design pressure
- 13. increased design temperature
- 14. valves to be Sour-WCB Body c/w 316SS Ball/Stem
- 15. slope, do not pocket
- 16. B31.3 initial service leak test - Category D fluid (test with air)
- 17. FRP pipe to be Smith Red Thread II with Green Thread Fittings
- 18. Gaskets to be Trojan G10/Viton elastomeric type F for coated flange connections
- 19. Internally coated w/ Devco Devchem 253

REV	DESCRIPTION	BY	DATE	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	TP	12/20/2016	TK	NG	3080
1	RE-ISSUED FOR CONSTRUCTION	TP	01/11/2017	TK	NG	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature 

Date Jan 16/17

PERMIT NUMBER: P 11113

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

STAMP




LONG RUN EXPLORATION

ENGINEERING RECORD

DRAWN: T. POMERANZ	DATE: 01/11/2017
CHECKED: T. KEARNES	DATE: 01/11/2017
APPROVED: N. GUNDERMAN	DATE: 01/11/2017
ENGINEER: T. POMERANZ	DATE: 01/11/2017


TNT Engineering Ltd.

SUITE 600, 639 - 5th Ave SW
CALGARY, AB T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

REDWATER
02-12-058-23 W4M
LINE LIST
PAGE 4 OF 5

DWG. 0212058234.1500/04

REV. 1

SIZE	IDENT	SPEC.	NO.	FLUID	FROM	TO	CODE	PIPE SCH	C.A. (mm)	PIPE MATERIAL (smls)	DESIGN			TEST PRESSURE (kPag)	OPERATING		INSULATION		X RAY (min %)	STRESS RELIEF	HARDNESS TESTING (min %)	ASME FLUID SERVICE CATEGORY	RADIOGRAPHY CRITERIA	NOTES	P&ID NO.	LIST REV.	
											PRESS. (kPag)	TEMP. (°C)	MDMT (°C)		PRESS. (kPag)	TEMP. (°C)	THICK. (mm)	HEAT TRACE									
2	-	UG	-	B	-	620	Utility Gas	Line 603	Line 621	ASME B31.3	80	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	1350	35	-	-	-	Normal	-	3	2105/01	1
2	-	UG	-	B	-	621	Utility Gas	Line 620	T-28	ASME B31.3	80	1.6	ASTM A 106 Gr.B	5102	38	-29	7654	1350	35	-	-	-	Normal	-	3	2103/02	1
2	-	UG	-	A	-	622	Utility Gas	Line 621	T-28	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1965	38	-29	2945	620	35	-	-	-	Normal	-	3	2103/02	1
2	-	IA	-	A	-	700	Instrument Air	BU-8100 / I/A Outlet	Instrument Air Header	ASME B31.3	40	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	Normal	16	2111/01	0
1	-	IA	-	A	-	701	Instrument Air	Line 700	V-1000 I/A Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	-	3,16	2111/01	0
1	-	IA	-	A	-	702	Instrument Air	Line 700	V-1600 I/A Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	-	3,16	2111/01	0
1	-	IA	-	A	-	703	Instrument Air	Line 700	K-2000 I/A Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	-	3,16	2111/01	0
1	-	IA	-	A	-	704	Instrument Air	Line 703	T-25	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	-	3,16	2111/01	0
1	-	IA	-	A	-	705	Instrument Air	Line 700	M-0150 I/A Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	-	3,16	2111/01	0
1	-	IA	-	A	-	706	Instrument Air	Line 705	T-32	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	-	3,16	2104/01	0
1	-	IA	-	A	-	707	Instrument Air	Line 700	M-0160 I/A Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	-	3,16	2111/01	0
1	-	IA	-	A	-	708	Instrument Air	Line 707	T-39	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	-	3,16	2104/02	0
1	-	IA	-	A	-	709	Instrument Air	Line 700	P-1750 I/A Inlet	ASME B31.3	80	1.6	ASTM A 106 Gr.B	1034	38	-29	1034	690	10	-	-	-	Category D	-	3,16	2111/01	0

- | | | | |
|---|--|---|--|
| <ul style="list-style-type: none"> 1. Insulate pipe sections to first elbow below ground 2. Insulate pipe sections outside building and utilidors 3. NPT piping 4. reduced corrosion allowance 5. Insulate and electric heat trace pipe sections outside buildings and utilidors | <ul style="list-style-type: none"> 6. no pressure test - atmospheric vent or drain 7. pipe sections underground to be coated with Shaw YJ1 or equal 8. internally coated pipe with Devco Devchem 253, 3M Scotchkote 134, or equal 9. reduced design pressure 10. CSA piping - test @ 1.5 x design pressure (ASME pressure test) | <ul style="list-style-type: none"> 11. CSA pressure test 1.25 x design pressure 12. CSA pressure test 1.4 x design pressure 13. increased design temperature 14. valves to be Sour-WCB Body c/w 316SS Ball/Stem 15. slope, do not pocket | <ul style="list-style-type: none"> 16. B31.3 initial service leak test - Category D fluid (test with air) 17. FRP pipe to be Smith Red Thread II with Green Thread Fittings 18. Gaskets to be Trojan G10/Viton elastomeric type F for coated flange connections 19. Internally coated w/ Devco Devchem 253 |
|---|--|---|--|

REV	DESCRIPTION	BY	DATE	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	TP	12/20/2016	TK	NG	3080
1	RE-ISSUED FOR CONSTRUCTION	TP	01/11/2017	TK	NG	3080

PERMIT TO PRACTICE

TNT ENGINEERING LTD.

Signature:

Date: Jan 16/17

PERMIT NUMBER: P 11113

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

STAMP

PROFESSIONAL ENGINEER ALBERTA

TREVOR KEARNES

Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: T. POMERANZ	DATE: 01/11/2017
CHECKED: T. KEARNES	DATE: 01/11/2017
APPROVEI: N. GUNDERMAN	DATE: 01/11/2017
ENGINEER: T. POMERANZ	DATE: 01/11/2017

SUITE 600, 639 - 5th Ave SW
CALGARY, AB T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

REDWATER
02-12-058-23 W4M
LINE LIST
PAGE 5 OF 5

DWG: 0212058234.1500/05
REV: 1

PLT BY: SKM, 12/05/2016 11:12 AM

Z:\DRAFTING\WORKS\LONG RUN EXPLORATION\SYMBOL SHEET REV F.DWG

DRAWING SHEET SIZE: 11" x 17"

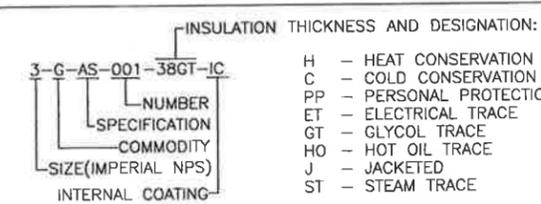
INSTRUMENTATION TABLE

Table with columns: FIRST LETTER, MEASURED INITIATING OR VARIABLE, CONTROLLERS (RECORDER, INDICATOR, BLIND), READOUT DEVICES (SELF ACTUATED CONTROL VALVE, RECORDER, INDICATOR), SWITCHES (HIGH, HIGH HIGH (SHUTDOWN), LOW, LOW LOW (SHUTDOWN), COMBINATION), ALARM DEVICES (HIGH, HIGH HIGH (SHUTDOWN), LOW, LOW LOW (SHUTDOWN), COMBINATION), TRANSMITTER (RECORDER, INDICATOR, BLIND), SOLENOID, RELAYS, COMPUTING DEVICES, PRIMARY ELEMENT, TEST POINT, WELL OR PROBE, VIEW DEVICE, GLASS, SAFETY DEVICE, FINAL ELEMENT.

INSTRUMENT SYMBOLS

Table of instrument symbols including: DISCRETE INSTRUMENTS, SHARED DISPLAY SHARED CONTROL DCS, COMPUTER FUNCTION, PROGRAMMABLE LOGIC CONTROL (PLC), PANEL MOUNTED PATCHBOARD POINT 12, INTERLOCK, PURGE, RESET, I/A OR I/G SUPPLY, HORN, CURRENT/PNEUMATIC, INDICATOR LIGHT, BEACON, PNEUMATIC LATCH MANUAL RESET, PNEUMATIC LATCH AUTO RESET, PNEUMATIC SPEED CONTROL VALVE, PNEUMATIC QUICK EXHAUST VALVE.

LINE NUMBERING



FACILITY EQUIPMENT NUMBERING

EQUIPMENT NUMBERING STARTS WITH A LETTER CHOSEN FROM THE EQUIPMENT TAGS THAT BEST SUITS THE EQUIPMENT TO BE DESCRIBED. FOLLOWING THE EQUIPMENT TAG ARE FOUR DIGIT CATEGORY NUMBER FROM THE EQUIPMENT NUMBERING LIST. EXAMPLE: V-1000. EQUIPMENT (INLET SEPARATOR), SERIAL NUMBERING (ASSIGNED TAG NUMBER).

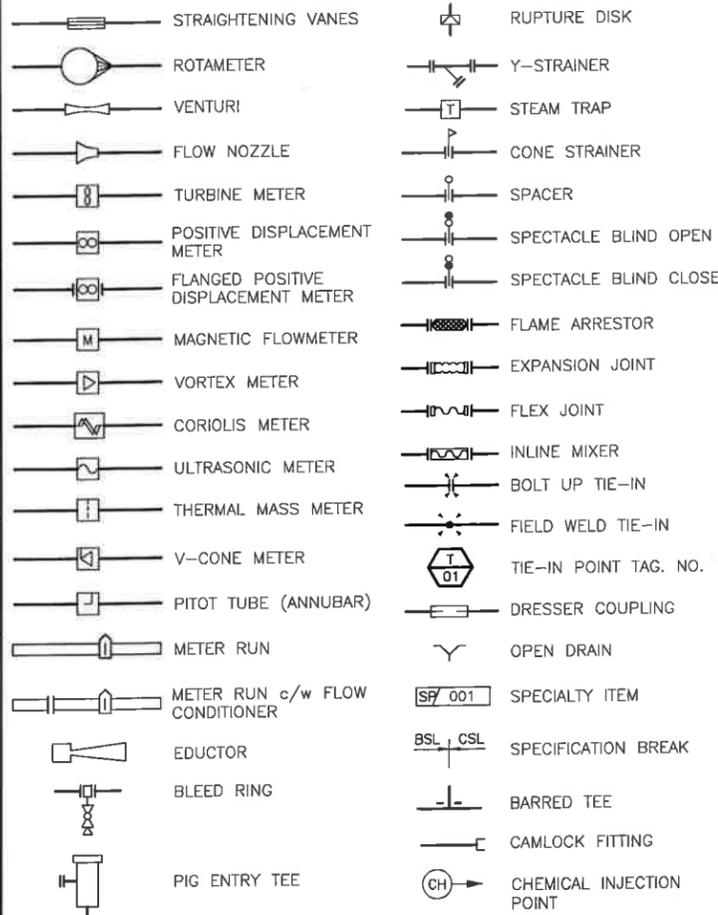
EQUIPMENT TAGS

- A - AUXILIARY FACILITY
B - BLOWER OR FAN (PROCESS)
BH - BUILDING HEATER
C - CRUSHER AND COOLER
CP - COMPRESSOR PANEL
D - DRIVER
E - EXCHANGER, PLATE, SHELL AND TUBE
F - FILTER SEPARATOR (PROCESS)
FS - FLARE STACK
G - GENERATOR, ELECTRIC, GAS OR TEG UNIT
H - FIRED HEATER OR BOILER
I - INCINERATOR
J - CONVEYORS
K - COMPRESSORS
M - MIXER AND MOTOR
P - PUMP
R - REACTOR OR CONVERTER
S - STORAGE
T - TANK
V - PRESSURE VESSEL
VS - VENT STACK
Z - MISC. PACKAGE, METER SKID

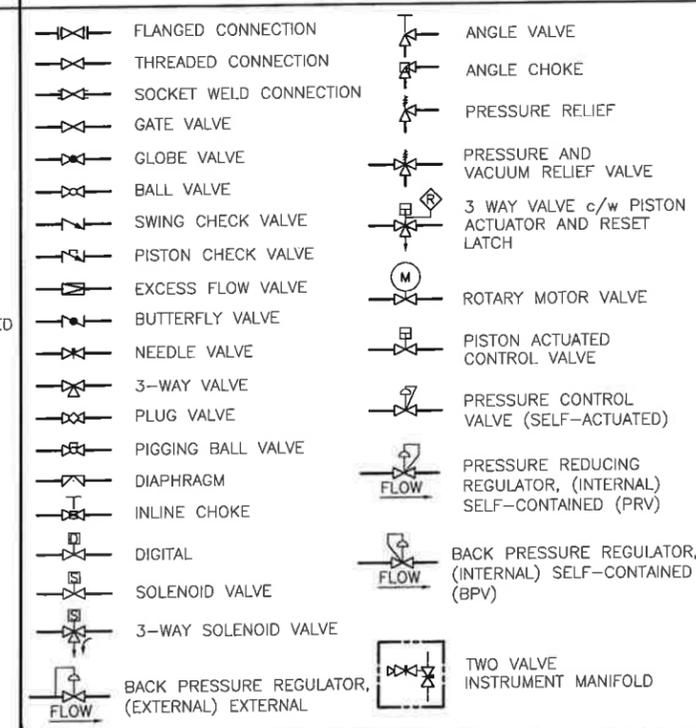
EQUIPMENT NUMBERING

- 0100 SERIES: INLET AND SALES/RISERS PUMP JACKS
2000 SERIES: COMPRESSORS SALES COMPRESSOR
6000 SERIES: REFRIGERATION PACKAGE PROCESS PACKAGE
1000-1500 SERIES: INLET SEPARATORS GROUP SEPARATOR TEST SEPARATOR
2400 SERIES: VRU
7000 SERIES: FLARE STACK FLARE KNOCK OUT DRUM VENT STACK INCINERATOR
1600 SERIES: TREATER
3000 SERIES: DEHYDRATION PACKAGE AMINE PACKAGE PROCESS PACKAGE
8000 SERIES: USERS CHOICE
1700-1900 SERIES: PUMP BUILDING
4000 SERIES: TANKS TANK HEATER TANK PUMP
9000 SERIES: MCC
5000 SERIES: HEAT MEDIUM
9500 SERIES: INSTRUMENT AIR PACKAGE

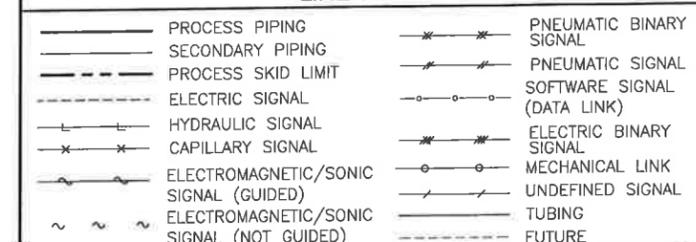
PIPING SYMBOLS



VALVES AND CONNECTIONS



LINE TYPES



COMMODITY CODES

- AF - ACID GAS FLARE
AM - AMINE
B - BUTANE
BA - BREATHING AIR
BG - BLANKET GAS
BD - BLOWDOWN
BFW - BOILER FEED WATER
C - CONDENSATE (C4-C8)
CA - COMBUSTION AIR
C - COOLING WATER
D - DRAIN
EX - EXHAUST GAS
F - FLARE
FG - FUEL GAS
FO - FUEL OIL
FW - FIRE WATER
G - GAS
GL - GLYCOL
H - HYDROGEN
HF - HIGH PRESSURE FLARE
HM - HEAT MEDIUM
IA - INSTRUMENT AIR
IG - INSTRUMENT GAS (OIL AND CONDENSATE)
IW - INJECTION WATER
JW - JACKET WATER
LF - LOW PRESSURE FLARE
LO - LUBE OIL
N - NITROGEN
NCL - PETROLEUM LIQUIDS (C2-C4)
O - SHIPPING OIL
OE - OIL EMULSION
OW - OIL AND WATER
PL - POLYMER
PW - PRODUCED WATER
R - RELIEF
RF - REFRIGERANT
RW - RAW WATER
S - STEAM
SC - STEAM CONDENSATE
SU - SULPHUR
SW - SOURCE WATER
V - VENT
UA - UTILITY AIR
UG - UTILITY GAS
UW - UTILITY WATER

LINE NUMBERING BY COMMODITY

- LINES 100-299: MAIN PROCESS LINES, PROCESS GAS LINES
LINES 300-499: SECONDARY PROCESS LINES (OIL AND CONDENSATE)
LINES 500-599: BLOWDOWNS, RELIEF AND DRAINS (BD, D, HF, LF, R)
LINES 600-699: FUEL GAS (FG), INSTRUMENT GAS (IG, UA)
LINES 700-899: UTILITIES, BLANKET GAS (BG), CHEMICAL INJECTION (CH), HEAT MEDIUM (HM), STEAM (S, SC)
LINES 900-999: USERS CHOICE (EX, N, SU)

OTHER POSSIBLE INSTRUMENTATION COMBINATIONS

- RO - RESTRICTION ORIFICE
FRK - FLOW CONTROL STATION
HK - HAND CONTROL STATION
FX - ACCESSORIES
TJR - SCANNING RECORDER
LLH - PILOT LIGHT
PFR - RATIO
KQI - RUNNING TIME INDICATOR
QQI - INDICATING COUNTER
WKIC - RATE OF WEIGHT LOSS CONTROLLER
HMS - HAND MOMENTARY SWITCH
ESDV - EMERGENCY SHUTDOWN VALVE
ZSC - LIMIT SWITCH CLOSED
ZSO - LIMIT SWITCH OPEN

ABBREVIATIONS

- AC - AIR TO CLOSE
AO - AIR TO OPEN
CC - CORROSION COUPON
CO - CLEAN OUT
CP - CATHODIC PROTECTION
CSC - CAR SEAL CLOSED
CSO - CAR SEAL OPEN
DBB - DOUBLE BLOCK AND BLEED
FC - FAIL CLOSED
FL - FAIL LOCK
FLP - FAIL LAST POSITION
FO - FAIL OPEN
FOB - FLAT ON BOTTOM
FOT - FLAT ON TOP
FP - FULL PORT
HDPE - HIGH DENSITY POLYETHYLENE
HOA - HAND OFF AUTO
IK - INSULATING KIT
LEL - LOWER EXPLOSIVE LIMIT
MW - MANWAY
MCC - MOTOR CONTROL CENTRE
NC - NORMALLY CLOSED
NO - NORMALLY OPEN
SP - SAMPLE POINT
S/S - SEAM TO SEAM
T/T - TANGENT TO TANGENT
TH - THIEF HATCH
TSS - TEMPORARY SUCTION STRAINER
WC - WAFER CHECK



DRAWING NUMBERING

0408081166.0000/01 SHEET NO. SURFACE LSD/NTS DRAWING NO.



SUITE 600, 639 - 5TH AVE SW CALGARY, AB, T2P 0M9 (403) 387-2500 PHONE (403) 387-2535 FAX

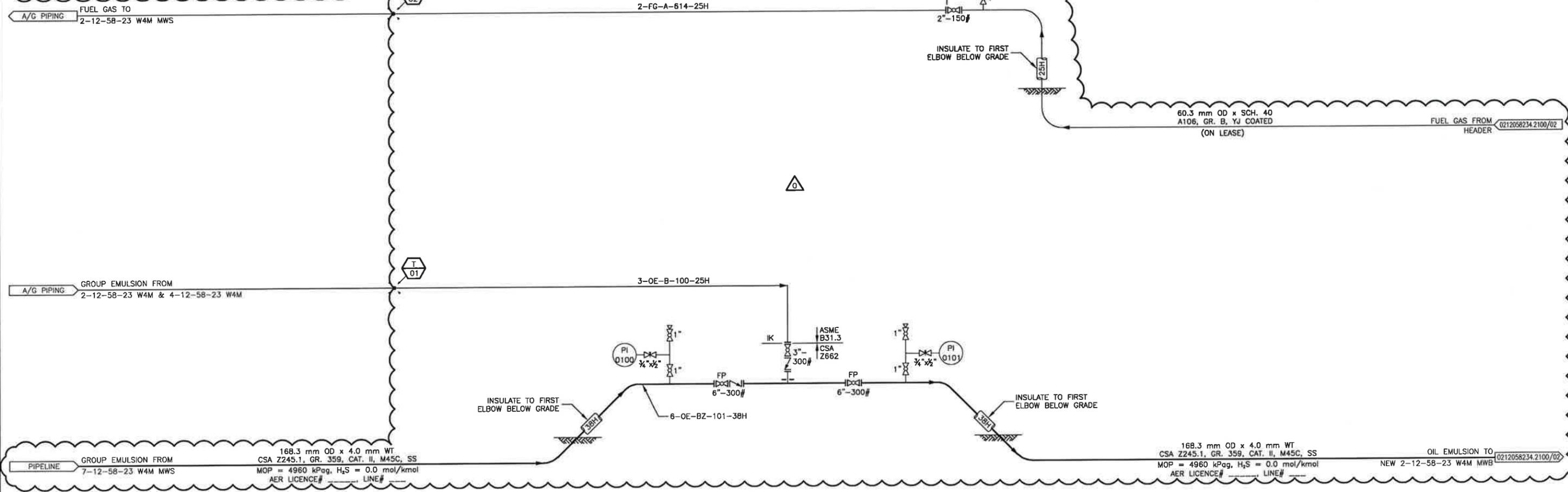
TYPICAL FLOW SHEET SYMBOLS AND STANDARDS

REV. DATE 05/12/2016 DWG SYMBOL SHEET REV. F

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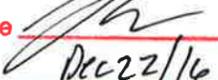
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NOTE: 
 1. OPERATIONS/FIELD MAINTENANCE OR PIGGING SHOULD BE LIMITED TO AMBIENT TEMPERATURES ABOVE -29° DUE TO REGULAR TEMPERATURE MATERIALS.



REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature: 
 Date: Dec 22/16

PERMIT NUMBER: P 11113
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

STAMP


 Dec 22/16


LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: S. KIM	DATE: 11/24/2016
CHECKED: K. ROBERTS	DATE: 11/24/2016
ENGINEER: T. POMERANZ	DATE: 11/24/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/24/2016


TNT Engineering Ltd.

SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

REDWATER
 2-12-58-23 W4M
 WELLHEAD TIE-IN AREA
 PIPING AND INSTRUMENTATION DIAGRAM

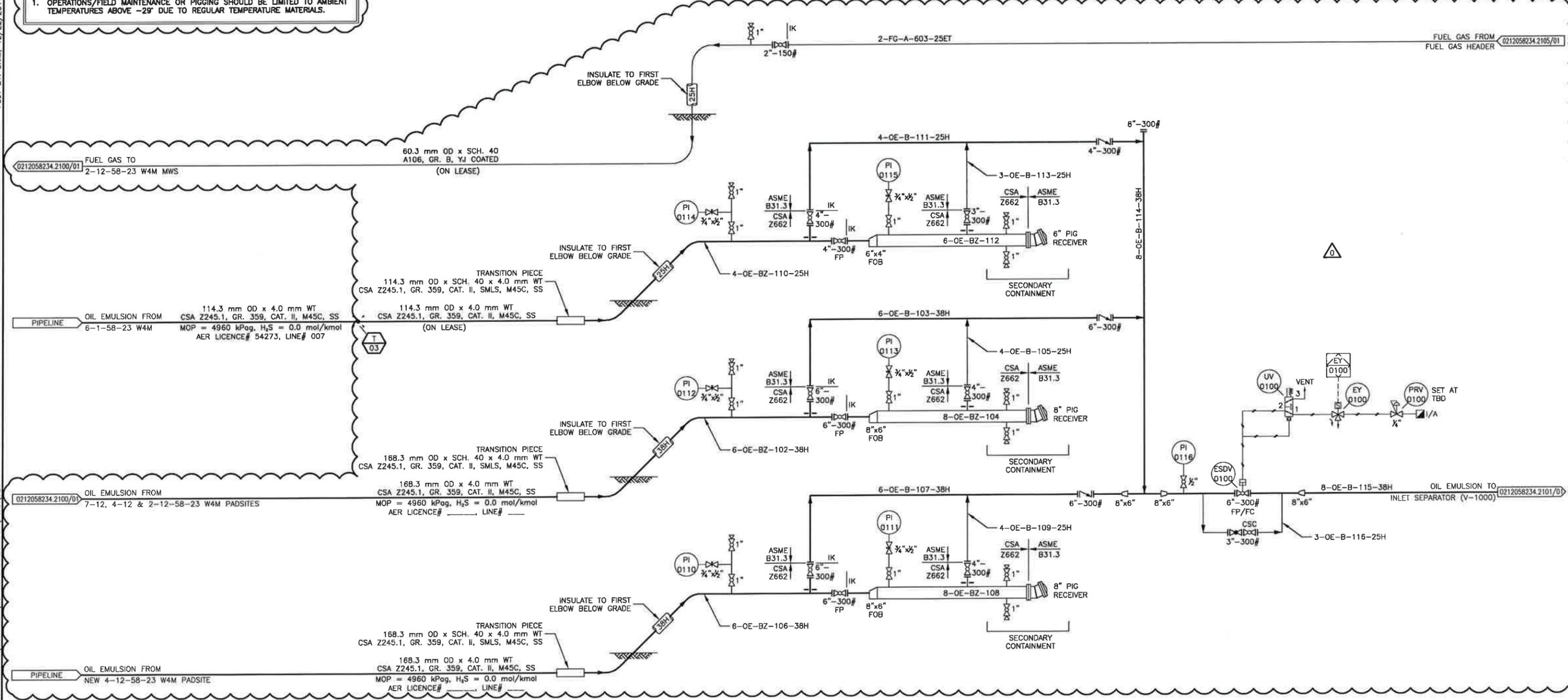
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NTS	0212058234.2100/01	0

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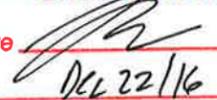
DRAWING SHEET SIZE: 11" x 17"

NOTE: 
 1. OPERATIONS/FIELD MAINTENANCE OR PIGGING SHOULD BE LIMITED TO AMBIENT TEMPERATURES ABOVE -29° DUE TO REGULAR TEMPERATURE MATERIALS.



REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080

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LONG RUN EXPLORATION

ENGINEERING RECORD	
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ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

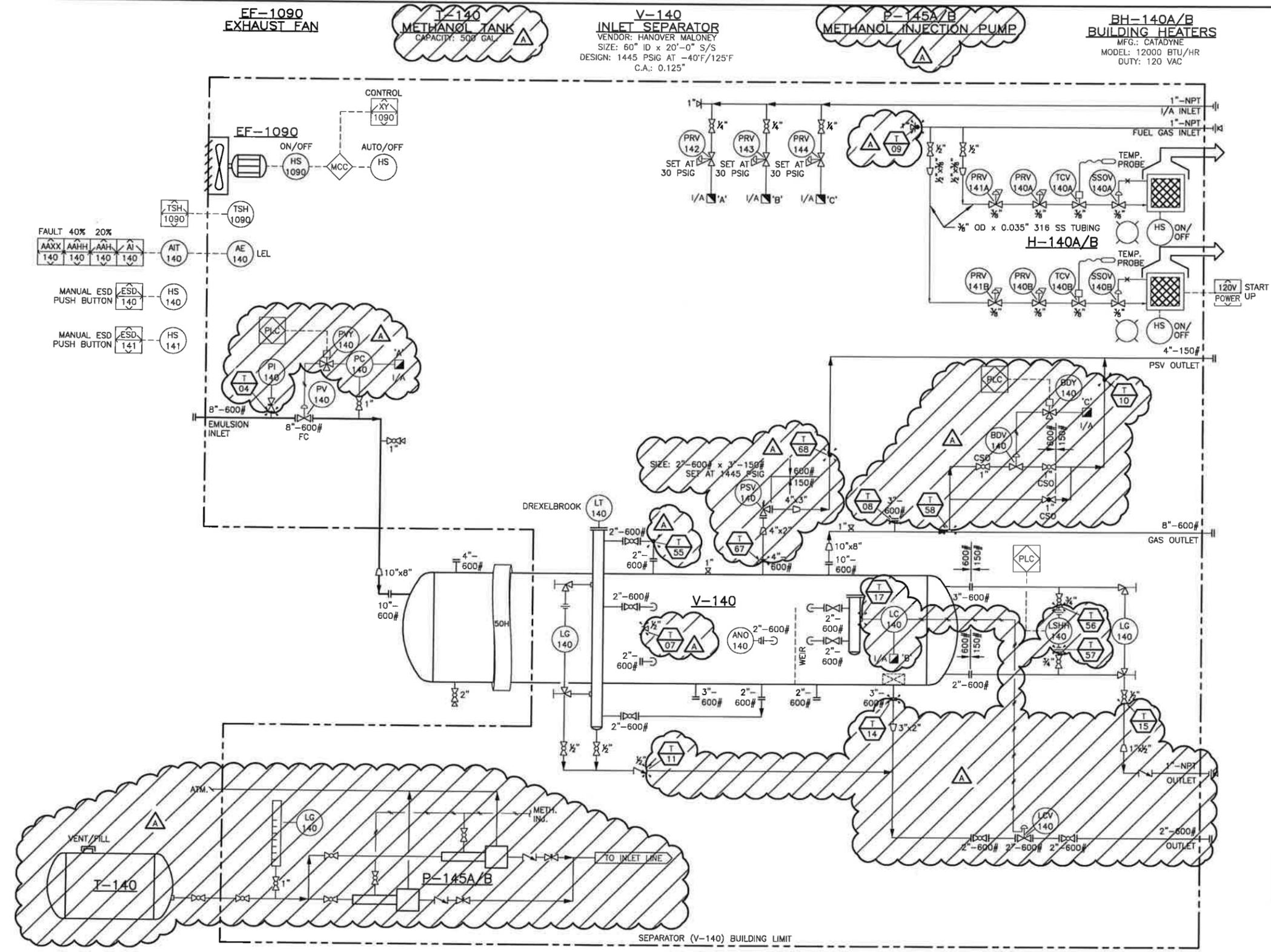

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REDWATER
 2-12-58-23 W4M
 INLET RISER AREA
PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS	DWG: 0212058234.2100/02	REV: 0
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DEMOLITION DWG

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
A	ISSUED FOR DEMOLITION	SK	01/06/2017	KR	TP	3080

PERMIT	STAMP

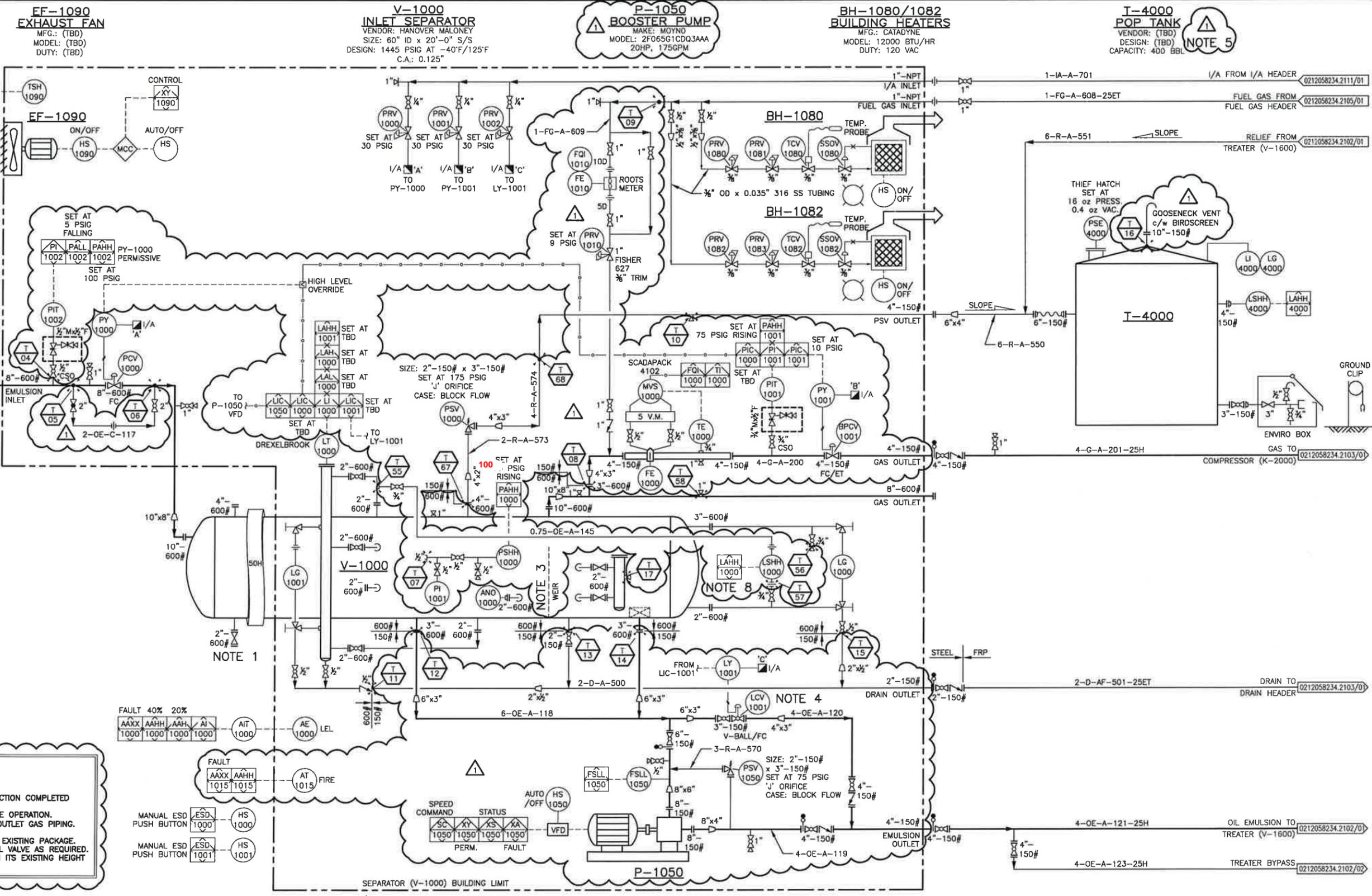
LONG RUN EXPLORATION		TNT Engineering Ltd.	
ENGINEERING RECORD		REDWATER	
DRAWN: S. KIM	DATE: 12/09/2016	2-12-58-23 W4M	
CHECKED: K. ROBERTS	DATE: 12/09/2016	INLET SEPARATOR (V-1000) AREA	
ENGINEER: T. POMERANZ	DATE: 12/09/2016	PIPING AND INSTRUMENTATION DIAGRAM	
PROJECT MANAGER: N. GUNDERMAN	DATE: 12/09/2016	SCALE: NTS	DWG: 0212058234.2101D/01
			REV: A

SUITE 600, 639 - 5TH AVE SW
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DRAWING SHEET SIZE: 11" x 17"



- NOTES:**
1. ALTERNATE DRAIN FOR TRUCK-OUT.
 2. PACKAGE TO HAVE FULL "FIT FOR SERVICE" INSPECTION COMPLETED PRIOR TO START-UP.
 3. FIELD TO ENSURE WEIR IS REMOVED FOR 2-PHASE OPERATION.
 4. 3"-150# RF V-BALL RELOCATED FROM TREATER OUTLET GAS PIPING.
 5. FIELD TO CONFIRM T-4000 DESIGN PRESSURE.
 6. CLOUDED AREAS ARE CHANGES REQUIRED TO THE EXISTING PACKAGE.
 7. FIELD TO RE-TAG EACH INSTRUMENT AND CONTROL VALVE AS REQUIRED.
 8. LSHH-1000 TO BE RAISED 300 mm HIGHER THAN ITS EXISTING HEIGHT IN RELATION TO VESSEL CENTER.

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
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1	RE-ISSUED FOR CONSTRUCTION	SK	01/06/2017	KR	TP	3080

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Signature: *[Signature]*
Date: Jan 16/17

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PROFESSIONAL ENGINEER ALBERTA
TREVOR KEARNS
Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD

DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

REDWATER
2-12-58-23 W4M
INLET SEPARATOR (V-1000) AREA
PIPING AND INSTRUMENTATION DIAGRAM

SUITE 600, 639 - 5TH AVE SW
CALGARY, AB, T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

SCALE: NTS DWG: 0212058234.2101/01 REV: 1

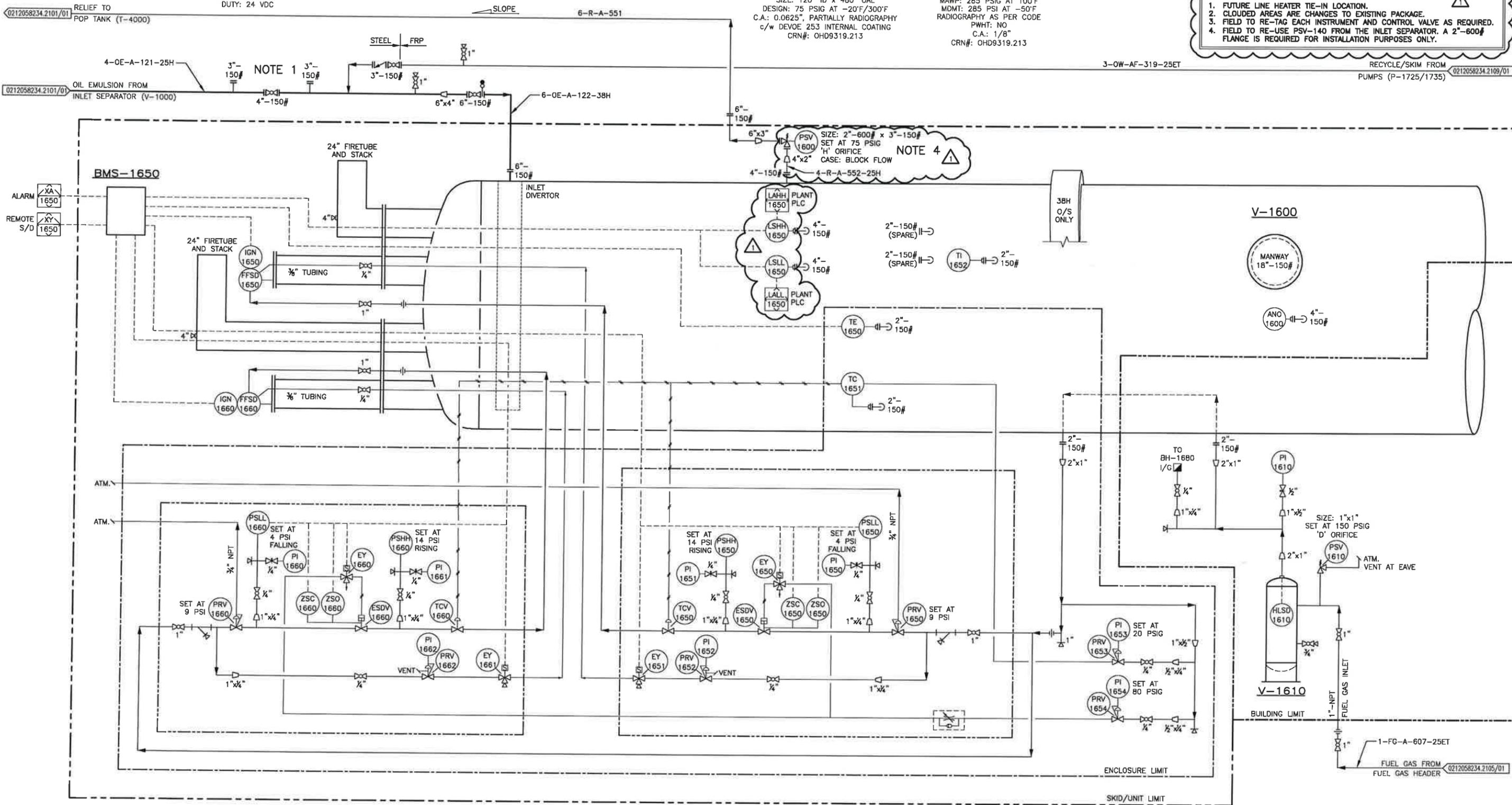
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 DRAWING SHEET SIZE: 11" x 17"
 PLOT BY: SKIM, 1/12/2017 12:59 PM

**BMS-1650
BURNER MANAGEMENT SYSTEM**
 BRAND: PROFIRE
 MODEL: PF2100
 DUTY: 24 VDC

**V-1600
TREATER**
 MFG: NWP INDUSTRIES INC.
 SIZE: 120" ID x 480" DAL
 DESIGN: 75 PSIG AT -20°F/300°F
 C.A.: 0.0625", PARTIALLY RADIOGRAPHY
 c/w DEVCOE 253 INTERNAL COATING
 CRN#: OHD9319.213

**V-1610
FUEL GAS SCRUBBER**
 SIZE: 8.625" DIA. x 23" S/S
 MAWP: 285 PSIG AT 100°F
 MDMT: 285 PSI AT -50°F
 RADIOGRAPHY AS PER CODE
 PWHT: NO
 C.A.: 1/8"
 CRN#: OHD9319.213

- NOTES:**
1. FUTURE LINE HEATER TIE-IN LOCATION.
 2. CLOUDED AREAS ARE CHANGES TO EXISTING PACKAGE.
 3. FIELD TO RE-TAG EACH INSTRUMENT AND CONTROL VALVE AS REQUIRED.
 4. FIELD TO RE-USE PSV-140 FROM THE INLET SEPARATOR. A 2"-600# FLANGE IS REQUIRED FOR INSTALLATION PURPOSES ONLY.



* ENGINEER AND PERMIT STAMP APPLY TO CLOUDED AND OUTSIDE SKID AREAS ONLY.

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PROFESSIONAL ENGINEER ALBERTA
TREVOR KEARNES
 Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD

DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

REDWATER
 2-12-58-23 W4M
 TREATER (V-1600) AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS DWG: 0212058234.2102/01 REV: 1

SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

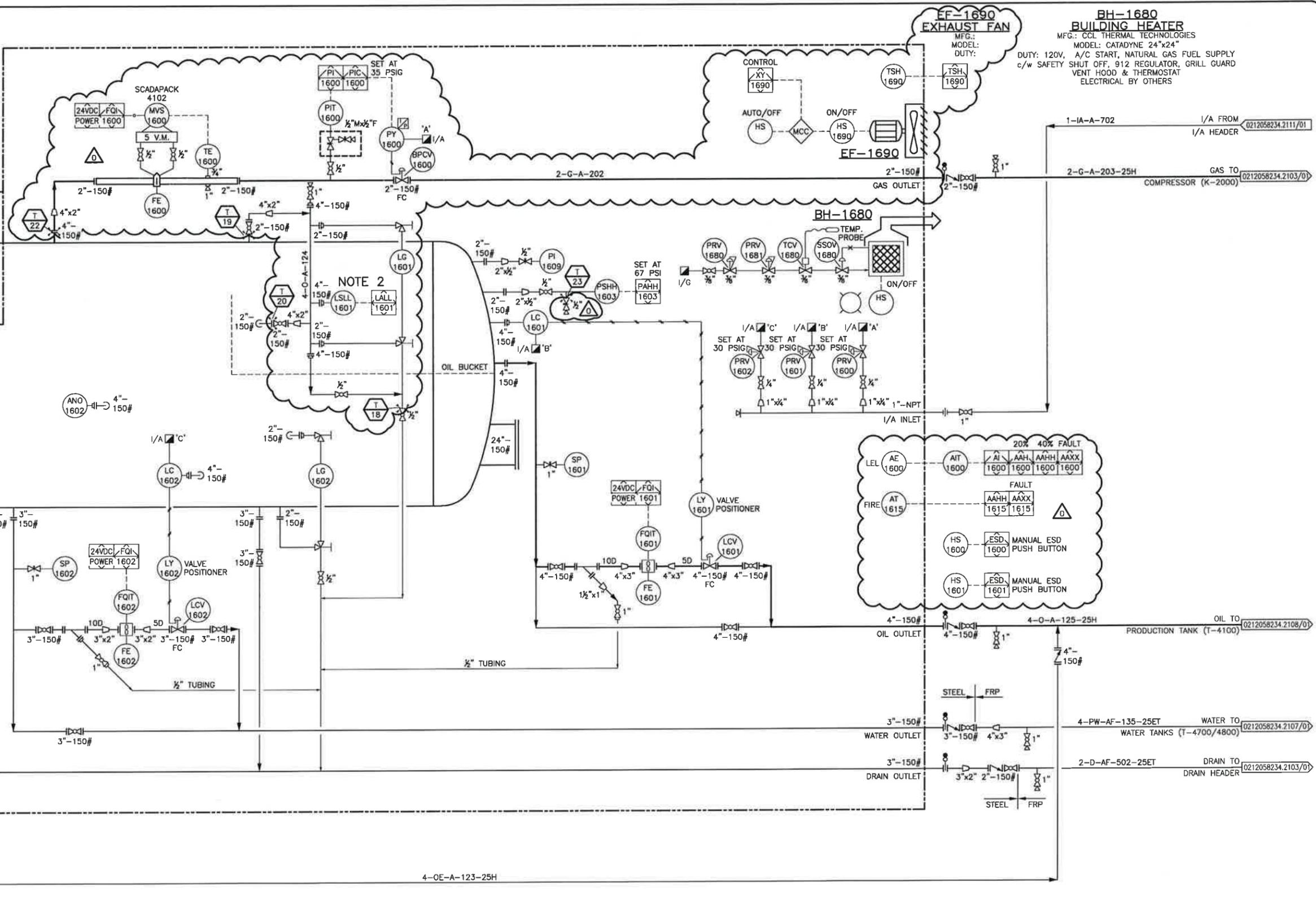
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DRAWING SHEET SIZE: 11" x 17"

NOTES:

- CLOUDED AREAS ARE CHANGES TO EXISTING PACKAGE.
- LSLL-1601 TO BE SET AT SAME ELEVATION AS THE OIL BUCKET OUTLET NOZZLE. LG-1601 TO BE RE-INSTALLED ON NEW BRIDLE/STAND PIPE.



* ENGINEER AND PERMIT STAMP APPLY TO CLOUDED AND OUTSIDE SKID AREAS ONLY.

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Date: *Dec 22/16*

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PROFESSIONAL ENGINEER ALBERTA
TREVOR KEARNES
[Signature]
Dec 22/16

LONG RUN EXPLORATION

ENGINEERING RECORD

DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

REDWATER
2-12-58-23 W4M
TREATER (V-1600) AREA
PIPING AND INSTRUMENTATION DIAGRAM

SUITE 600, 639 - 5TH AVE SW
CALGARY, AB, T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

SCALE: NTS DWG: 0212058234.2102/02 REV: 0

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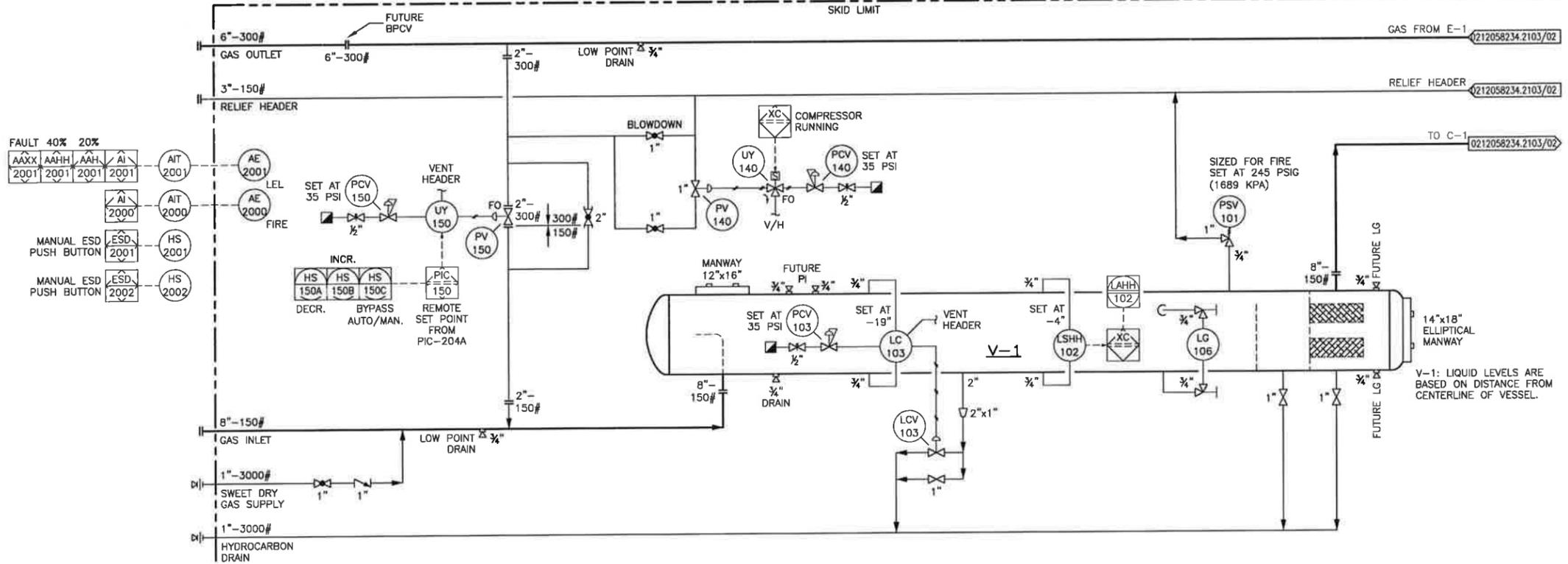
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DRAWING SHEET SIZE: 11" x 17"

H-1A/B
BUILDING GLYCOL UNIT HEATER
 RUFFNECK MODEL: H-2AA-ASX1-A1-2A
 HEAT OUTPUT: 45 KW
 POWER: 1 / 60 / 120 V
 0.375 KW AT 1725 RPM
 WEIGHT: 173 KGS

V-1
COMPRESSOR SUCTION FILTER
 SIZE: 48" ID x 138" S/S
 M.A.W.P.: 245 PSIG AT 250°F
 M.D.M.T.: -20°F AT 245 PSIG
 C.A.: 0.0625"
 SHELL MATERIAL: SA-516-70
 HEAD MATERIAL: SA-516-70
 ELEMENTS: (16) PEACOCK MODEL# JPMG-36349-V
 WEIGHT: 3800 LBS.

CP-1
CONTROL PANEL
 MAKE: EXACTA
 MODEL: SERIES XI
 POWER: 24 VDC (BY OTHERS)
 CSA APPROVED CLASS I, DIV II,
 GROUP D AS NON-INCENDIVE



FAULT 40% 20%

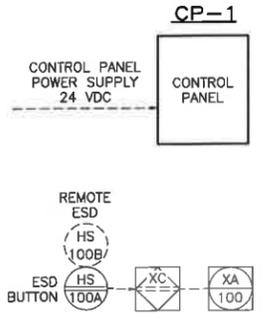
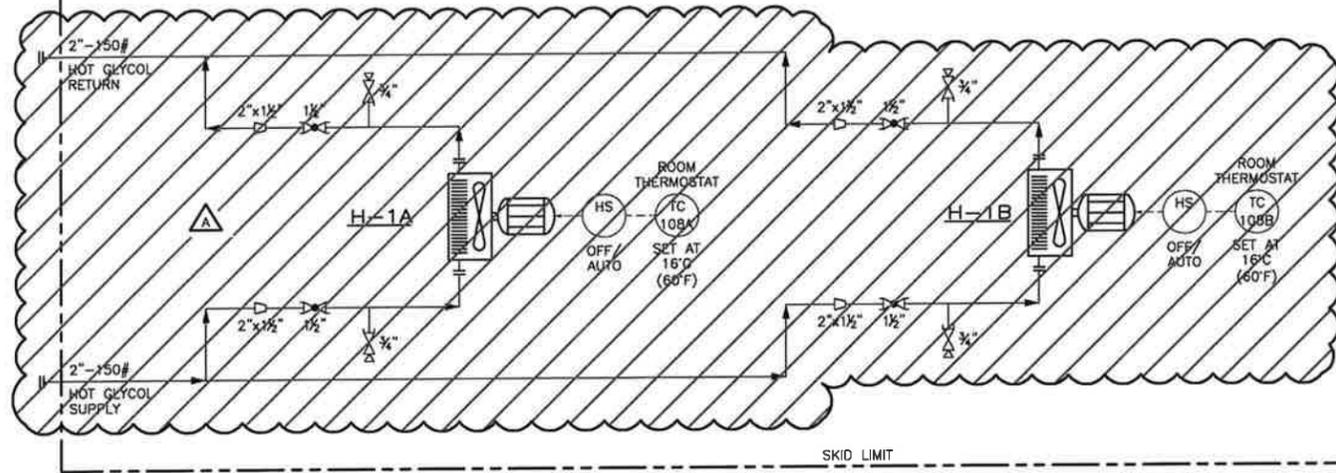
AAXX	AAHH	AAH	AI
2001	2001	2001	2001

MANUAL ESD PUSH BUTTON (AI 2000)

MANUAL ESD PUSH BUTTON (HS 2001)

MANUAL ESD PUSH BUTTON (HS 2002)

DEMOLITION DWG



REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
A	ISSUED FOR DEMOLITION	GW	12/09/2016	KR	TP	3080

PERMIT	STAMP

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: G. WONG	DATE: 12/09/2016
CHECKED: K. ROBERTS	DATE: 12/09/2016
ENGINEER: T. POMERANZ	DATE: 12/09/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 12/09/2016

TNT Engineering Ltd.

SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

REDWATER
 2-12-58-23 W4M
 SALES COMPRESSOR (K-2000) AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS	DWG: 0212058234.2103D/01	REV: A
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DRAWING SHEET SIZE: 11" x 17"

NOTES:

1. LONG RUN TO SOURCE AND INSTALL CATADYNE BUILDING HEATERS AS REQUIRED.
2. PACKAGE TO HAVE FULL "FIT FOR SERVICE" INSPECTION COMPLETED PRIOR TO START-UP.
3. CLOUDED AREAS ARE CHANGES REQUIRED TO THE EXISTING PACKAGE.
4. FIELD TO RE-TAG EACH INSTRUMENT AND CONTROL VALVE AS REQUIRED.
5. OPERATIONS TO CONFIRM RAISING THE SET PRESSURE OF PC-2011 WITH ENGINEERING WHEN GOING ABOVE 40 PSIG.

BH-2080/2082 BUILDING HEATERS

MFG.: CATADYNE
MODEL: 24" x 24"
DUTY: 120 VAC

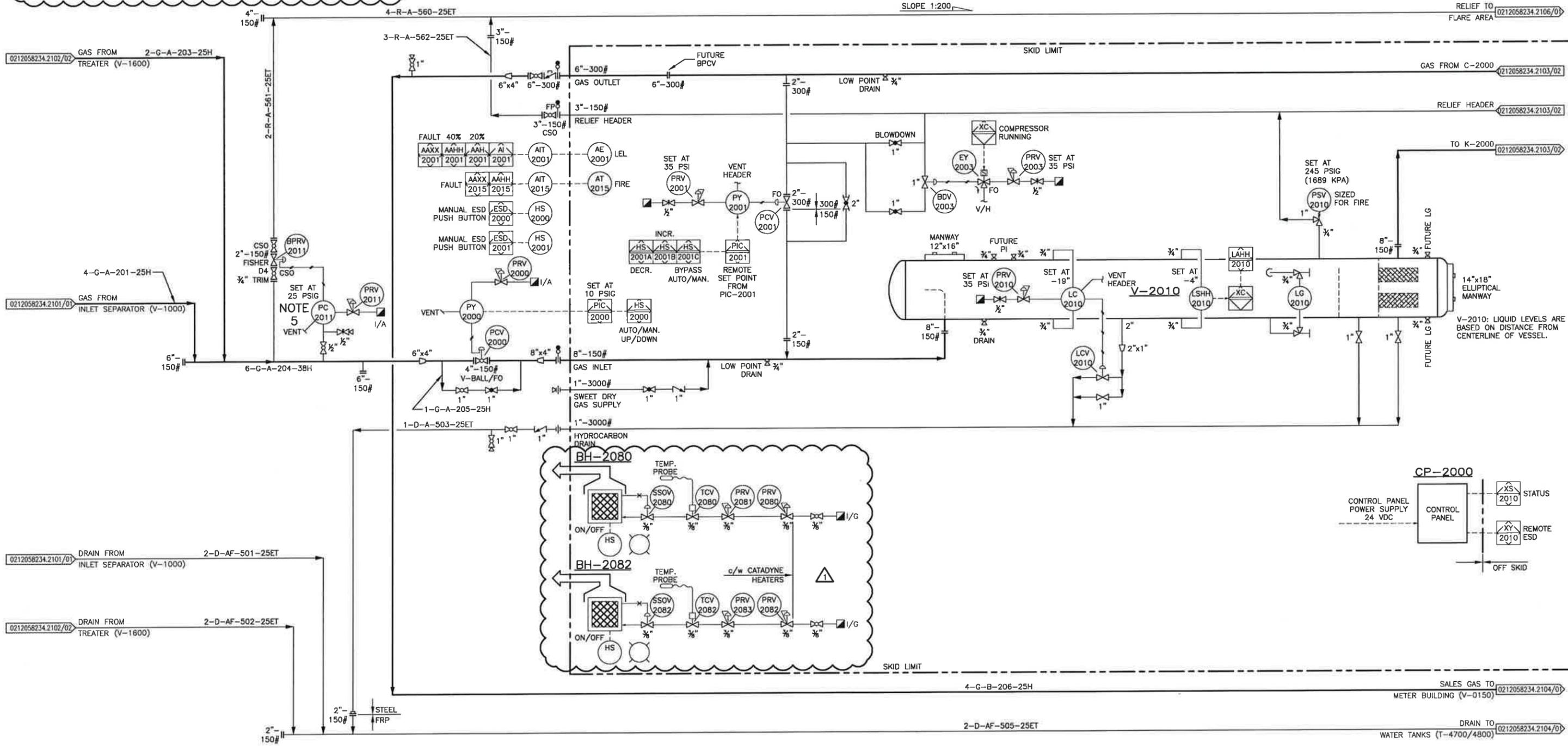
NOTE 1

V-2010 COMPRESSOR SUCTION FILTER

SIZE: 48" ID x 138" S/S
M.A.W.P.: 245 PSIG AT 250°F
M.D.M.T.: -20°F AT 245 PSIG
C.A.: 0.0625"
SHELL MATERIAL: SA-516-70
HEAD MATERIAL: SA-516-70
ELEMENTS: (16) PEACOCK MODEL# JPMG-36349-V
WEIGHT: 3800 LBS.

CP-2000 CONTROL PANEL

MAKE: EXACTA
MODEL: SERIES XI
POWER: 24 VDC (BY OTHERS)
CSA APPROVED CLASS I, DIV II,
GROUP D AS NON-INCENDIVE



* ENGINEER AND PERMIT STAMP APPLY TO CLOUDED AND OUTSIDE SKID AREAS ONLY.

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1	RE-ISSUED FOR CONSTRUCTION	SK	01/06/2017	KR	TP	3080

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Date: Jan 16/17

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PROFESSIONAL ENGINEER
TREVOR KEARNES
ALBERTA
[Signature]
Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

REDWATER
2-12-58-23 W4M
SALES COMPRESSOR (K-2000) AREA
PIPING AND INSTRUMENTATION DIAGRAM

SUITE 600, 639 - 5TH AVE SW
CALGARY, AB, T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

SCALE: NTS DWG: 0212058234.2103/01 REV: 1

PLOT BY: SKM, 1/10/2017 3:01 PM

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DRAWING SHEET SIZE: 11" x 17"

NOTES:

- TAL-2004 - PERMISSIVE TO OPEN ESD VALVES AND INTRODUCE RAW GAS.
- TALL-2004 - SHUTDOWN TO PREVENT CONDENSATION.
- PAL-2001 - PERMISSIVE TO START K-2000. SYSTEM MUST BE PRESSURIZED (WITH SWEET GAS) TO "TBA" PSIG.

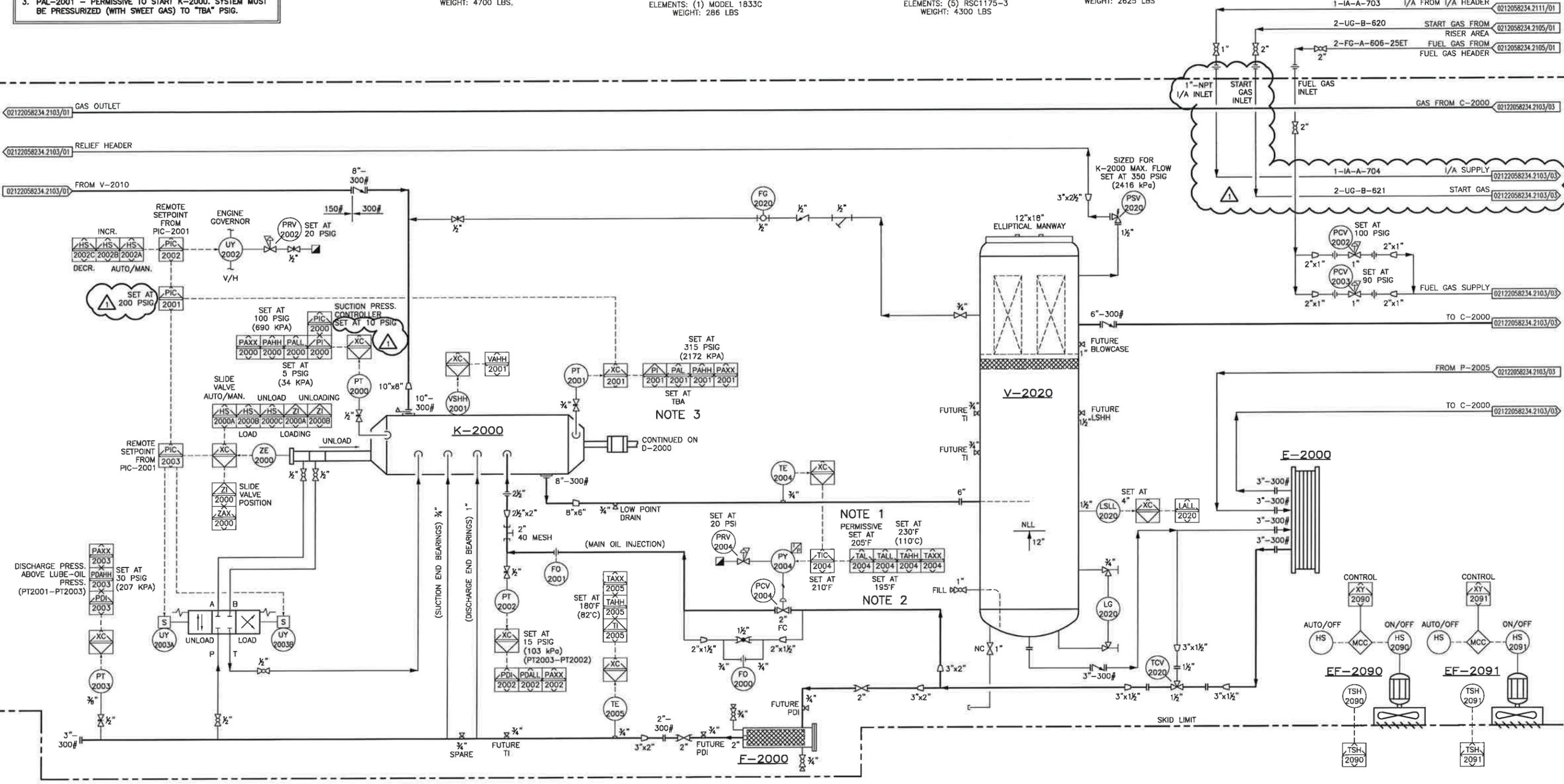
**K-2000
GAS COMPRESSOR**
FRICK: TD5H-283SX
OPERATING SPEED: 1800 RPM
SUCTION PRESSURE: SEE CURVE
DISCHARGE PRESSURE: SEE CURVE
OIL TEMP.: 160°F
POWER DRAW: SEE CURVE
WEIGHT: 4700 LBS.

**F-2000
OIL FILTER**
SIZE: 8.6" OD x 27.5" S/F
MAWP: 400 PSIG AT 250°F
MDMT: 400 PSIG AT -20°F
C.A.: 0.0625"
SHELL MATERIAL: SA-516-70
HEAD MATERIAL: SA-516-70
ELEMENTS: (1) MODEL 1833C
WEIGHT: 286 LBS

**V-2020
OIL SEPARATOR**
SIZE: 36" ID x 102" S/S
MAWP: 350 PSIG AT 250°F
MDMT: 350 PSIG AT -20°F
C.A.: 0.0625"
SHELL MATERIAL: SA-516-70
HEAD MATERIAL: SA-516-70
ELEMENTS: (5) RSC1175-3
WEIGHT: 4300 LBS

**E-2000
OIL COOLER**
MODEL: VICARB V-45-SST-100
PLATES: 47
MAWP OIL SIDE: 350 PSIG AT 250°F
MAWP GLYCOL SIDE: 350 PSIG AT 250°F
DESIGN DUTY: 988722 BTU/HR
SURFACE AREA: 217.86 SQ.FT
WEIGHT: 2625 LBS

**EF-2090/2091
EXHAUST FANS**
MFG.:
MODEL:
DUTY:



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0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080
1	RE-ISSUED FOR CONSTRUCTION	SK	01/06/2017	KR	TP	3080

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**PROFESSIONAL ENGINEER
TREVOR KEARNES
ALBERTA**

Jan 16/17


LONG RUN EXPLORATION

ENGINEERING RECORD

DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016


TNT Engineering Ltd.

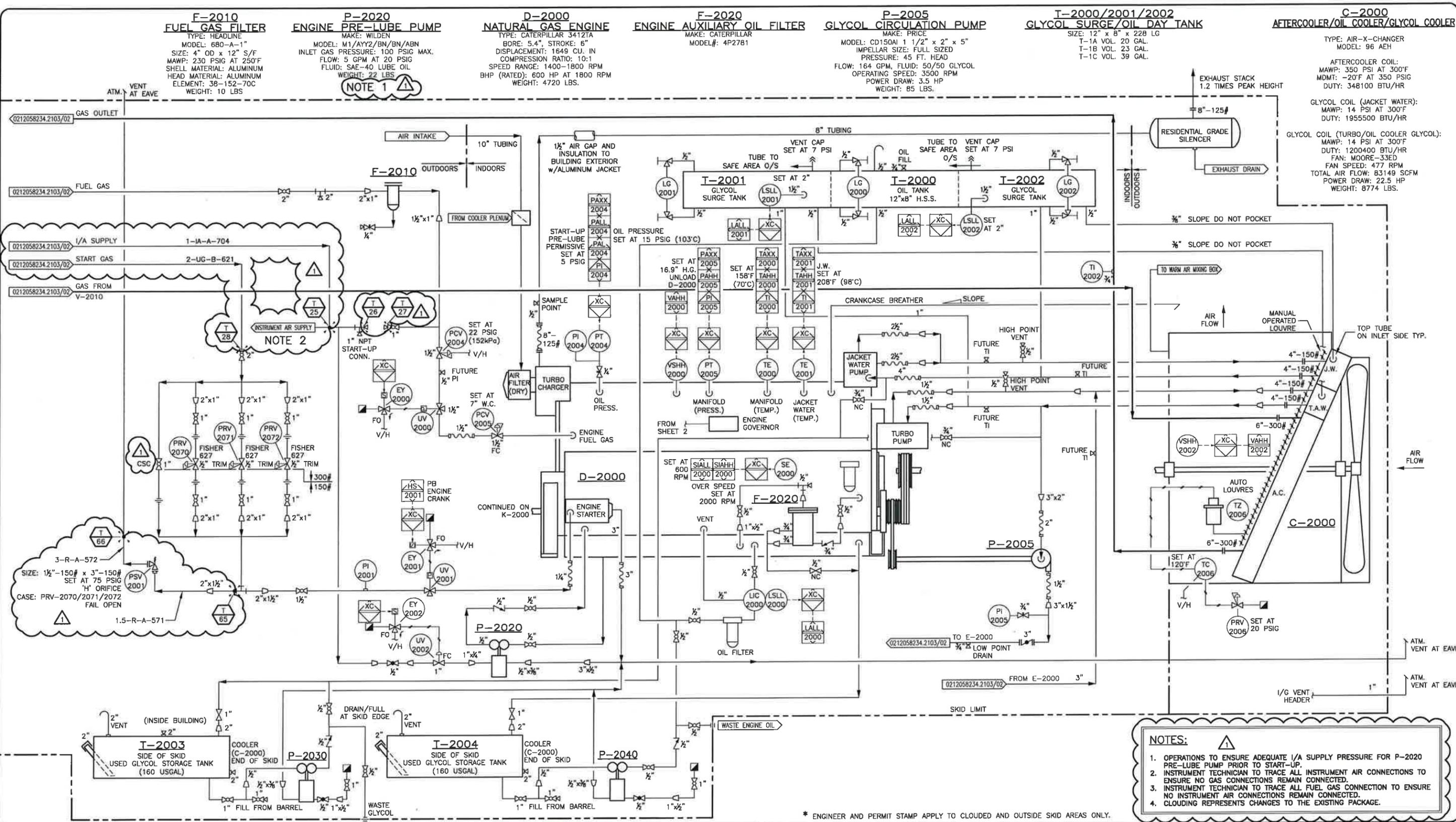
SUITE 600, 639 - 5TH AVE SW
CALGARY, AB, T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

REDWATER
2-12-58-23 W4M
SALES COMPRESSOR (K-2000) AREA
PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS	DWG: 0212058234.2103/02	REV: 1
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F-2010 FUEL GAS FILTER
 TYPE: HEADLINE
 MODEL: 680-A-1"
 SIZE: 4" OD x 12" S/F
 MAMP: 230 PSIG AT 250°F
 SHELL MATERIAL: ALUMINUM
 HEAD MATERIAL: ALUMINUM
 ELEMENT: 38-152-70C
 WEIGHT: 10 LBS

P-2020 ENGINE PRE-LUBE PUMP
 MAKE: WILDEN
 MODEL: M1/AYY2/BN/BN/ABN
 INLET GAS PRESSURE: 100 PSIG MAX.
 FLOW: 5 GPM AT 20 PSIG
 FLUID: SAE-40 LUBE OIL
 WEIGHT: 22 LBS

D-2000 NATURAL GAS ENGINE
 TYPE: CATERPILLAR 3412TA
 BORE: 5.4", STROKE: 6"
 DISPLACEMENT: 1649 CU. IN
 COMPRESSION RATIO: 10:1
 SPEED RANGE: 1400-1800 RPM
 BHP (RATED): 600 HP AT 1800 RPM
 WEIGHT: 4720 LBS.

F-2020 ENGINE AUXILIARY OIL FILTER
 MAKE: CATERPILLAR
 MODEL#: 4P2781

P-2055 GLYCOL CIRCULATION PUMP
 MAKE: PRICE
 MODEL: CD150AI 1 1/2" x 2" x 5"
 IMPELLER SIZE: FULL SIZED
 PRESSURE: 45 FT. HEAD
 FLOW: 164 GPM, FLUID: 50/50 GLYCOL
 OPERATING SPEED: 3500 RPM
 POWER DRAW: 3.5 HP
 WEIGHT: 85 LBS.

T-2000/2001/2002 GLYCOL SURGE/OIL DAY TANK
 SIZE: 12" x 8" x 228 LG
 T-1A VOL. 20 GAL.
 T-1B VOL. 23 GAL.
 T-1C VOL. 39 GAL.

C-2000 AFTERCOOLER/OIL COOLER/GLYCOL COOLER
 TYPE: AIR-X-CHANGER
 MODEL: 96 AEH
 AFTERCOOLER COIL:
 MAMP: 350 PSI AT 300°F
 DMDT: -20°F AT 350 PSIG
 DUTY: 348100 BTU/HR
 GLYCOL COIL (JACKET WATER):
 MAMP: 14 PSI AT 300°F
 DUTY: 1955500 BTU/HR
 GLYCOL COIL (TURBO/OIL COOLER GLYCOL):
 MAMP: 14 PSI AT 300°F
 DUTY: 1200400 BTU/HR
 FAN: MOORE-33ED
 FAN SPEED: 477 RPM
 TOTAL AIR FLOW: 83149 SCFM
 POWER DRAW: 22.5 HP
 WEIGHT: 8774 LBS.

NOTE 1

NOTE 2

NOTES:

- OPERATIONS TO ENSURE ADEQUATE I/A SUPPLY PRESSURE FOR P-2020 PRE-LUBE PUMP PRIOR TO START-UP.
- INSTRUMENT TECHNICIAN TO TRACE ALL INSTRUMENT AIR CONNECTIONS TO ENSURE NO GAS CONNECTIONS REMAIN CONNECTED.
- INSTRUMENT TECHNICIAN TO TRACE ALL FUEL GAS CONNECTION TO ENSURE NO INSTRUMENT AIR CONNECTIONS REMAIN CONNECTED.
- CLOUDING REPRESENTS CHANGES TO THE EXISTING PACKAGE.

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080
1	RE-ISSUED FOR CONSTRUCTION	SK	01/06/2017	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature: *[Signature]*
 Date: Jan 16/17

PERMIT NUMBER: P 11113
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

STAMP
PROFESSIONAL ENGINEER ALBERTA
 TREVOR KEARNES
 Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

REDWATER
 2-12-58-23 W4M
 SALES COMPRESSOR (K-2000) AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

SCALE: NTS DWG: 0212058234.2103/03 REV: 1

PLOT BY: SKIM, 1/6/2017 2:06 PM

Z:\DRAWING\JOBS\LONG RUN EXPLORATION\REDWATER\02-12-58-23 W4M\PAID\0212058234.2100.DWG

DRAWING SHEET SIZE: 11" x 17"

- NOTES:**
1. OPERATIONS TO CONFIRM METHANOL/CHEMICAL INJECTION HOOK-UP.
 2. OPERATIONS TO DETERMINE METER REQUIREMENT.
 3. FIELD TO CONFIRM PACKAGE DETAILS. NO AS-BUILT DRAWINGS WERE AVAILABLE.
 4. PACKAGE TO HAVE FULL "FIT FOR SERVICE" INSPECTION COMPLETED PRIOR TO START-UP.

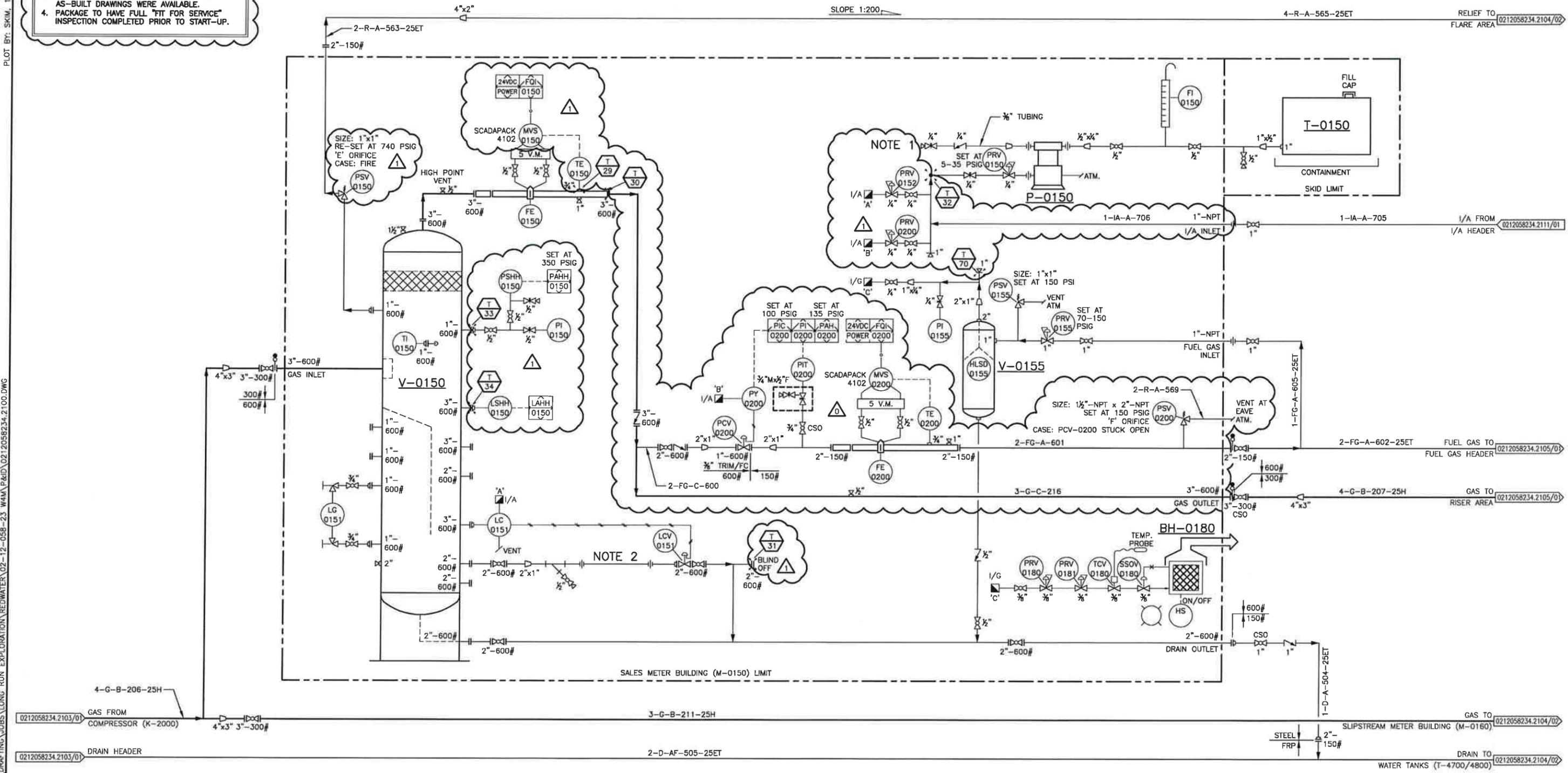
V-0150 SEPARATOR
 VENDOR: MAGIC SPAN FABRICATING LTD.
 SIZE: 24" OD x 7'-8" S/S
 TYPE: VERTICAL 3 PHASE
 MAWP: 1440 PSIG AT 100°F/-20°F
 YEAR BUILT: 2001

V-0155 FUEL GAS SCRUBBER
 VENDOR: MAGIC SPAN FABRICATING LTD.
 SIZE: (TBC)
 MAWP: 150 PSIG AT 100°F/-20°F
 SN: 01-810
 YEAR BUILT: 2001

P-0150 CHEMICAL PUMP
 MODEL: BRUIN NO.51 3/8 MV8
 MAX. DISCH. PRESS.: 1500 PSIG
 SN: P04755

BH-0180 BUILDING HEATER
 MFG: CATADYNE
 MODEL: THERMCAT HA 24" x 24"
 DUTY: 120 VAC

T-0150 METHANOL TANK



* ENGINEER AND PERMIT STAMP APPLY TO CLOUDED AND OUTSIDE SKID AREAS ONLY.

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080
1	RE-ISSUED FOR CONSTRUCTION	SK	01/06/2017	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature: *[Signature]*
 Date: Jan 16/17

PERMIT NUMBER: P 11113
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

STAMP

PROFESSIONAL ENGINEER ALBERTA
 TREVOR KEARNES
 2888

[Signature]
 Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD

DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

REDWATER
 2-12-58-23 W4M
 SALES METER BUILDING (M-0150) AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

SCALE: NTS DWG: 0212058234.2104/01 REV: 1

PLOT BY: SKIM, 12/22/2016 7:44 PM

Z:\DRAFTING\JOBS\LONG RUN EXPLORATION\REDWATER\02-12-05B-23 W4M\PSID\0212058234.2100D_REV A.DWG

DRAWING SHEET SIZE: 11" x 17"

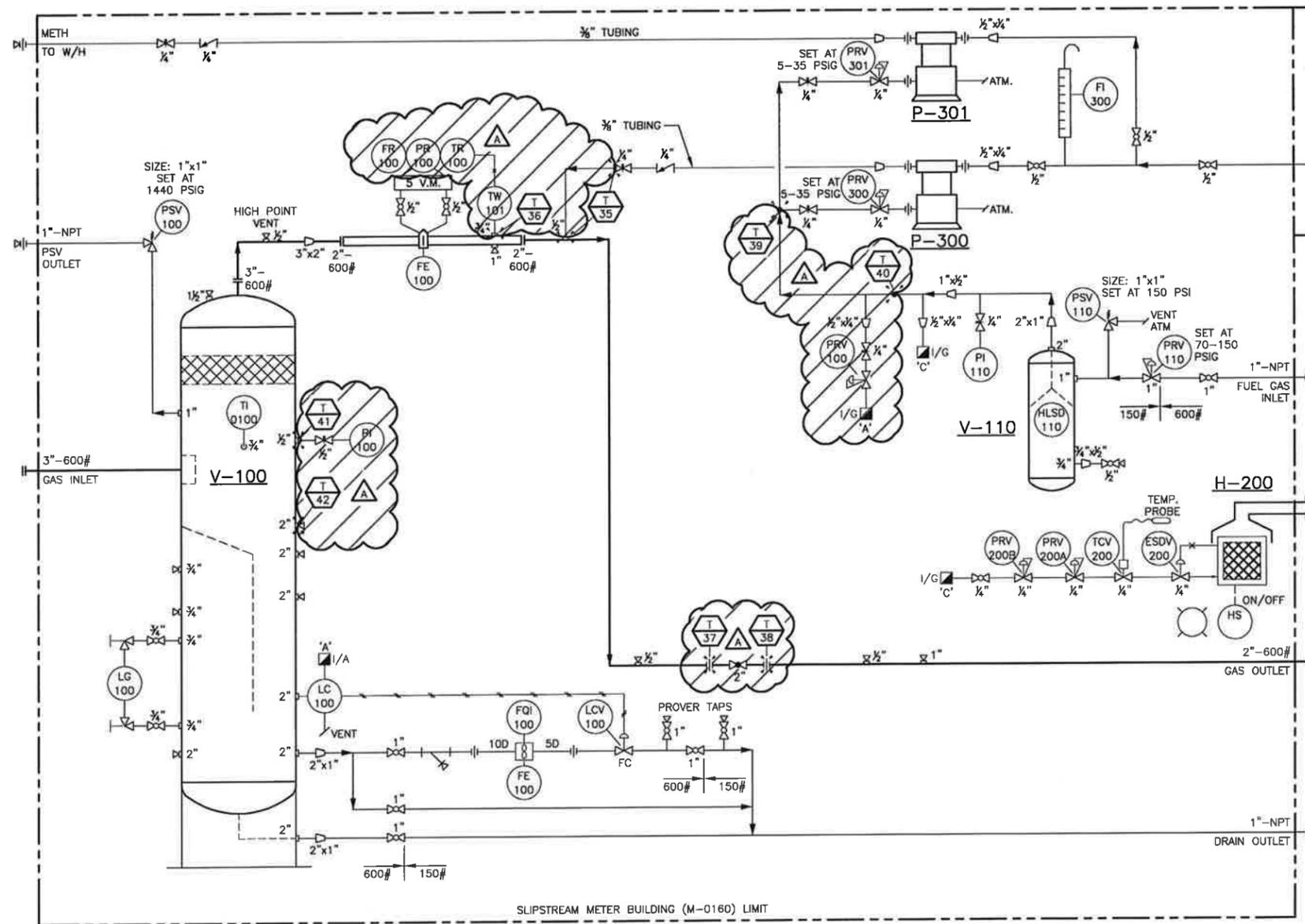
V-100 SEPARATOR
 VENDOR: NUSCO SUPPLY & MANUFACTURING INC.
 SIZE: 16" OD x 7'-8" S/S
 TYPE: VERTICAL 3 PHASE
 MAWP: 1440 PSIG AT 100°F/-20°F
 C.A.: 1/6"
 SN: 010463-200
 YEAR BUILT: 2005

V-110 FUEL GAS SCRUBBER
 VENDOR: FOREMOST
 SIZE: 8 5/8" OD x 2'-6" S/S
 MAWP: 250 PSIG AT 250°F/-20°F
 C.A.: 1/16"

P-300/301 CHEMICAL PUMPS
 MODEL: BRUIN BR5113LP-2511
 RATE: 16.8 GPD
 MAX. DISCH. PRESS.: 6000 PSIG

H-200 BUILDING HEATER
 MFG.: CATADYNE
 MODEL: THERMCAT HA 24" x 24"
 DUTY: 120 VAC

T-300 METHANOL TANK
 SIZE: 50" DIA. x 72" LG.
 NUSCO STANDARD
 CAPACITY: 500 GAL
 DUAL WALL



DEMOLITION DWG

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
A	ISSUED FOR DEMOLITION	SK	12/09/2016	KR	TP	3080

PERMIT	STAMP

ENGINEERING RECORD
DRAWN: S. KIM DATE: 12/09/2016
CHECKED: K. ROBERTS DATE: 12/09/2016
ENGINEER: T. POMERANZ DATE: 12/09/2016
PROJECT MANAGER: N. GUNDERMAN DATE: 12/09/2016

LONG RUN EXPLORATION

TNT Engineering Ltd.

SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

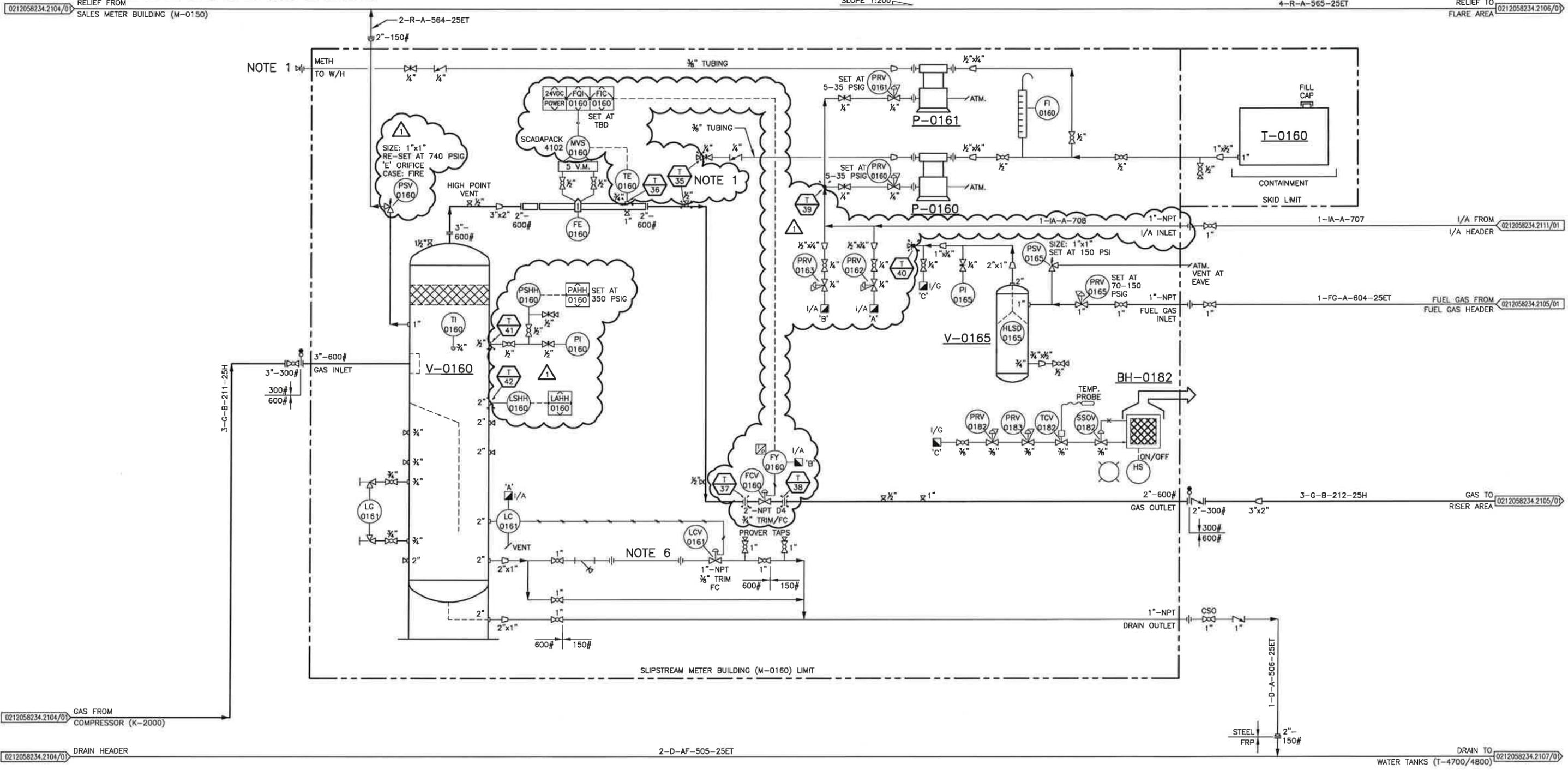
REDWATER
 2-12-58-23 W4M
 SLIPSTREAM METER BUILDING (M-0160) AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS DWG: 0212058234.2104D/02 REV: A

Z:\DRAWING\JOBS\LONG RUN EXPLORATION\REDWATER\02-12-058-23 W4M (P&ID)\0212058234.2100.DWG
 PLOT BY: SKIM, 1/6/2017 2:07 PM
 DRAWING SHEET SIZE: 11" x 17"

- NOTES:**
1. OPERATIONS TO CONFIRM METHANOL/CHEMICAL INJECTION HOOK-UP.
 2. FIELD TO CONFIRM PACKAGE DETAILS.
 3. CLOUDED AREAS ARE CHANGES REQUIRED TO THE EXISTING PACKAGE.
 4. FIELD TO RE-TAG EACH INSTRUMENT AND CONTROL VALVE AS REQUIRED.
 5. PACKAGE TO HAVE FULL "FIT FOR SERVICE" INSPECTION COMPLETED PRIOR TO START-UP.
 6. OPERATIONS TO DETERMINE METER REQUIREMENT.

<p>V-0160 SEPARATOR VENDOR: NUSCO SUPPLY & MANUFACTURING INC. SIZE: 16" OD x 7'-8" S/S TYPE: VERTICAL 3 PHASE MAWP: 1440 PSIG AT 100°F/-20°F C.A.: 1/6" SN: 010463-200 YEAR BUILT: 2005</p>	<p>V-0165 FUEL GAS SCRUBBER VENDOR: FOREMOST SIZE: 8 5/8" OD x 2'-6" S/S MAWP: 250 PSIG AT 250°F/-20°F C.A.: 1/16"</p>	<p>P-0160/0161 CHEMICAL PUMPS MODEL: BRUIN BR5113LP-2511 RATE: 16.6 GPD MAX. DISCH. PRESS.: 6000 PSIG</p>	<p>BH-0182 BUILDING HEATER MFG.: CATADYNE MODEL: THERMCAT HA 24" x 24" DUTY: 120 VAC</p>	<p>T-0160 METHANOL TANK SIZE: 50" DIA. x 72" LG. NUSCO STANDARD CAPACITY: 500 GAL DUAL WALL</p>
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* ENGINEER AND PERMIT STAMP APPLY TO CLOUDED AND OUTSIDE SKID AREAS ONLY.

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080
1	RE-ISSUED FOR CONSTRUCTION	SK	01/06/2017	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature: *[Signature]*
 Date: Jan 16/17

PERMIT NUMBER: P 1113
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

STAMP

PROFESSIONAL ENGINEER ALBERTA
 TREVOR KEARNEY
 Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD

DRAWN: S. KIM	DATE: 11/30/2016
CHECKED: K. ROBERTS	DATE: 11/30/2016
ENGINEER: T. POMERANZ	DATE: 11/30/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/30/2016

TNT Engineering Ltd.

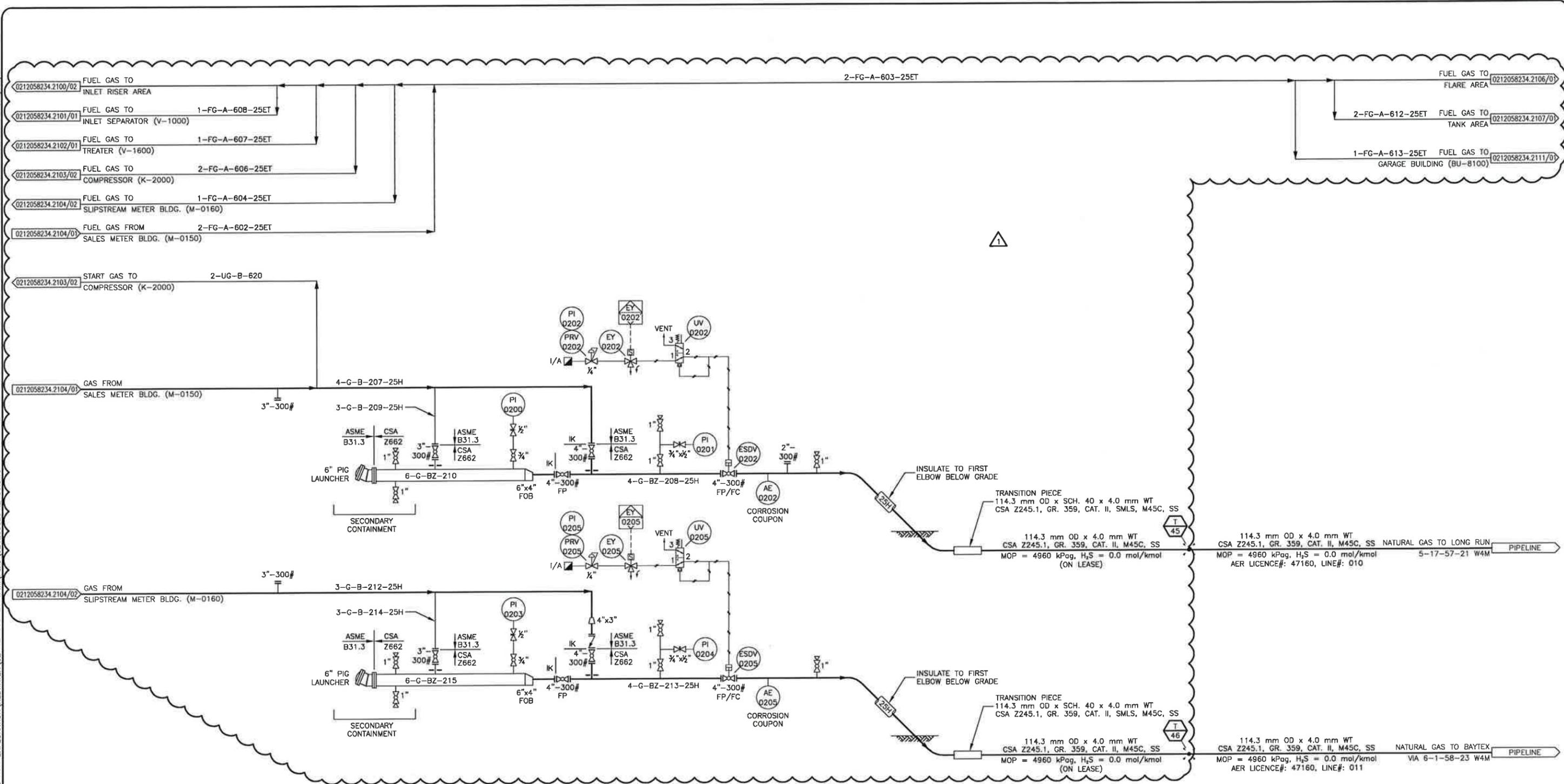
REDWATER
 2-12-58-23 W4M
 SLIPSTREAM METER BUILDING (M-0160) AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

SCALE: NTS DWG: 0212058234.2104/02 REV: 1

PLOT BY: SKM, 1/10/2017 1:22 PM

Z:\DRAWING\JOBS\LONG RUN EXPLORATION\REDWATER\02-12-58-23 W4M\PSUD\0212058234.2105.DWG



NOTES: ⚠

- OPERATIONS/FIELD MAINTENANCE OR PIGGING SHOULD BE LIMITED TO AMBIENT TEMPERATURES ABOVE -20° DUE TO REGULAR TEMPERATURE MATERIALS.
- HOLD FOR SIZE.

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080
1	RE-ISSUED FOR CONSTRUCTION	SK	01/06/2017	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature: *[Signature]*
Date: Jan 16/17

PERMIT NUMBER: P 11113
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

STAMP

PROFESSIONAL ENGINEER ALBERTA
TREVOR KEARNS
[Signature]
Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD

DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

REDWATER
2-12-58-23 W4M
OUTLET RISER AREA
PIPING AND INSTRUMENTATION DIAGRAM

SUITE 600, 639 - 5TH AVE SW
CALGARY, AB, T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

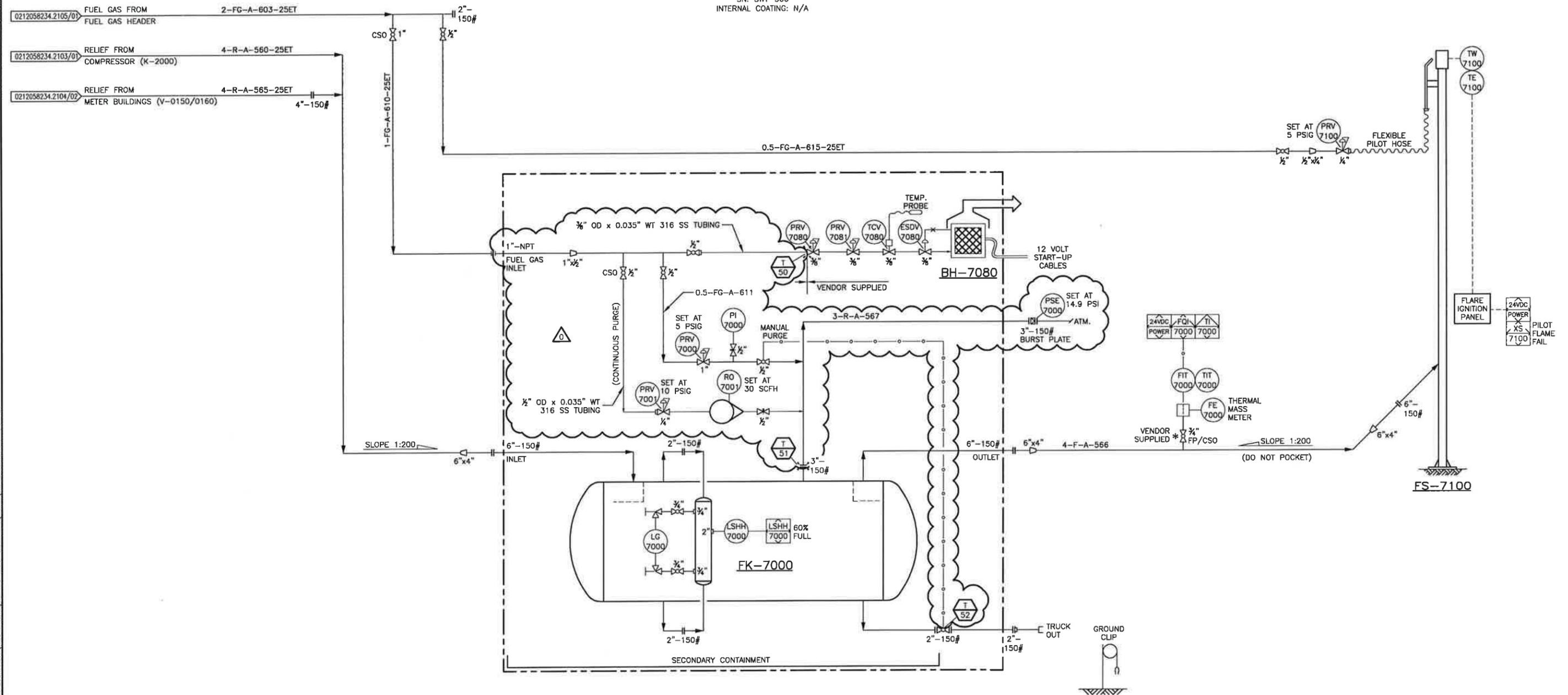
SCALE: NTS DWG: 0212058234.2105/01 REV: 1

PLOT BY: SKIM, 12/23/2016 8:56 AM
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 DRAWING SHEET SIZE: 11" x 17"

FK-7000
FLARE KNOCK OUT DRUM
 VENDOR: SWATECH INDUSTRIES LTD.
 SIZE: 48" OD x 120" S/S
 CAPACITY: 25 BBL
 MAWP: 14.9 PSI AT 100°F
 SN: SWT-300
 INTERNAL COATING: N/A

BH-7080
BUILDING HEATER
 MFG.: CATADYNE
 MODEL: 12000 BTU
 DUTY: 12 VDC

FS-7100
FLARE STACK
 VENDOR: MACTRONIC
 SIZE: 8" x 6" OD x 30'-0" HIGH
 FREESTANDING
 c/w PURGE DEVICE & WIND SHROUD



NOTES:

- TRUCKER TO ENSURE PURGE GAS IS ON AND PI-7000 SHOULD READ 5 PSIG PRIOR TO UNLOADING TO ENSURE PRV-7000 HAS NOT FAILED.
- FIELD TO PROCURE AND INSTALL PER MANUFACTURERS RECOMMENDATION.
- CLOUDED AREAS ARE CHANGES REQUIRED TO THE EXISTING PACKAGE.

* ENGINEER AND PERMIT STAMP APPLY TO CLOUDED AND OUTSIDE SKID AREAS ONLY.

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.
 Signature: *[Signature]*
 Date: *Dec 22/16*
PERMIT NUMBER: P 11113
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER ALBERTA
 STAMP
 TREVOR KEARNES
[Signature]
 Dec 22/16

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.
 SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

REDWATER
 2-12-58-23 W4M
 FKOD AND FLARE STACK AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS	DWG: 0212058234.2106/01	REV: 0
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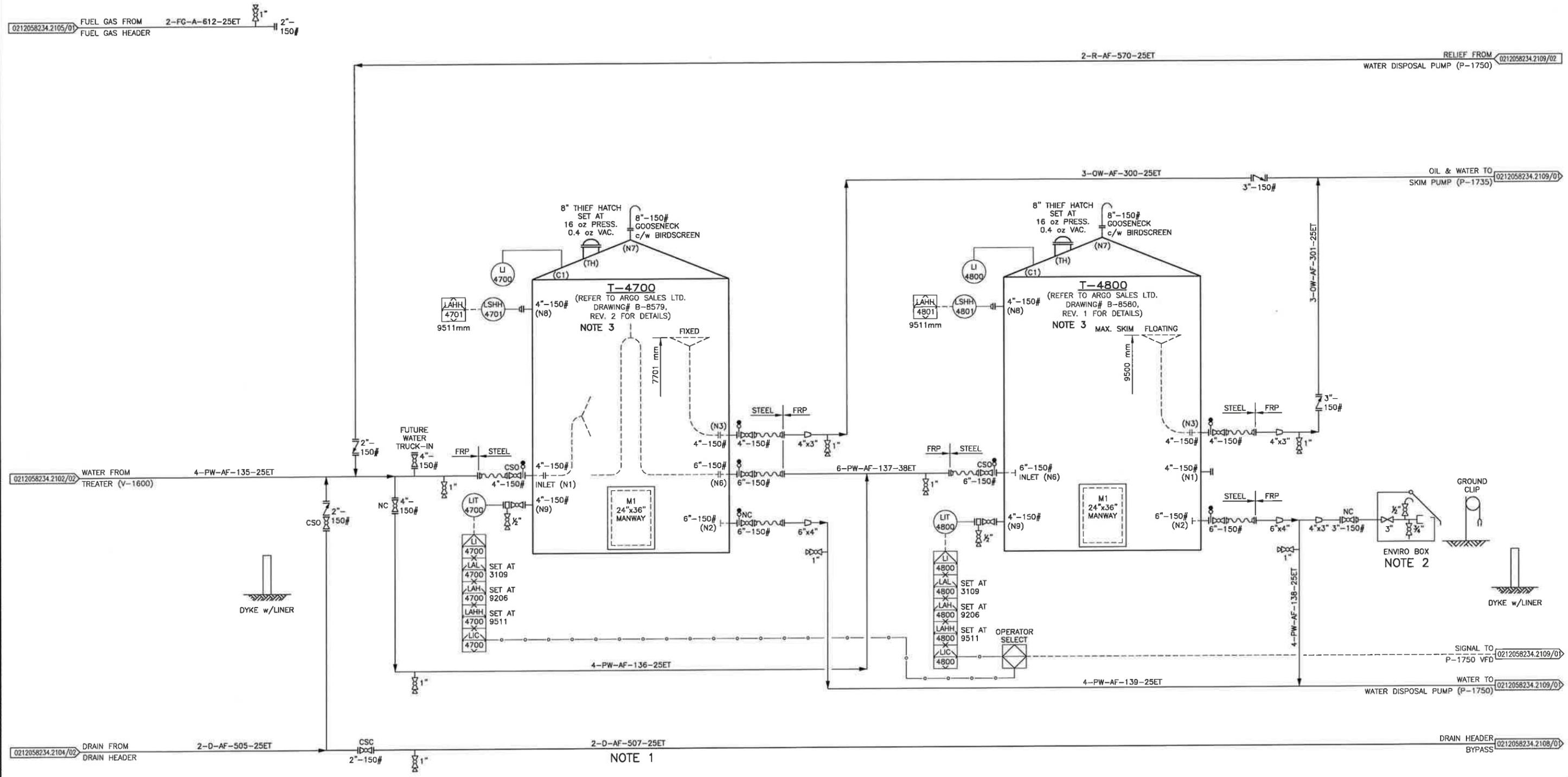
PLOT BY: SKIM, 1/10/2017 1:30 PM

Z:\DRAFTING\JOBS\LONG RUN EXPLORATION\REDWATER\02-12-058-23 W4M\PRD\0212058234.2100.DWG

NOTES:
 1. BYPASS TO T-4100 PRODUCTION TANK.
 2. LOCATED JUST INSIDE CONTAINMENT AREA.
 3. TANK INTERNALS TO BE INSTALLED IN THE FIELD.

T-4700 WATER STORAGE TANK
 VENDOR: ARGO SALES LTD.
 SIZE: 15'-6" DIA. x 32'-0" HIGH
 CAPACITY: 1000 BBL
 INSULATED: 1-1/2" URETHANE SPRAY FOAM
 INTERNAL COATING: FULL TANK DEVOE 253
 DESIGN PRESSURE : 16 oz
 SN: 8579
 YEAR BUILT: 2016

T-4800 WATER STORAGE TANK
 VENDOR: ARGO SALES LTD.
 SIZE: 15'-6" DIA. x 32'-0" HIGH
 CAPACITY: 1000 BBL
 INSULATED: 1-1/2" URETHANE SPRAY FOAM
 INTERNAL COATING: FULL TANK DEVOE 253
 DESIGN PRESSURE : 16 oz
 SN: 8580
 YEAR BUILT: 2016



REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080
1	RE-ISSUED FOR CONSTRUCTION	GW	01/06/2017	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.
 Signature: *[Signature]*
 Date: Jan 16/17
PERMIT NUMBER: P 11113
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER ALBERTA
 TREVOR KEARNES
 Jan 16/17

LONG RUN EXPLORATION
 ENGINEERING RECORD
 DRAWN: S. KIM DATE: 11/14/2016
 CHECKED: K. ROBERTS DATE: 11/14/2016
 ENGINEER: T. POMERANZ DATE: 11/14/2016
 PROJECT MANAGER: N. GUNDERMAN DATE: 11/14/2016

TNT Engineering Ltd.
 SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

REDWATER
 2-12-58-23 W4M
 WATER TANK (T-4700/4800) AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS DWG: 0212058234.2107/01 REV: 1

PLOT BY: SKM, 1/10/2017 2:35 PM

Z:\DRAFTING\JOBS\LONG RUN EXPLORATION\REDWATER\02-12-058-23 W4M\P&ID\0212058234.2100.DWG

DRAWING SHEET SIZE: 11" x 17"

- NOTES:**
1. LOCATED JUST INSIDE CONTAINMENT AREA.
 2. TRUCK-OUT AND RECYCLE HEADER FUTURE TIE-IN LOCATIONS TO BE ON WEST END OF THE RACK.
 3. FIELD TO FABRICATE AND INSTALL TANK INTERNALS.
 4. TANK LEVEL ALARM LOW SET POINTS ARE BASED OFF NPSH_r FOR P-1725/1735.

**T-4100
PRODUCTION STORAGE TANK**

VENDOR: ARGO SALES LTD.
 SIZE: 15'-6" DIA. x 32'-0" HIGH
 CAPACITY: 1000 BBL
 INSULATED: 1-1/2" URETHANE SPRAY FOAM
 INTERNAL COATING: FULL TANK DEVCOE 253
 DESIGN: 16 oz PRESSURE, 0.4 oz VAC.
 SN: 8581
 YEAR BUILT: 2016

**T-4200
SALES STORAGE TANK**

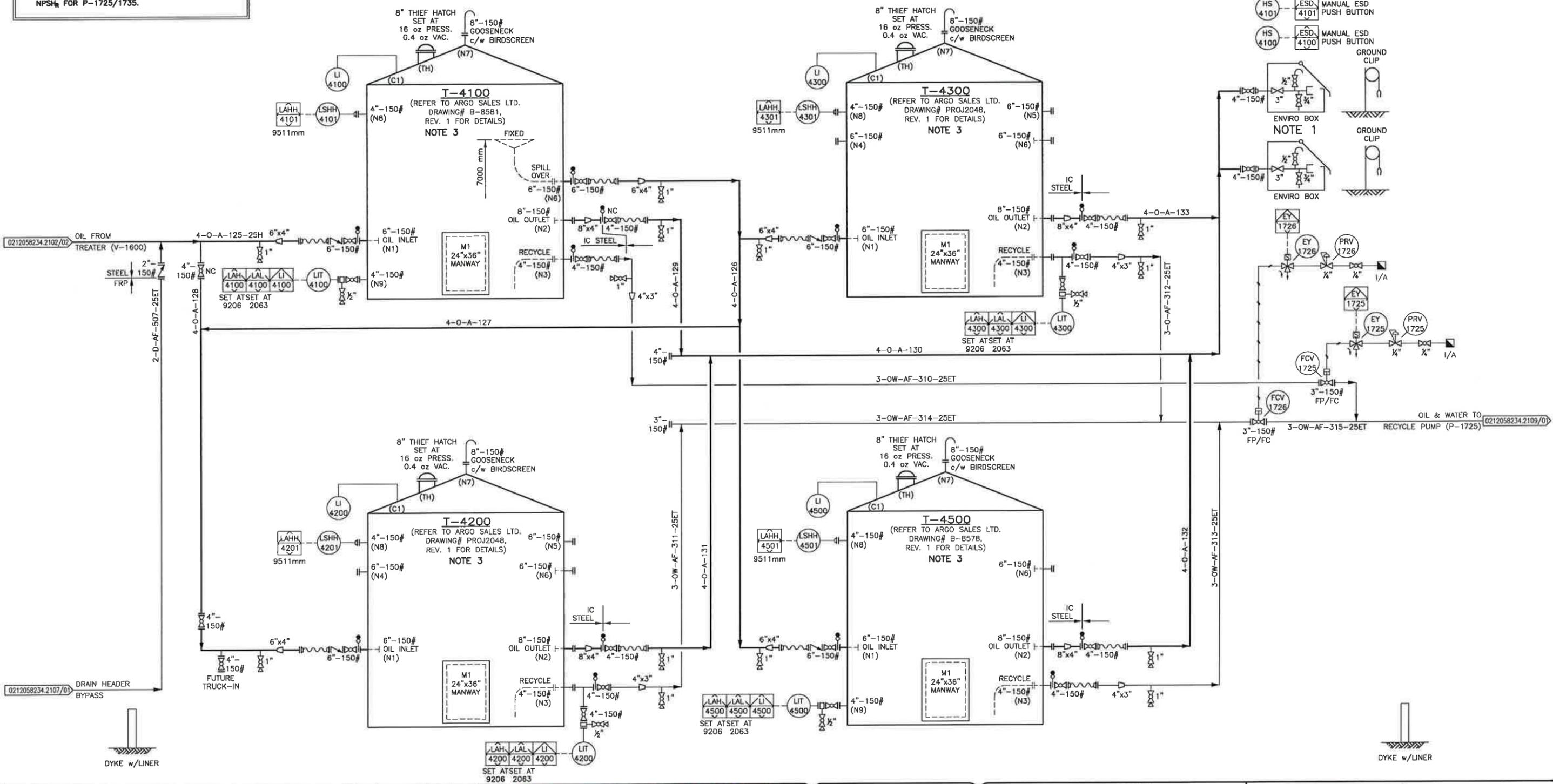
VENDOR: ARGO SALES LTD.
 SIZE: 15'-6" DIA. x 32'-0" HIGH
 CAPACITY: 1000 BBL
 INSULATED: 1-1/2" URETHANE SPRAY FOAM
 INTERNAL COATING: TANK FLOOR & 3'-0" UP SHELL w/DEVCOE 253
 DESIGN: 16 oz PRESSURE, 0.4 oz VAC.
 SN: 8571
 YEAR BUILT: 2016

**T-4300
SALES STORAGE TANK**

VENDOR: ARGO SALES LTD.
 SIZE: 15'-6" DIA. x 32'-0" HIGH
 CAPACITY: 1000 BBL
 INSULATED: 1-1/2" URETHANE SPRAY FOAM
 INTERNAL COATING: TANK FLOOR & 3'-0" UP SHELL w/DEVCOE 253
 DESIGN: 16 oz PRESSURE, 0.4 oz VAC.
 SN: 8572
 YEAR BUILT: 2016

**T-4500
SALES STORAGE TANK**

VENDOR: ARGO SALES LTD.
 SIZE: 15'-6" DIA. x 32'-0" HIGH
 CAPACITY: 1000 BBL
 INSULATED: N/A
 INTERNAL COATING: TANK FLOOR & 3'-0" UP SHELL w/DEVCOE 253
 DESIGN: 16 oz PRESSURE, 0.4 oz VAC.
 SN: 8578
 YEAR BUILT: 2016



REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080
1	RE-ISSUED FOR CONSTRUCTION	GW	01/06/2017	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature: *[Signature]*
 Date: *Jan 16/17*

PERMIT NUMBER: P 11113
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

STAMP

PROFESSIONAL ENGINEER
TREVOR KEARNES
 8888

Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

REDWATER
 2-12-58-23 W4M
 PRODUCTION AND SALES STORAGE TANK AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS DWG: 0212058234.2108/01 REV: 1

PLOT BY: SKM, 12/22/2016 7:43 PM

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DRAWING SHEET SIZE: 11" x 17"

NOTES:

- SPOOL FOR FUTURE PUMP FILTRATION.
- RECYCLE AND SKIM PUMPS TO BE INSTALLED IN THE DISPOSAL PUMP BUILDING.
- CLOUDED AREAS ARE CHANGES TO EXISTING PACKAGE.

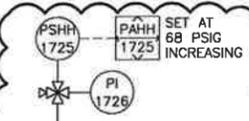
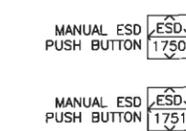
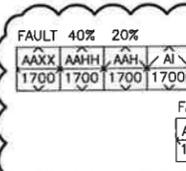
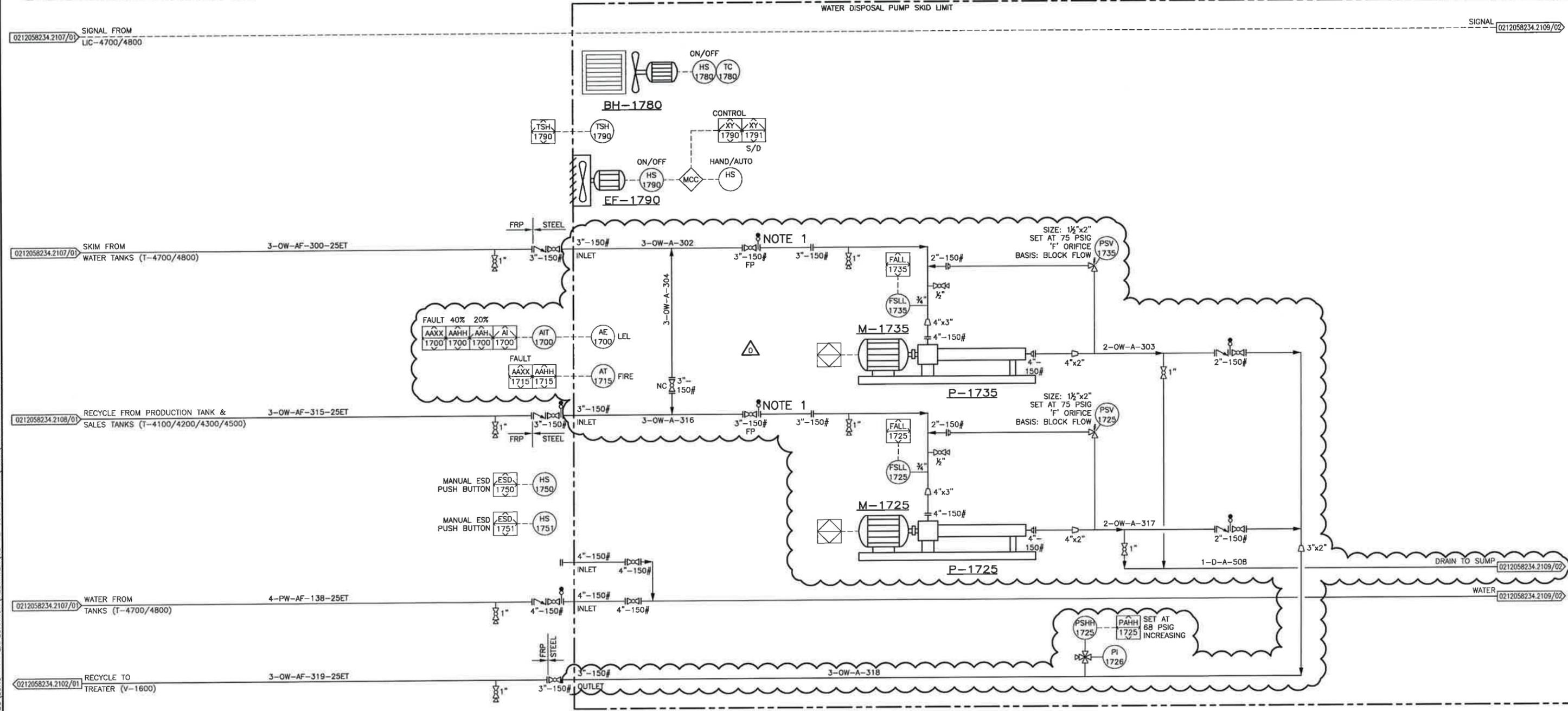
EF-1790 EXHAUST FAN
MFG.:
MODEL:
DUTY: 120 VAC

BH-1780 BUILDING HEATER
MFG.: RUFFNECK
MODEL: XL412 ELECTRIC HEATER
DUTY: 480V/3PH/60Hz, XP
RATED AT 17,050 BTU/HR
CUSTOMER SUPPLIED

M-1725/1735 PUMP MOTORS
MAKE: TECO-WESTINGHOUSE MOTOR
CAPACITY: 5 HP AT 1200 RPM
FRAME: 215T
230-460V/3PH/60Hz
TEXP. CLASS I, DIV. 1
VFD COMPATIBLE

P-1735 SKIM PUMP
MAKE: CONTINENTAL
TYPE: PROGRESSIVE CAVITY
MODEL: 2CLB-CDY-AAA
SUCTION: 4"-150# RF
DISCHARGE: 4"-NPT
NPSHR: 3.0 FT
FLOWRATE: 120-240 m³/d
DISCHARGE PRESSURE: 50 PSIG

P-1725 RECYCLE PUMP
MAKE: CONTINENTAL
TYPE: PROGRESSIVE CAVITY
MODEL: 2CLB-CDY-AAA
SUCTION: 4"-150# RF
DISCHARGE: 4"-NPT
NPSHR: 3.0 FT
FLOWRATE: 120-240 m³/d
DISCHARGE PRESSURE: 50 PSIG



* ENGINEER AND PERMIT STAMP APPLY TO CLOUDED AND OUTSIDE SKID AREAS ONLY.

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature: *[Signature]*
Date: *Dec 22/16*

PERMIT NUMBER: P 11113
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

STAMP

PROFESSIONAL ENGINEER ALBERTA
TREVOR KEARNS
Dec 22/16

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

SUITE 600, 639 - 5TH AVE SW
CALGARY, AB, T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

REDWATER
2-12-58-23 W4M
WATER DISPOSAL PUMP (P-1750) AREA
PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS	DWG: 0212058234.2109/01	REV: 0
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PLOT BY: SKIM, 1/6/2017 2:18 PM

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DRAWING SHEET SIZE: 11" x 17"

NOTES:

1. MAXIMUM DISCHARGE PRESSURE IS DEPENDANT ON PLUNGER DIAMETER INSTALLED. OPERATIONS TO CONFIRM PRIOR TO USE.
2. CLOUDED AREAS ARE CHANGES TO EXISTING PACKAGE.

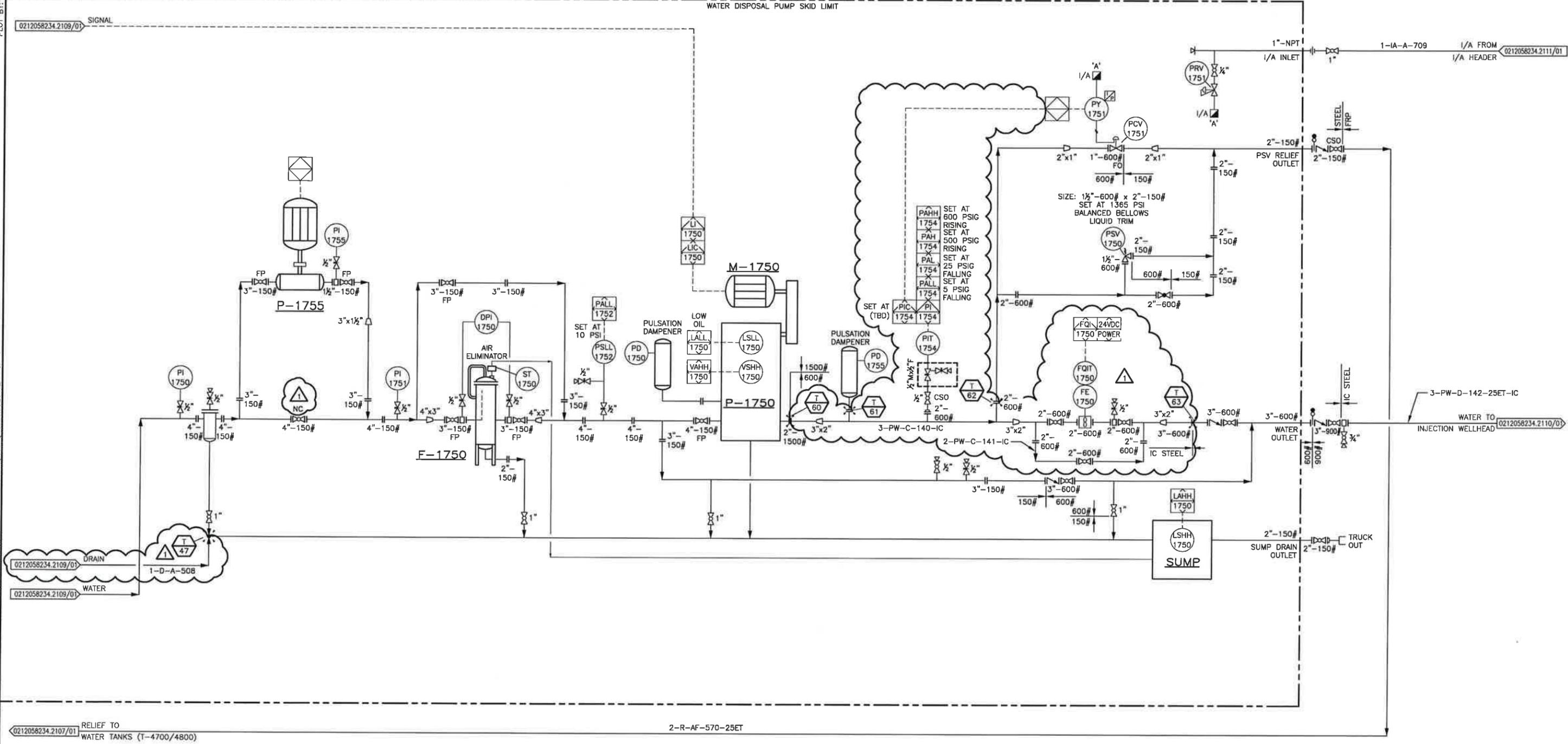
P-1755 CHARGE PUMP
 MODEL: EAGLE V-200S 3x1.5-6
 TECO-WESTINGHOUSE MOTOR
 15 HP, 3600 RPM
 FRAME: 254TC
 230/460V/3PH/60Hz, XP
 SN: V-912019

F-1750 FILTER SEPARATOR
 JD FLUID JLMB-3 BAG
 DP: 250 PSI AT -20°F TO 200°F
 20 MICRONS

P-1750 WATER DISPOSAL PLUNGER PUMP
 MAKE: GARDNER DENVER
 MODEL: TAEGGABABC (GD 150T)
 150 HP AT 400S PSI MAX.
 3 PLUNGERS AT 1.75" DIA.
 5" STROKE LENGTH, MAX. 370 RPM
 CUSTOMER SUPPLIED

M-1750 PUMP MOTOR
 TECO-WESTINGHOUSE MOTOR
 100 HP, 1180 RPM
 FRAME: 444T
 460V/3PH/60Hz, TEXP
 INSULATION: CLASS F

NOTE 1



RELIEF TO
 0212058234.2107/01 WATER TANKS (T-4700/4800)

2-R-AF-570-25ET

* ENGINEER AND PERMIT STAMP APPLY TO CLOUDED AND OUTSIDE SKID AREAS ONLY.

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080
1	RE-ISSUED FOR CONSTRUCTION	SK	01/06/2017	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.

Signature: *[Signature]*
 Date: Jan 16/17

PERMIT NUMBER: P 11113
 The Association of Professional Engineers,
 Geologists and Geophysicists of Alberta

PROFESSIONAL ENGINEER
TREVOR KEARNES
 ALBERTA

[Signature]
 Jan 16/17

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

SUITE 600, 639 - 5TH AVE SW
 CALGARY, AB, T2P 0M9
 (403) 387-2500 PHONE
 (403) 387-2535 FAX

REDWATER
 2-12-58-23 W4M
 WATER DISPOSAL PUMP (P-1750) AREA
 PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS	DWG: 0212058234.2109/02	REV: 1
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PLOT BY: SKM, 12/22/2016 7:44 PM

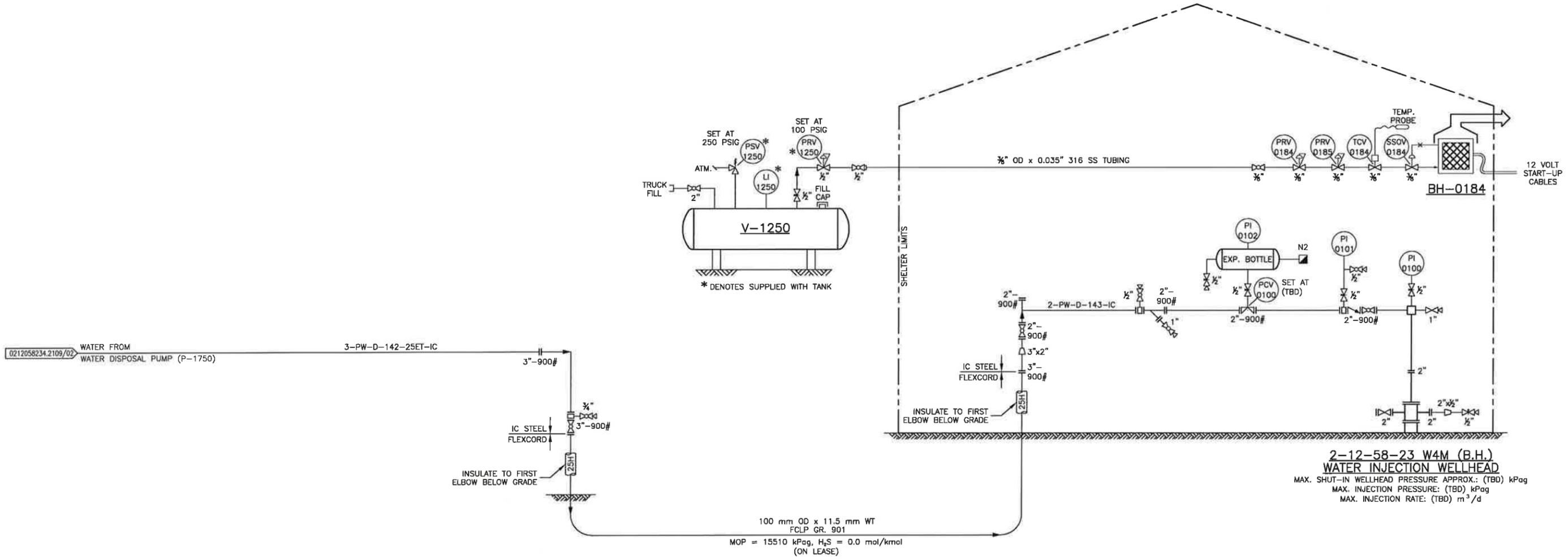
Z:\DRAFTING\JOBS\LONG RUN EXPLORATION\REDWATER\02-12-058-23 W4M\PAID\0212058234-2100.DWG

DRAWING SHEET SIZE: 11" x 17"

NOTE:
1. INTERNALLY COATED PIPING TO USE TROJAN TYPE F G10/VITON GASKETS.

V-1250
PROPANE TANK
SUPPLIED BY CLIENT

BH-0184
BUILDING HEATER
MFG.: CATADYNE
MODEL:
DUTY: 12 VDC



0212058234.2109/02 WATER FROM WATER DISPOSAL PUMP (P-1750) 3-PW-D-142-25ET-IC

3"-900#
IC STEEL FLEXCORD
INSULATE TO FIRST ELBOW BELOW GRADE

100 mm OD x 11.5 mm WT
FCLP GR. 901
MOP = 15510 kPag, H₂S = 0.0 mol/kmol (ON LEASE)

2-12-58-23 W4M (B.H.)
WATER INJECTION WELLHEAD
MAX. SHUT-IN WELLHEAD PRESSURE APPROX.: (TBD) kPag
MAX. INJECTION PRESSURE: (TBD) kPag
MAX. INJECTION RATE: (TBD) m³/d

REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION	SK	12/20/2016	KR	TP	3080

PERMIT TO PRACTICE
TNT ENGINEERING LTD.
Signature: *[Signature]*
Date: Dec 22/16
PERMIT NUMBER: P 11113
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

STAMP
PROFESSIONAL ENGINEER ALBERTA
TREVOR KEARNES
DEC 22/16

LONG RUN EXPLORATION

ENGINEERING RECORD	
DRAWN: S. KIM	DATE: 11/14/2016
CHECKED: K. ROBERTS	DATE: 11/14/2016
ENGINEER: T. POMERANZ	DATE: 11/14/2016
PROJECT MANAGER: N. GUNDERMAN	DATE: 11/14/2016

TNT Engineering Ltd.

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CALGARY, AB, T2P 0M9
(403) 387-2500 PHONE
(403) 387-2535 FAX

REDWATER
2-12-58-23 W4M
WATER INJECTION WELLHEAD AREA
PIPING AND INSTRUMENTATION DIAGRAM

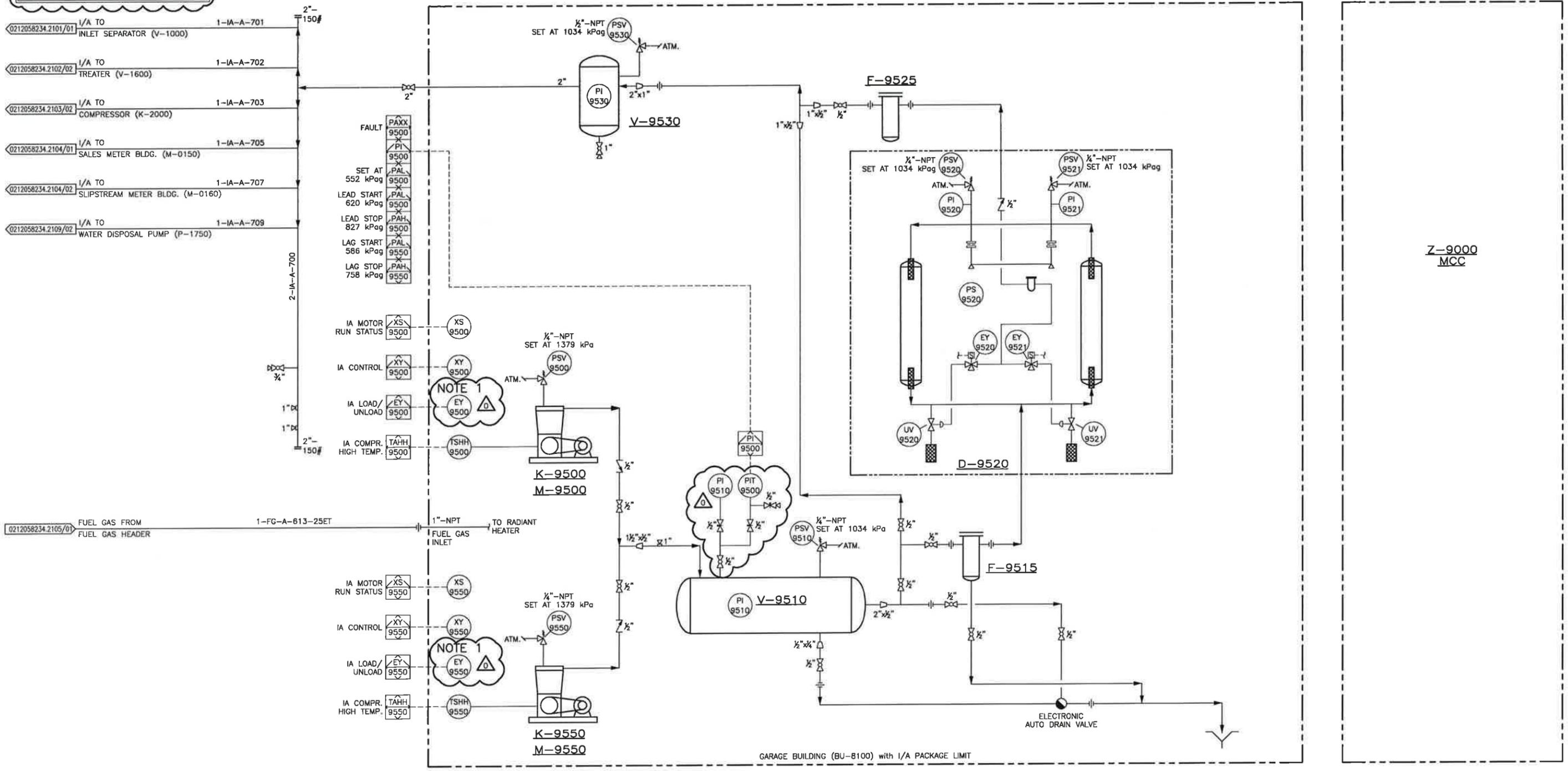
SCALE: NTS	DWG: 0212058234.2110/01	REV: 0
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PLOT BY: SKIM, 12/20/2016 6:02 PM
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 DRAWING SHEET SIZE: 11" x 17"

NOTES:

- COMPRESSOR LOAD/UNLOAD SOLENOIDS TO BE CHANGED TO 24 VDC. FIELD CONTRACTOR TO SUPPLY AND INSTALL.
- FIELD TO CONFIRM I/A PACKAGE COMPONENTS ONCE SHIPPED TO SITE.

K-9500/9550 ROTARY SCREW AIR COMPRESSORS MAKE/MODEL: ROTA NOVA SCI-7 OPERATING PRESSURE: 862 kPa CAPACITY: 44.17 m ³ /h AT 862 kPa SPEED: 3480 RPM	M-9500/9550 COMPRESSOR DRIVE MOTORS MAKE: WESTINGHOUSE ENCLOSURE: TEXP FRAME SIZE: 213T 7.5 HP AT 3600 RPM 3 PH/60 HZ/230-460V	V-9530 DRY AIR RECEIVER SIZE: 609 mm DIA x 1702 mm S/S DESIGN: 1379 kPa AT 232°C CAPACITY: 0.454 m ³	V-9510 WET AIR RECEIVER SIZE: 609 mm DIA x 1727 mm S/S DESIGN: 1379 kPa AT 232°C CAPACITY: 0.454 m ³	F-9515 AIR PRE-FILTER MAKE/MODEL: DELTECH D0050-CC c/w SIGHT GLASS DIFFERENTIAL INDICATOR CAPACITY: 85 m ³ /h (50 SCFM)	D-9520 HEATLESS AIR DRYER MAKE/MODEL: EAGLE EADR40 XP DESIGN: 1379 kPa AT 93.3°C CAPACITY: 68 m ³ /h AT 37.7°C AT 689 kPa	F-9525 AIR AFTER FILTER MAKE/MODEL: DELTECH D0050-PF c/w SIGHT GLASS DIFFERENTIAL INDICATOR CAPACITY: 85 m ³ /h (50 SCFM)	Z-9000 MCC
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STAMP

PROFESSIONAL ENGINEER ALBERTA
TREVOR KEARNES
DEC 22/16

LONG RUN EXPLORATION

ENGINEERING RECORD	
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ENGINEER: T. POMERANZ	DATE: 11/14/2016
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CALGARY, AB, T2P 0M9
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REDWATER
2-12-58-23 W4M

GARAGE BLDG. (BU-8100) AND MCC BLDG. (Z-9000) AREA
PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NTS	DWG: 0212058234.2111/01	REV: 0
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