

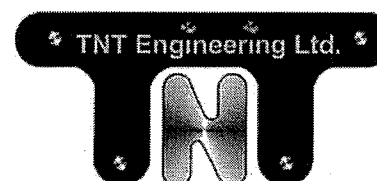
DRAWING SHEET SIZE: 11" x 17" Z:\DRAFTING\JOBS\ARC RESOURCES LTD\PEMBINA\MIPA 8\02-13-048-08 W5M\CVR\ARC CVR PROJECT #2136.DWG

PLOT BY: MROBERTS, 2/25/2015 8:50 AM



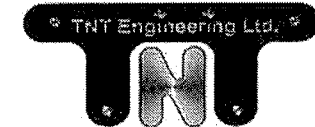
PEMBINA - MIPA 8
2-13-48-8 W5M
FRESH WATER MODIFICATIONS
MECHANICAL DRAWINGS
PROJECT # 2136

ISSUED FOR
CONSTRUCTION

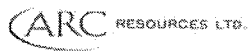


TNT ENGINEERING LTD.
SUITE 600, 639 - 5TH AVE SW
CALGARY, AB, T2P 0M9
PHONE (403) 387-2500
FAX (403) 387-2535

DRAWING INDEX



STRIKE AREA	SURFACE LOCATION	BOTTOM HOLE LOCATION	DRAWING	DRAWING TYPE	COMMENTS	REV.
PEMBINA	MULTI	-	-	COVER PAGE	FRESH WATER MODIFICATIONS	-
-	-	-	-	ARC RESOURCES LTD. PIPING SPECIFICATION NOTES	ASME PIPING NOTES	01
-	-	-	-	ARC RESOURCES LTD. PIPING SPECIFICATION	ASME PIPING CLASS B	01
-	-	-	-	ARC RESOURCES LTD. PIPING SPECIFICATION	ASME PIPING CLASS D	01
PEMBINA - MIPA 8	02-13-048-08 W5M	-	0213048085.1500/01	LINE LIST	FRESH WATER MODIFICATIONS	0
PEMBINA - MIPA 8	07-12-048-08 W5M	-	0712048085.1500/01	LINE LIST	FRESH WATER MODIFICATIONS	0
PEMBINA - MIPA 8	15-01-048-08 W5M	-	1501048085.1500/01	LINE LIST	FRESH WATER MODIFICATIONS	0
-	-	-	-	TNT SYMBOL SHEET	TYPICAL FLOW SHEET SYMBOLS AND STANDARDS	D
PEMBINA - MIPA 8	15-01-048-08 W5M	-	1544-2106	PIPING AND INSTRUMENTATION DIAGRAM	WATER STORAGE	3
PEMBINA - MIPA 8	15-01-048-08 W5M	-	150148085.2100/01	PIPING AND INSTRUMENTATION DIAGRAM	WATER STORAGE S-913	0
PEMBINA - MIPA 8	15-01-048-08 W5M	-	1544-2107D	PIPING AND INSTRUMENTATION DIAGRAM	WATER INJECTION (DEMOLITION DRAWING)	A
PEMBINA - MIPA 8	15-01-048-08 W5M	-	1544-2107	PIPING AND INSTRUMENTATION DIAGRAM	WATER INJECTION	3
PEMBINA - MIPA 8	07-12-048-08 W5M	-	06-012-051-25165D	PIPING AND INSTRUMENTATION DIAGRAM	PIPELINE RISER AREA (DEMOLITION DRAWING)	A
PEMBINA - MIPA 8	07-12-048-08 W5M	-	06-012-051-25165	PIPING AND INSTRUMENTATION DIAGRAM	PIPELINE RISER AREA	3
PEMBINA - MIPA 8	02-13-048-08 W5M	-	0213048085.2100/01	PIPING AND INSTRUMENTATION DIAGRAM	2-13 INJECTION SOUTH HEADER	A
PEMBINA - MIPA 8	02-13-048-08 W5M	-	0213048085.2101D/01	PIPING AND INSTRUMENTATION DIAGRAM	2-13 INJECTION NORTH HEADER (DEMOLITION DRAWING)	A
PEMBINA - MIPA 8	02-13-048-08 W5M	-	0213048085.2101/01	PIPING AND INSTRUMENTATION DIAGRAM	2-13 INJECTION NORTH HEADER	1
PEMBINA - MIPA 8	02-13-048-08 W5M	-	0213048085.2102/01	PIPING AND INSTRUMENTATION DIAGRAM	2-13 CDG POLYMER SKID	2



SPEC N ASME PIPING SPECIFICATIONS
REVISION 01 NOTES
DATE July 18, 2007

The following NOTES apply to all ASME Piping Specifications

- 1 corrosion allowances for threaded connections are reduced if utilizing minimum of Sch 80. threaded connections not recommended in vibrating or sour service applications
- 2 short radius elbow and returns shall not be used unless they satisfy the specification of the pipe and pressure rating restrictions imposed by ASME B16.28, Paragraph 2 (derated to 80% max. allowable stress value)
- 3 forged steel fitting to ASME B16.11
- 4 butt welding fitting to 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
- 10 for > 1/2" all thickness pipe and fittings A 106 B / A 234 WPB require additional testing to meet ASME B31.3 requirements for MDMT. A 333 6 / A 420 WPL6 are acceptable alternatives (as applicable) to meet MDMT requirements
- 11 use PWHT for production welds if WPS was qualified with PWHT to control hardness. Evidence of hardness control consisting of third party inspections on sample welds shall be included in the contractor's quality control manual. In particular, all weld procedures for sour piping systems must demonstrate that the weld metal, heat affected zone and parent metal through-thickness hardness levels will not exceed 22 HRC or 200 HBW (at 500 kg) as defined in NACE MR0175. Welds that do not comply with the above requirements or that do not have evidence of hardness control must be post-weld heat treated
- 12 on calculated pipe wall thicknessess, fitting wall thickness to match calculated pipe value
- 13 trunnion mounted ball valve
- 14 in sour service CSA Z662 applications, materials shall conform to the applicable CSA specification - that is: CSA Z245.1, Section 16 for linepipe - CSA Z245.11, Section 13 for fittings - CSA Z245.12, Section 13 for flanges - CSA Z245.15, Section 13 for valves - NACE approved fittings, flanges and valves meet the corresponding CSA code - it is acceptable to utilize NACE approved pipe provided that the microhardness is confirmed at a maximum of 248 Vickers
- 15 Low Temperature refers to systems based on A333-6 pipe (L and SL series) and is restricted by the A352 LCB flanges on the valves .
- 16 SFRF= Slip-on Flange Raised Face, TFRF = Threaded Flange Raised Face To be used in "Sweet Service" 150 and 300 ANSI Only
- 17 Stud length must accommodate nut and at a minimum 2 exposed threads on each end
- 18 Consult Asset Integrity Group for correct material selection. Valves with specific corrosion resistant properties may be required

<u>SPEC</u>	<u>ANSI Rating</u>
A=	150
B=	300
C=	600
D=	900
E=	1500

ARC RESOURCES LTD.

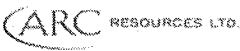
SERVICE:	SWEET HYDROCARBONS	ANSI CLASS:	300 RF
DESIGN PRESSURE:	5,102 kPag (740 psig) @ 38 C (100 F)	CODE:	ASME B31.3
TEST PRESSURE:	7,654 kPag (1,110 psig)		
TEMPERATURE LIMITS:	-29 to 149 C (-20 to 300 F)	RATING:	ASME/ANSI B16.5
CORROSION ALLOWANCE:	1.6 mm	PWHT:	if pipe wall thickness > 19 mm - see Note 11 also
NDT:	Visual, 10% of all butt welds for each welder to be 100% radiographed		

PIPE					
NPS	RATING	CONN	DESCRIPTION	NOTES	
1/2 to 2	Sch 80	SW / Scrd	ASTM A 106 B (SMLS) PE / TBE	1	
2 to 10	Sch 40	BW	ASTM A 106 B (SMLS) BE		
12	STD	BW	ASTM A 106 B (SMLS) BE		

ITEM	NPS	RATING	CONN	DESCRIPTION	NOTES
CAP	1/2 to 2	Class 3000	Scrd	ASTM A 105	3
	2 to 10	Sch 40	BW	ASTM A 234 WPB	4
	12	STD	BW	ASTM A 234 WPB	4
COUPLING	1/2 to 2	Class 3000	Scrd	ASTM A 105, full & half	3
CROSS	1/2 to 2	Class 3000	Scrd	ASTM A 105	3
ELBOW	1/2 to 2	Class 3000	Scrd	ASTM A 105, 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	1/2 to 2	Class 3000	Scrd	ASTM A 105	5
FLANGE	1 to 1 1/2	Class 300	SW	ASTM A 105, bored to Sch 80 pipe	16
	1 to 2	Class 300	SFRF or TRFR	ASTM A 105	
	2 to 10	Class 300	RFWN	ASTM A 105, bored to Sch 40 pipe	
	12	Class 300	RFWN	ASTM A 105, bored to STD pipe	
NIPPLE	1/2 to 2	Sch 80	Scrd	ASTM A 106 B (SMLS), 100 mm long min, TBE	1
REDUCER	2 to 10	Sch 40	BW	ASTM A 234 WPB, concentric / eccentric	4
	12	STD	BW	ASTM A 234 WPB, concentric / eccentric	4
SOCKOLET	1/2 to 1 1/2	Class 3000	SW	ASTM A 105	5
SWAGE	1/2 to 2	Sch 80	Scrd or PE	ASTM A 105 or A 106 B (SMLS), match pipe & conn	1, 6
TEE	1/2 to 2	Class 3000	Scrd	ASTM A 105	3
	2 to 10	Sch 40	BW	ASTM A 234 WPB, straight & reducing	4
	12	STD	BW	ASTM A 234 WPB, straight & reducing	4
THREDOLET	1/2 to 2	Class 3000	Scrd	ASTM A 105	5
UNION	1/2 to 2	Class 3000	Scrd	ASTM A 105	7
WELDOLET	2 to 4	Sch 40	BW	ASTM A 105	5

ITEM	NPS	RATING	CONN	DESCRIPTION	NOTES
BALL	≤ 2	WOG 2000	Scrd	A 105 body, cr. plated trim, API 602/607	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 ≥ 8"	9, 13
CHECK	≤ 1 1/2	800 API	Scrd	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 1/2	800 API	Scrd	A 105 body, trim No. 8 to API 602, handwheel	9
	2 to 12	Class 300	RF	WCB body, trim No. 8 to API 600, gear op ≥ 8"	9
GLOBE	≤ 1 1/2	800 API	Scrd	A 105 body, trim No. 8 to API 602, handwheel	9
	2 to 12	Class 300	RF	WCB body, trim No. 8 to API 600, gear op ≥ 8"	9
NEEDLE	1/2 to 3/4	Class 6000	Scrd	A 105 body & 316 SS trim	9

ITEM	NPS	RATING	CONN	DESCRIPTION	NOTES
BLIND	1 to 12	Class 300	RF	ASTM A 105	8
GASKET	1 to 12	Class 300	RF	spiral wound, flexible graphite filler, 304 SS windings, API 601, carbon steel centering ring	
NUTS				ASTM A 194 2H, heavy hexagon	
STUD				ASTM A 193 B7, threaded full length	17
PLUG	1/2 to 2	Sch 80	Scrd	Bull, ASTM A 105 or A 106 B (SMLS)	6
	1/2 to 2	Class 3000	Scrd	Hex Head, ASTM A 105	3



SPEC D ASME PIPING SPECIFICATIONS
REVISION 01
DATE July 18, 2007

SERVICE:	SWEET HYDROCARBONS		ANSI CLASS: 900 RTJ
DESIGN PRESSURE:	15,307 kPag (2,220 psig) @ 38 C (100 F)		CODE: ASME B31.3
TEST PRESSURE:	22,960 kPag (3,330 psig)		
TEMPERATURE LIMITS:	-29 to 149 C (-20 to 300 F)	RATING:	ASME/ANSI B16.5
CORROSION ALLOWANCE:	1.6 mm	PWHT:	if pipe wall thickness > 19 mm - see Note 11 also
NDT:	Visual, 100% of all butt welds to be 100% radiographed		

GENERAL: see ASME PIPING SPECIFICATION 'N' for a description of relevant NOTES
PV&F Specs not to be used for amine, cryogenic, CO2, acid gas, caustic, HVP or LPG services.

PIPE	NPS	RATING	CONN	DESCRIPTION	NOTES
	1/2 to 1 1/2	Sch 160	SW / Scrd	ASTM A 106 B (SMLS) PE / TBE	
	2, 3	Sch 80	BW	ASTM A 106 B (SMLS) BE	
	4 to 12	Sch 120 min. (calc WT & MDMT)	BW	ASTM A 106 B (SMLS) BE	10

FITTINGS	ITEM	NPS	RATING	CONN	DESCRIPTION	NOTES
CAP		1/2 to 1 1/2	Class 6000	Scrd	ASTM A 105	3
		2, 3	Sch 80	BW	ASTM A 234 WPB	4
		4 to 6	Sch 120 min.	BW	ASTM A 234 WPB	4, 10, 12
COUPLING		1/2 to 1 1/2	Class 6000	Scrd	ASTM A 105, full & half	3
CROSS		1/2 to 1 1/2	Class 6000	Scrd	ASTM A 105	3
ELBOW		1/2 to 1 1/2	Class 6000	Scrd	ASTM A 105, 45 & 90	3
		2, 3	Sch 80	LRBW	ASTM A 234 WPB, 45 & 90, straight & reducing	2, 4
		4 to 6	Sch 120 min.	LRBW	ASTM A 234 WPB, 45 & 90, straight & reducing	2, 4, 10, 12
ELBOLET		1/2 to 1 1/2	Class 6000	Scrd	ASTM A 105	5
FLANGE		2, 3	Class 900	RTJWN	ASTM A 105, bored to Sch 80 pipe	
		4 to 6	Class 900	RTJWN	ASTM A 105, bored to Sch 120 min. pipe	10, 12
NIPPLE		1/2 to 1 1/2	Sch 160	Scrd	ASTM A 106 B (SMLS), 100 mm long min, TBE	
REDUCER		2, 3	Sch 80	BW	ASTM A 234 WPB, concentric / eccentric	4
		4 to 3	Sch 120 min.	BW	ASTM A 234 WPB, concentric / eccentric	4, 10, 12
SOCKOLET		1/2 to 1 1/2	Class 6000	SW	ASTM A 105	5
SWAGE		1/2 to 1 1/2	Sch 160	Scrd or PE	ASTM A 105 or A 106 B (SMLS), match pipe & conn	6
TEE		1/2 to 1 1/2	Class 6000	Scrd	ASTM A 105	3
		2, 3	Sch 80	BW	ASTM A 234 WPB, straight & reducing	4
		4 to 6	Sch 120 min.	BW	ASTM A 234 WPB, straight & reducing	4, 10, 12
THREADOLET		1/2 to 1 1/2	Class 6000	Scrd	ASTM A 105	5
UNION		1/2 to 1 1/2	Class 6000	Scrd	ASTM A 105	7
WELDOLET		2, 3	Sch 80	BW	ASTM A 105	5
		4	Sch 120 min.	BW	ASTM A 105	5, 10, 12

VALVES	ITEM	NPS	RATING	CONN	DESCRIPTION	NOTES
BALL		≤ 1 1/2	WOG 4000	Scrd	A 105 body, cr. plated trim, 4000 # to API 607	9
		2	Class 900	RTJ	WCB body, cr. plated trim to API 607, lever op	9
		3 to 6	Class 900	RTJ	WCB body, cr. plated trim to API 607, gear op ≥ 3"	9, 13
CHECK		≤ 1 1/2	Class 1500	Scrd	A 105 body, trim No. 8 to API 602	9
		2 to 6	Class 900	RTJ	WCB body, trim No. 8 to API 600	9
GATE		≤ 1 1/2	Class 1500	Scrd	A 105 body, trim No. 8 to API 602, handwheel	9
		2 to 6	Class 900	RTJ	WCB body, trim No. 8 to API 600, gear op ≥ 4"	9
GLOBE		≤ 1 1/2	Class 1500	Scrd	A 105 body, trim No. 8 to API 602, handwheel	9
		2 to 6	Class 900	RTJ	WCB body, trim No. 8 to API 600, gear op ≥ 4"	9
NEEDLE		1/2 to 3/4	Class 6000	Scrd	A 105 body & 316 SS trim	9

MISCELLANEOUS	ITEM	NPS	RATING	CONN	DESCRIPTION	NOTES
BLIND		2 to 6	Class 900	RTJ	ASTM A 105	8
GASKET		2 to 6	Class 900	RTJ	soft iron oval ring, ANSI B16.20	
NUTS					ASTM A 194 2H, heavy hexagon	
STUD					ASTM A 193 B7, threaded full length	17
PLUG		1/2 to 1 1/2	Sch XXS	Scrd	Bull, ASTM A 105 or A 106 B (SMLS)	6
		1/2 to 1 1/2	Class 6000	Scrd	Hex Head, ASTM A 105	3

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[illegible]

[illegible]

PLOT BY: WMAK, 2/18/2015 2:51
Z:\DRAWING\JOBS\ARC RESOURCES LTD\ARC SYMBOL SHEET REV D.DWG
DRAWING SHEET SIZE: 11" x 17"

INSTRUMENTATION TABLE																												
FIRST LETTER	INITIATING OR MEASURED VARIABLE	CONTROLLERS			READOUT DEVICES		SWITCHES					ALARM DEVICES					TRANSMITTER			SOLENOID, RELAYS COMPUTING DEVICES	PRIMARY ELEMENT	TEST POINT	WELL OR PROBE	VIEW DEVICE. GLASS	SAFETY DEVICE	FINAL ELEMENT		
		RECORDER	INDICATOR	BLIND	SELF ACTUATED CONTROL VALVE	RECORDER	INDICATOR	HIGH	HIGH HIGH (SHUTDOWN)	LOW	LOW LOW (SHUTDOWN)	COMBINATION	HIGH	HIGH HIGH (SHUTDOWN)	LOW	LOW LOW (SHUTDOWN)	COMBINATION	RECORDER	INDICATOR								BLIND	
A	ANALYSIS	ARC	AIC	AC		AR	AI	ASH	ASHH	ASL	ASLL	ASHL	AAH	AAHH	AAL	AALL	AAHL	ART	AIT	AT	AY	AE	AP	AW			AV	
B	BURNER	BRC	BIC	BC		BR	BI	BSH	BSHH	BSL	BSLL	BSHL	BAH	BAHH	BAL	BALL	BAHL	BRT	BIT	BT	BY	BE		BW	BG		BZ	
C	USERS CHOICE																											
D	USERS CHOICE																											
E	VOLTAGE	ERC	EIC	EC		ER	EI	ESH	ESHH	ESL	ESLL	ESHL	EAH	EAHH	EAL	EALL	EAHL	ERT	EIT	ET	EY	EE					EZ	
F	FLOW	FRC	FIC	FC	FCV,RCV	FR	FI	FSH	FSHH	FSL	FSL	FSL	FAH	FAHH	FAL	FALL	FAHL	FRT	FIT	FT	FY	FE		FG			FV	
FQ	FLOW QUANTITY	FQRC	FQIC	FQC		FQR	FQI	FQSH	FQSHH	FQSL	FQSL	FQSHL	FQAH	FQAHH	FQAL	FQALL	FQAHL	FQRT	FQIT	FQT	FQY	FQE					FQV	
FF	FLOW RATIO	FFRC	FFIC	FFC		FFR	FFI	FFSH	FFSHH	FFSL	FFSL	FFSHL	FFAH	FFAHH	FFAL	FFALL	FFAHL	FFRT	FFIT	FFT	FFY							
G	USERS CHOICE																											
H	HAND		HIC	HC								HS					HA										HV	
I	CURRENT	IRC	IIC			IR	II	ISH	ISHH	ISL	ISLL	ISHL	IAH	IAHH	IAL	IALL	IAHL	IRT	IIT	IT	IY	IE					IZ	
J	POWER	JRC	JIC			JR	JI	JSH	JSHH	JSL	JSL	JISHL	JAH	JAHH	JAL	JALL	JAHL	JRT	JIT	JT	JY	JE					JZ	
K	TIME	KRC	KIC	KC	KCV	KR	KI	KSH	KSHH	KSL	KSL	KSHL	KAH	KAHH	KAL	KALL	KAHL	KRT	KIT	KT	KY	KE					KV	
L	LEVEL	LRC	LIC	LC	LCV	LR	LI	LSH	LSHH	LSL	LSLL	LSHL	LAH	LAHH	LAL	LALL	LAHL	LRT	LIT	LT	LY	LE		LG			LV	
M	MOISTURE	MRC	MIC	MC		MR	MI	MSH	MSHH	MSL	MSLL	MSHL	MAH	MAHH	MAL	MALL	MAHL	MRT	MIT	MT	MY	ME	MP					
N	USERS CHOICE																											
O	USERS CHOICE																											
P	PRESSURE, VACUUM	PRC	PIC	PC	PCV	PR	PI	PSH	PSHH	P	PSLL	PSHL	PAH	PAHH	PAL	PALL	PAHL	PRT	PIT	PT	PY	PE	PP		PG	PSV,PSE	PV	
PD	PRESSURE, DIFFERENTIAL	PDR	PDI	PDC	PDCV	PDR	PDI	PDSH	PDSHH	PDSL	PDSL	PDSHL	PDAH	PDAHH	PDAL	PDALL	PDAHL	PDR	PDIT	PDT	PDY						PDV	
Q	QUANTITY	QRC	QIC	QC		QR	QI	QSH	QSHH	QSL	QSL	QSHL	QAH	QAHH	QAL	QALL	QAHL	QRT	QIT	QT	QY						QZ	
R	RADIATION	RRC	RIC	RC		RR	RI	RSH	RSHH	RSL	RSL	RSHL	RAH	RAHH	RAL	RALL	RAHL	RRT	RIT	RT	RY			RW			RZ	
S	SPEED	SRC	SIC	SC		SR	SI	SSH	SSHH	SSL	SSL	SSL	SAH	SAHH	SAL	SALL	SAHL	SRT	SIT	ST	SY	SE						
T	TEMPERATURE	TRC	TIC	TC	TCV	TR	TI	TSH	TSHH	TSL	TSL	TSHL	TAH	TAHH	TAL	TALL	TAHL	TRT	TIT	TT	TY	TE		TW	TG	TSE	TV	
TD	TEMPERATURE, DIFFERENTIAL	TDR	TDI	TDC	TDCV	TDR	TDI	TDSH	TDSHH	TDSL	TDSL	TDSHL	TDAH	TDAHH	TDAL	TDALL	TDAHL	TDRT	TDIT	TDT	TDY	TDE		TDW			TDV	
U	MULTI-VARIABLE																			UY							UV	
V	VIBRATION, MECH. ANALYSIS					VR	VI	VSH	VSHH	VSL	VSL	VSHL	VAH	VAHH	VAL	VALL	VAHL	VRT	VIT	VT	VY	VE					VZ	
W	WEIGHT FORCE	WRC	WIC	WC		WR	WI	WSH	WSHH	WSL	WSLL	WSHL	WAH	WAHH	WAL	WALL	WAHL	WRT	WIT	WT	WY	WE					WZ	
WD	WEIGHT FORCE, DIFFERENTIAL	WDR	WDI	WDC		WDR	WDI	WDSH	WDSHH	WDSL	WDSL	WDSHL	WDAH	WDAHH	WDAL	WDALL	WDAHL	WDRT	WDIT	WDT	WDY	WDE					WDZ	
X	UNCLASSIFIED																											
Y	EVENT STATE, PRESENCE		YIC	YC		YR	YI	YSH	YSHH	YSL	YSL		YAH	YAHH	YAL	YALL	YAHL			YT	YY	YE						
Z	POSITION	ZRC	ZIC	ZC		ZR	ZI	ZSH	ZSHH	ZSL	ZSL		ZAH	ZAHH	ZAL	ZALL	ZAHL	ZRT	ZIT	ZT	ZY	ZE						
ZD	GAUGING DEVIATION	ZDR	ZDI	ZDC		ZDR	ZDI	ZDSH	ZDSHH	ZDSL	ZDSL		ZDAH	ZDAHH	ZDAL	ZDALL	ZDAHL	ZDRT	ZDIT	ZDT	ZDY	ZDE						

PIPING SYMBOLS	
	FLANGED POSITIVE DISPLACEMENT METER
	STRAIGHTENING VANES
	ROTAMETER
	VENTURI
	FLOW NOZZLE
	TURBINE METER
	POSITIVE DISPLACEMENT METER
	MAGNETIC FLOWMETER
	VORTEX METER
	CORIOLIS METER
	PITOT TUBE (ANNUBAR)
	METER RUN
	METER RUN c/w STRAIGHTENING VANES
	EDUCTOR
	RUPTURE DISK
	BLEED RING
	PIG ENTRY TEE
	Y-STRAINER
	STEAM TRAP
	CONE STRAINER
	SPACER
	SPECTACLE BLIND OPEN
	SPECTACLE BLIND CLOSED
	FLAME ARRESTOR
	EXPANSION JOINT
	FLEX JOINT
	INLINE MIXER
	BOLT UP TIE-IN
	FIELD WELD TIE-IN
	TIE-IN POINT TAG, NO.
	DRESSER COUPLING
	OPEN DRAIN
	SPECIALTY ITEM
	SPECIFICATION BREAK
	BARRED TEE
	CAMLOCK FITTING
	CHEMICAL INJECTION POINT

VALVES & CONNECTIONS	
	FLANGED CONNECTION
	THREADED CONNECTION
	SOCKET WELD CONNECTION
	GATE VALVE
	GLOBE VALVE
	BALL VALVE
	SWING CHECK VALVE
	PISTON CHECK VALVE
	EXCESS FLOW VALVE
	BUTTERFLY VALVE
	NEEDLE VALVE
	3-WAY VALVE
	PLUG VALVE
	PIGGING BALL VALVE
	DIAPHRAGM
	INLINE CHOKE
	ANGLE VALVE
	ANGLE CHOKE
	PRESSURE RELIEF
	PRESSURE & VACUUM RELIEF VALVE
	3 WAY VALVE c/w PISTON ACTUATOR & RESET LATCH
	ROTARY MOTOR VALVE
	PRESSURE CONTROL VALVE (SELF-ACTUATED)
	PISTON ACTUATED CONTROL VALVE
	DIGITAL
	SOLENOID VALVE
	3-WAY SOLENOID VALVE
LINE TYPES	
	PROCESS PIPING
	SECONDARY PIPING
	PROCESS SKID LIMIT
	ELECTRIC SIGNAL
	HYDRAULIC SIGNAL
	CAPILLARY SIGNAL
	ELECTROMAGNETIC/SONIC SIGNAL (GUIDED)
	ELECTROMAGNETIC/SONIC SIGNAL (NOT GUIDED)
	PNEUMATIC BINARY SIGNAL
	PNEUMATIC SIGNAL
	SOFTWARE SIGNAL (DATA LINK)
	ELECTRIC BINARY SIGNAL
	MECHANICAL LINK
	UNDEFINED SIGNAL
	TUBING
	FUTURE

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
IW	INJECTION WATER
JW	JACKET WATER
LF	LOW PRESSURE FLARE
LO	LUBE OIL
N	NITROGEN
NGL	PETROLEUM LIQUIDS (C2-C4)
O	SHIPPING OIL
OE	OIL EMULSION
OW	OIL & 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

INSTRUMENT SYMBOLS

	DISCRETE INSTRUMENTS FIELD MOUNTED		INSTRUMENTS SHARING COMMON HOUSING		PANEL MOUNTED PATCHBOARD POINT 12
	DISCRETE INSTRUMENTS PRIMARY LOCATION		INACCESSIBLE OR BEHIND THE PANEL DEVICES & FUNCTIONS USE THE SAME SYMBOL BUT WITH DASHED HORIZONTAL BARS		INTERLOCK
	DISCRETE INSTRUMENTS AUXILIARY LOCATION		PROGRAMMABLE LOGIC CONTROL (PLC) FIELD MOUNTED		PURGE
	DISTRIBUTED CONTROL FIELD MOUNTED		PROGRAMMABLE LOGIC CONTROL (PLC) PRIMARY LOCATION		RESET
	DISTRIBUTED CONTROL PRIMARY LOCATION		PROGRAMMABLE LOGIC CONTROL (PLC) AUXILIARY LOCATION		I.A. OR I.G. SUPPLY
	DISTRIBUTED CONTROL AUXILIARY LOCATION		HORN		CURRENT/PNEUMATIC
	COMPUTER FUNCTION FIELD MOUNTED		INDICATOR LIGHT		BEACON
	COMPUTER FUNCTION PRIMARY LOCATION				
	COMPUTER FUNCTION AUXILIARY LOCATION				

LINE NUMBERING

INSULATION THICKNESS AND DESIGNATION:

3-P-AS-001-38GT-IC

NUMBER SPECIFICATION COMMODITY SIZE(IMP. NPS) INTERNAL COATING

H	HEAT CONSERVATION
C	COLD CONSERVATION
PP	PERSONAL PROTECTION
ET	ELECTRICAL TRACE
GT	GLYCOL TRACE
HO	HOT OIL TRACE
J	JACKETED
ST	STEAM TRACE

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 THREE DIGIT CATEGORY NUMBER FROM THE EQUIPMENT NUMBERING LIST.

EXAMPLE: E-315

EQUIPMENT (HEAT EXCHANGER) SERIAL NUMBERING (ASSIGNED TAG NUMBER)

EQUIPMENT TAGS

A	AUXILIARY FACILITIES
B	BLOWER OR FAN (PROCESS)
BH	BUILDING HEATER
C	CRUSHERS, MILLS & GRINDERS
D	DRIVERS
E	EXCHANGERS, AERIAL COOLERS, PLATE, SHELL & TUBE EXCH.
F	FILTER SEPARATOR (PROCESS)
FS	FLARE STACK
G	GENERATOR, ELECTRIC, GAS OR TEG UNIT
H	FIRE HEATER OR BOILER
I	INCINERATOR
J	CONVEYORS
K	COMPRESSORS
M	MIXERS & AGITATORS
P	PUMPS
R	REACTORS OR CONVERTER
S	STORAGE
T	TANKS
V	VESEL
VS	VENT STACK
Z	MISC. PACKAGES, METER SKIDS

EQUIPMENT NUMBERING

100 SERIES VESSELS - SEPARATORS - PROPANE TANKS - F.G. SCRUBBERS - CHILLERS - CONTACTORS - SPHERES - BULLETS	300 SERIES FIRED EQUIP. HEAT EXCHANGERS - LINE HEATERS - DEHY./AMINE REBOILERS - FIN COOLERS - SHELL & TUBE EXCHANGERS - PLATE EXCHANGERS - AERIAL COOLERS - BUILDING HEATERS	500 SERIES POWER SYSTEM/DRIVERS - TEG UNITS - SOLAR - GENERATORS - GAS/ELECTRIC MOTORS
200 SERIES PUMPS & COMPRESSORS - SCREW COMP. - RECIP. COMP. - I.A. COMP. - PUMPS	400 SERIES TANKS - WATER, OIL & DRAIN - METHANOL - CORROSION INHIBITOR - CHEMICAL	600 SERIES MISCELLANEOUS - EXHAUST FANS - METER SKIDS
	700 SERIES FLARE SYSTEM - FLARE STACK - FLARE KNOCK OUT DRUM - VENT STACK - INCINERATOR	800 SERIES FILTERS
		900 SERIES USERS CHOICE

LINE NUMBERING BY COMMODITY

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

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 & 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
MV	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

OTHER POSSIBLE INSTRUMENTATION COMBINATIONS

FO	RESTRICTION ORIFICE	PFR	RATIO
FRK	FLOW CONTROL STATION	KQI	RUNNING TIME INDICATOR
HIK	HAND CONTROL STATION	QKI	INDICATING COUNTER
FX	ACCESSORIES	WKIC	RATE OF WEIGHT LOSS CONTROLLER
TJR	SCANNING RECORDER	HMS	HAND MOMENTARY SWITCH
LLH	PILOT LIGHT	ESDV	EMERGENCY SHUTDOWN VALVE

ARC RESOURCES LTD.

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

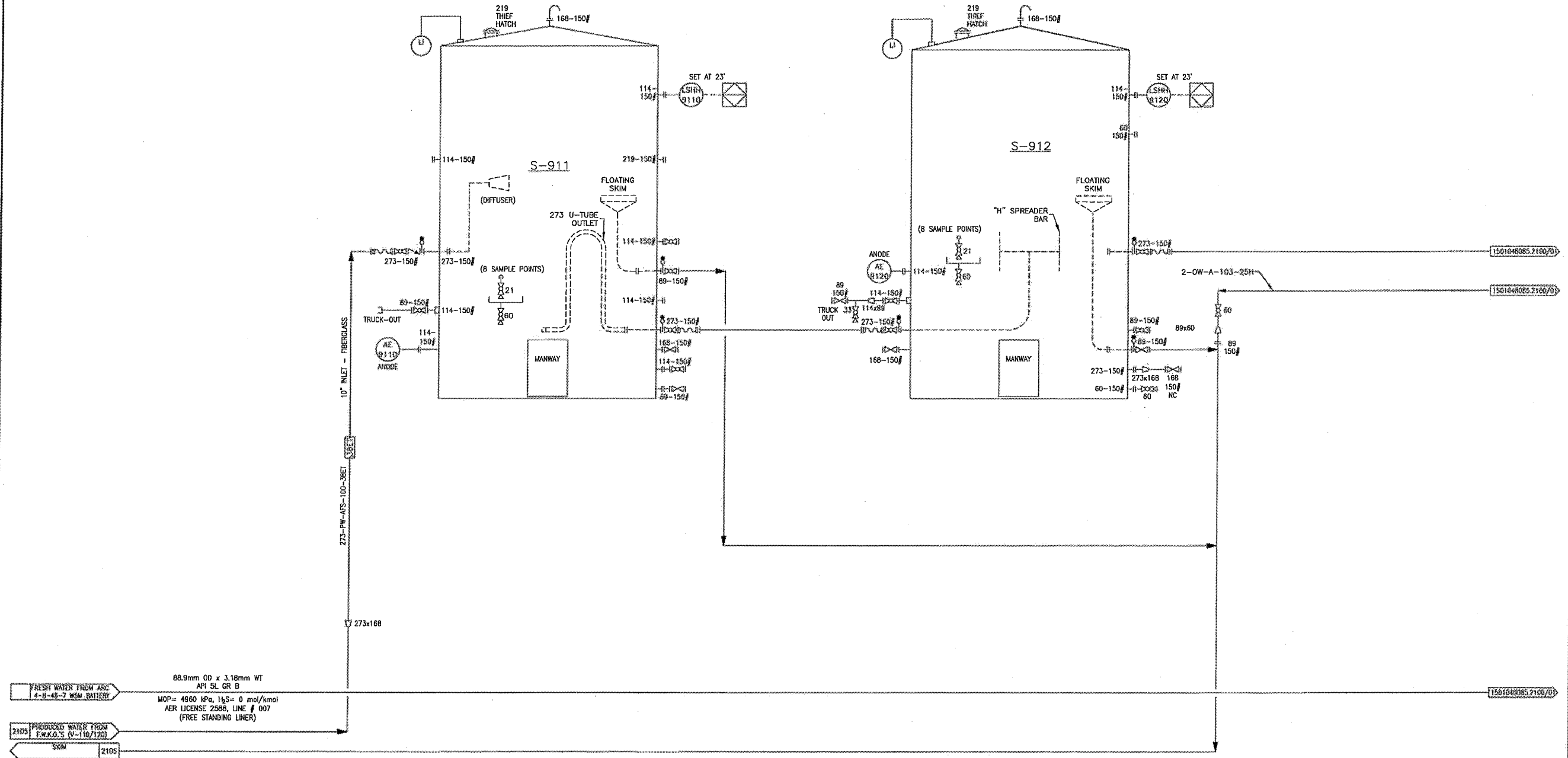
TYPICAL FLOW SHEET SYMBOLS AND STANDARDS</

02/25/2015 2:35 PM

Z:\DRAFTING\JOBS\ARC RESOURCES LTD\PEMBINA\154-01-048-08 WSM\1544-2106_3_KR.DWG

S-911
PRODUCED WATER INLET TANK
VENDOR: ARGO
SIZE: 5258mm ϕ X 7315mm HIGH
CAPACITY: 1000BBL
INTERNALLY COATED

S-912
PRODUCED WATER INLET TANK (2)
VENDOR: GLM
SIZE: 5258mm ϕ X 7315mm HIGH
CAPACITY: 1000BBL
SN: G-98-197-1



REFERENCE DRAWINGS	DWG. NO.

NOTES :

NO.	DATE	REVISION / DESCRIPTION	BY	CHKD.	APPD.	JOB No.
A	06.11.10	ISSUED FOR INFORMATION	RN			1723
B	11.09.07	ISSUED FOR APPROVAL - TNT # 1030	WM	BPH		1030
1	11.09.29	ISSUED FOR CONSTRUCTION - TNT # 1030	MY	BPH		1030
2A	14.08.15	ISSUED FOR REVIEW - TNT # 2355	BW	KR		2355
2	14.09.10	ISSUED FOR CONSTRUCTION - TNT # 2355	BW	KR		2355
3	15.02.12	ISSUED FOR CONSTRUCTION - FRESH WATER MODIFICATIONS	KR	RC		2136

PERMIT STAMP	ENGINEER'S STAMP



TITLE

VIOLET GROVE AREA (BLOCK 8)
LSD: 15-01-048-08 WSM
WATER STORAGE
PROCESS & INSTRUMENTATION DIAGRAM

SCALE

NTS (A1 Size)

FILE NO.

1544-2106

REV.

3

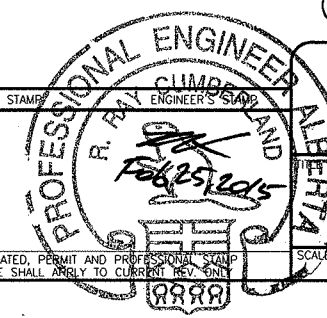
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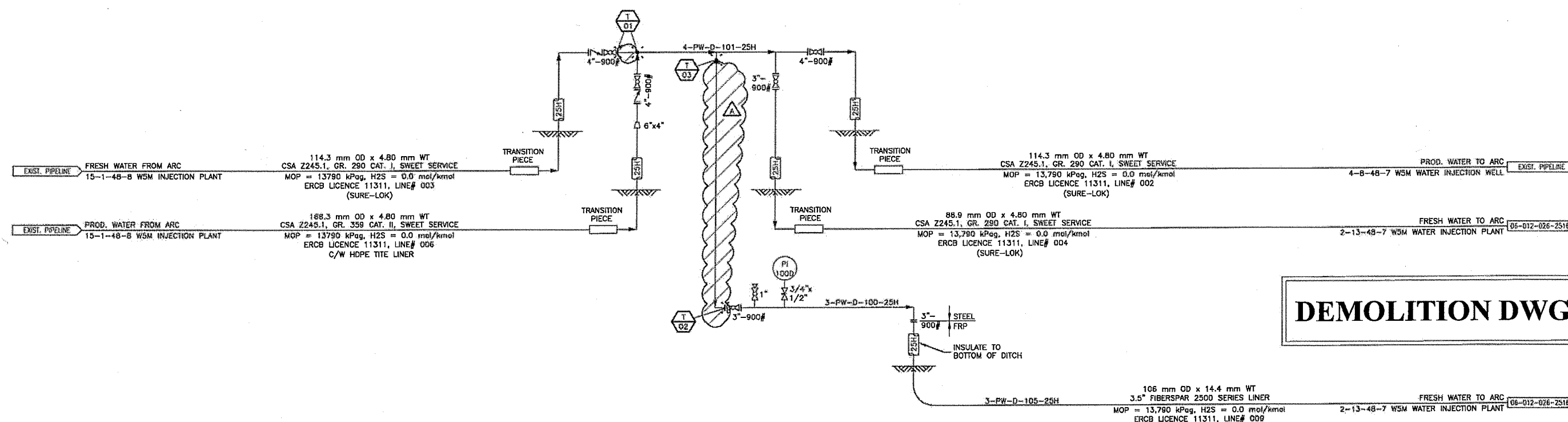
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2:\DRAWING\JOBS\ARC RESOURCES LTD\PEMBINA\MIPA 8\15-01-048-08 WSM\PROJECT\1544-2107_D_A.DWG



REFERENCE DRAWINGS	DWG. NO.	NOTES :	NO.	DATE	REVISION / DESCRIPTION	BY	CHKD.	APPD.	JOB No.	PERMIT STAMP	ENGINEER'S STAMP	 	
			A	15.02.12	ISSUED FOR DEMOLITION	KR	RC		2136				
												TITLE VIOLET GROVE AREA (BLOCK 8) LSD: 15-01-048-08 W5M WATER INJECTION PROCESS & INSTRUMENTATION DIAGRAM	
										IF SIGNED & DATED, PERMIT AND PROFESSIONAL STAMP AFFIXED ABOVE SHALL APPLY TO CURRENT REV. ONLY	SCALE NTS (A1 Size)	FILE NO. 1544-2107D	REV. A





DEMOLITION DWG

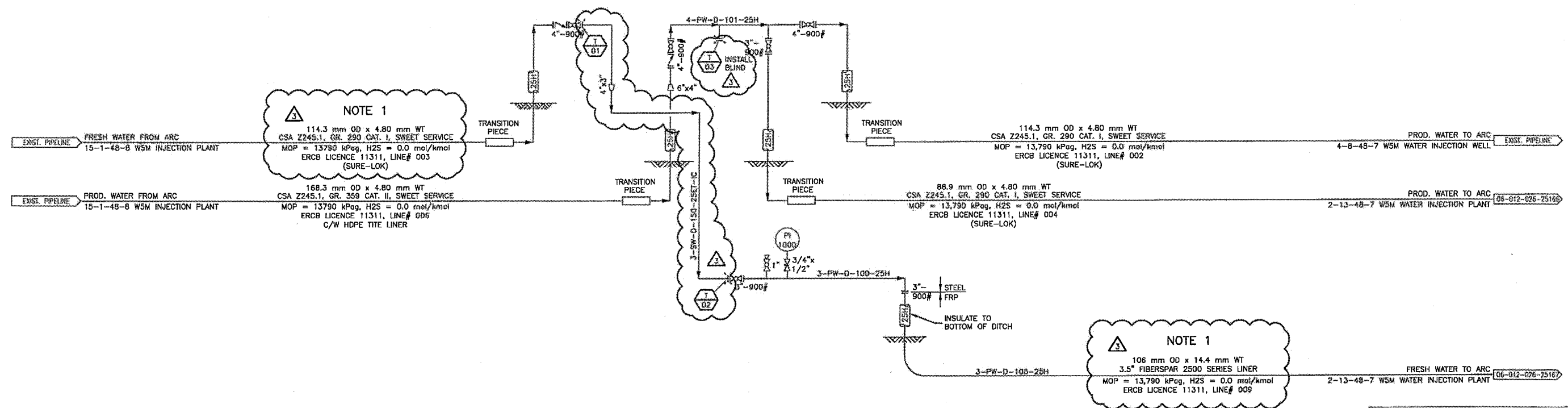


REV	DESCRIPTION	BY	DATE	CHKD	APPD	JOB No.
A	ISSUED FOR DEMOLITION	KR	2015/02/13		RC	2136

ENGINEERING STAMPS

ARC RESOURCES LTD.		XXL ENGINEERING LTD.	
CLIENT: K. ROBERTS		PREPARED BY: R. CUMBERLAND	
DATE: 2015/02/13		DATE: 2015/02/13	
DRAWING TITLE: PEMBINA 07-12-048-08 W5M PIPELINE RISER AREA PIPING AND INSTRUMENTATION DIAGRAM			
SCALE: NONE	DWG. NO.: 06-012-051-25165D	REV: A	

NOTE:
1. SUBSTANCE CHANGE TO FRESH WATER.



TNT
TNT IS ONLY RESPONSIBLE FOR LATEST REVISION AND CLOUDED AREAS ONLY.

REV	DESCRIPTION	BY	DATE	CHKD	APPD	JOB No.
01	ISSUED FOR APPROVAL - 7-12 PIPELINE INSTALLATION	MY	2009/01/30			2697
02	ISSUED FOR CONSTRUCTION - 7-12 PIPELINE INSTALLATION	SL	2009/06/12	BPH		2697
3	ISSUED FOR CONSTRUCTION - FRESH WATER MODIFICATIONS	KR	2015/02/25		RC	2136

ENGINEERING STAMPS

CLIENT: **ARC RESOURCES LTD.**

ENGINEERING RECORD:

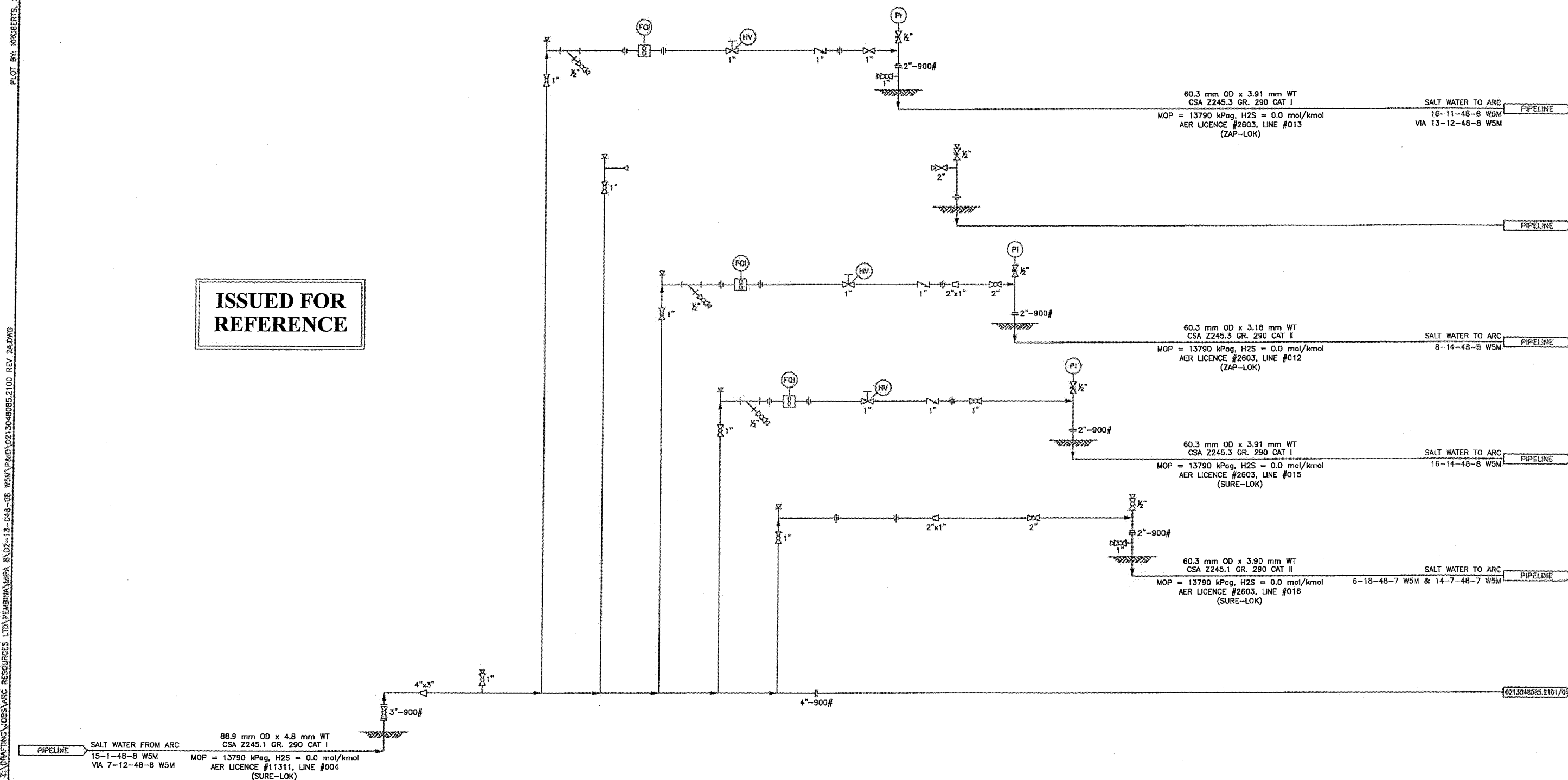
ENG. APPD/APPD/CHKD/DWN	M. YANG	DATE	2009/01/30
	B. HEXSPOOR	DATE	2009/06/12
		DATE	
	R. CUMBERLAND	DATE	2015/02/25

PREPARED BY: **XXL ENGINEERING LTD.**

PROJECT: **PEMBINA**
07-12-048-08 WSM
PIPELINE RISER AREA
PIPING AND INSTRUMENTATION DIAGRAM

SCALE: NONE
DWC. NO. 06-012-051-25165
REV. 3

PLOT BY: KPCBERTS, 2/25/2015 8:19 AM

[illegible]

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STAMP	

 ARC RESOURCES LTD.	
ENGINEERING RECORD	
DRAWN: E. USON	DATE: 03/03/2014
CHECKED: K. ROBERTS	DATE: 03/03/2014
ENGINEER:	DATE:
PROJECT MANAGER: R. CUMBERLAND	DATE: 03/03/2014

		SUITE 600, 639 - 5TH AVE SW CALGARY, AB, T2P 0M9 (403) 387-2500 PHONE (403) 387-2535 FAX	
PEMBINA - MIPA 8 2-13-48-8 W5M 2-13 INJECTION SOUTH HEADER NG AND INSTRUMENTATION DIAGRAM			
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DRAWING SHEET SIZE: 11" x 17"

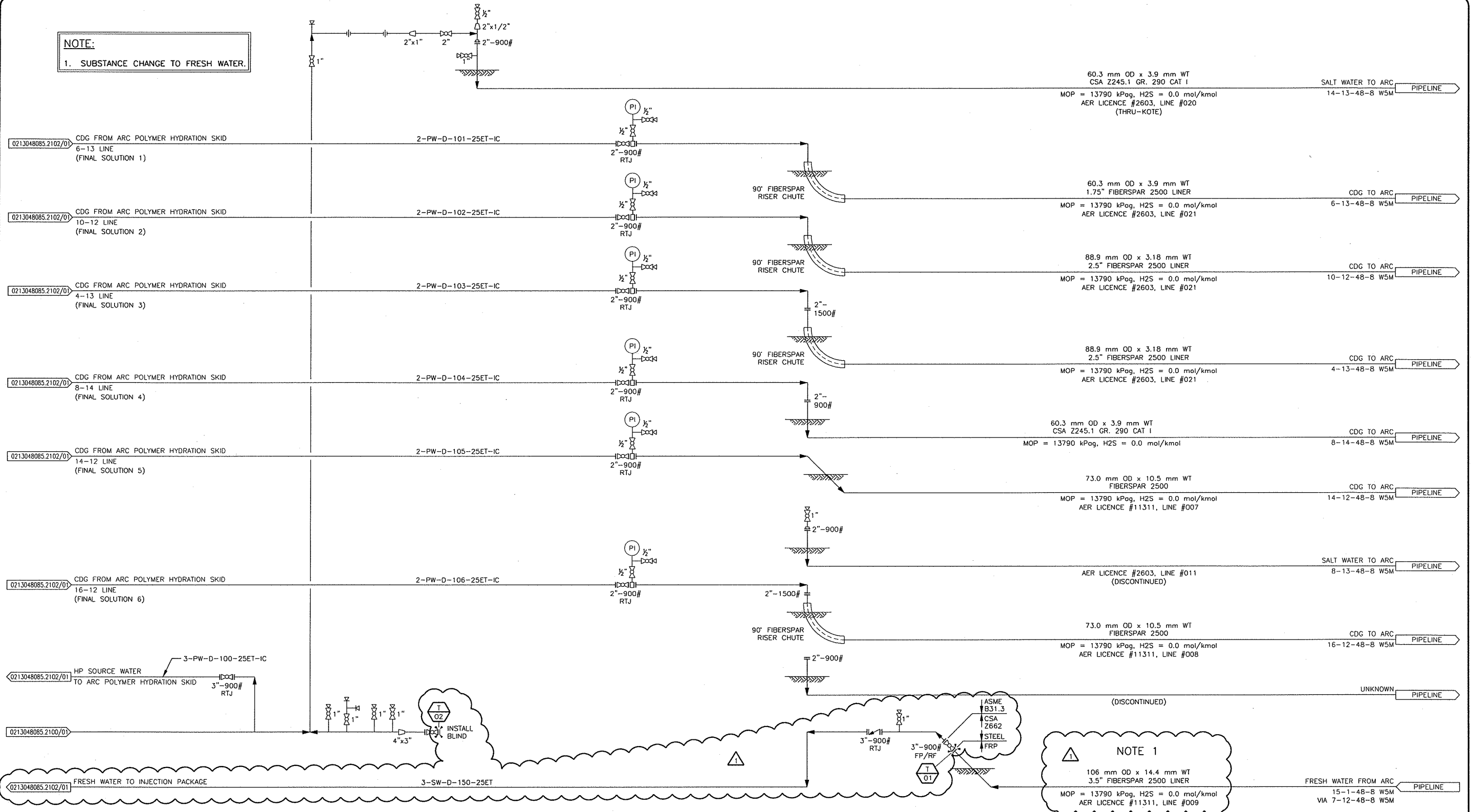
REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.	PERMIT	STAMP	ARC RESOURCES LTD.		TNT Engineering Ltd.		SUITE 600, 639 - 5TH AVE SW CALGARY, AB, T2P 0M9 (403) 387-2500 PHONE (403) 387-2535 FAX	
A	ISSUED FOR DEMOLITION	WM	02/18/2015	RC		2136								

PLOT BY: WMAK, 2/25/2015 3:29

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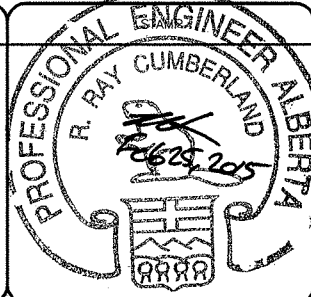
DRAWING SHEET SIZE: 11" x 17"

NOTE:
1. SUBSTANCE CHANGE TO FRESH WATER.



REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION - 2-13 POLYMER INJECTION SKID	BW	09/11/2014	KR		2136
1	ISSUED FOR CONSTRUCTION	WM	02/25/2015	KR	RC	2136

PERMIT



ENGINEERING RECORD	
DRAWN:	E. USON
CHECKED:	K. ROBERTS
ENGINEER:	M. AALBERS
PROJECT MANAGER:	R. CUMBERLAND
DATE:	03/03/2014

ARC RESOURCES LTD.

TNT Engineering Ltd.

PEMBINA - MIPA 8
2-13-48-8 W5M
2-13 INJECTION NORTH HEADER
PIPING AND INSTRUMENTATION DIAGRAM

SCALE	NTS
DWG	0213048085.2101/01
REV.	1

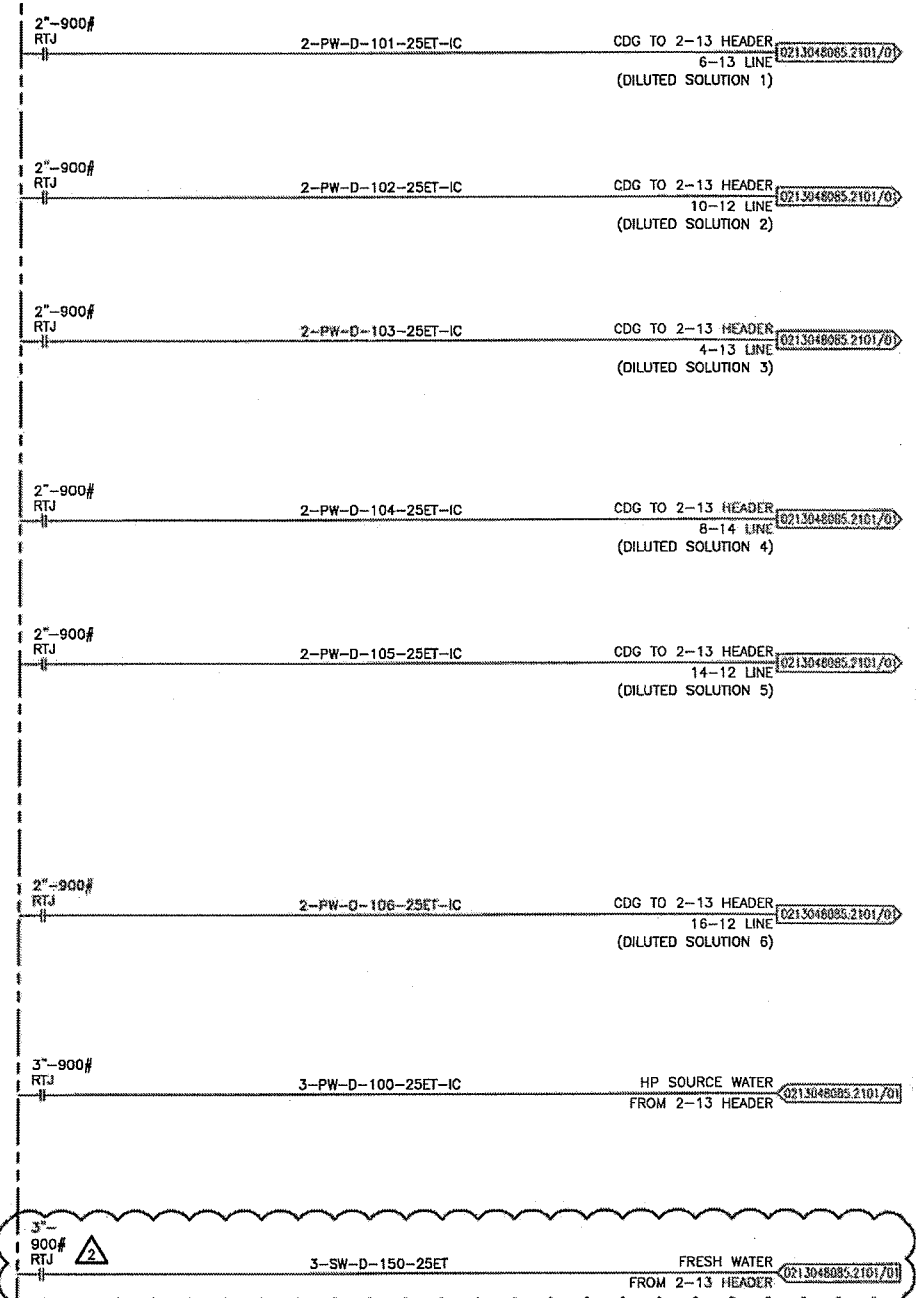
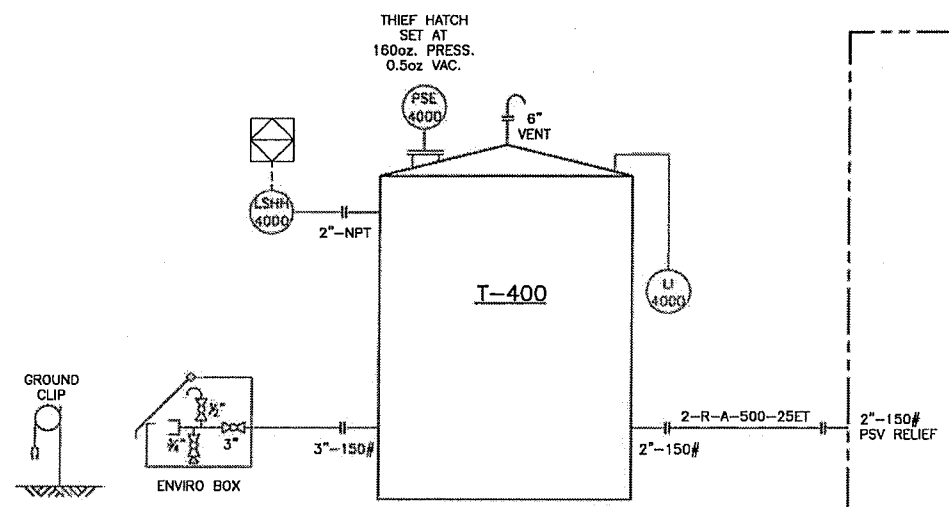
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PLOT BY: KROBERTS, 2/25/2015 8:22 AM

DRAWING SHEET SIZE: 11" x 17"

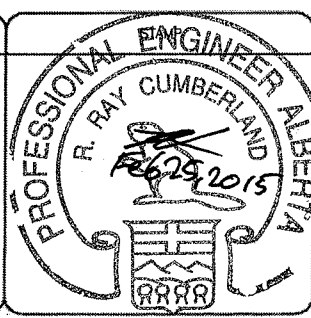
T-400
POP TANK
VENDOR: R. POLLITT
SIZE: 100 BBL

Z-900
POLYMER INJECTION PACKAGE
VENDOR: FABTECH - BLACK BOX
TYPE: CDG - CHROMIUM CROSS-LINKER
DATE: 2014



REV	DESCRIPTION	BY	MM/DD/YYYY	CHKD	APPD	JOB No.
0	ISSUED FOR CONSTRUCTION - 2-13 POLYMER INJECTION SKID	BW	09/11/2014	KR	MA	2136
1	RE-ISSUED FOR CONSTRUCTION - ADDED T-400	BW	11/20/2014	KR	MA	2136
2	ISSUED FOR CONSTRUCTION	WM	02/25/2015	KR	RC	2136

PERMIT



ARC RESOURCES LTD.			
ENGINEERING RECORD			
DRAWN:	G. WONG	DATE:	08/28/2014
CHECKED:	K. ROBERTS	DATE:	08/28/2014
ENGINEER:	M. AALBERS	DATE:	08/28/2014
PROJECT MANAGER:	R. CUMBERLAND	DATE:	08/28/2014

TNT Engineering Ltd.			
SUITE 600, 639 - 5TH AVE SW CALGARY, AB, T2P 0M9 (403) 387-2500 PHONE (403) 387-2535 FAX			
PEMBINA - MIPA 8 2-13-48-8 W5M 2-13 CDG POLYMER SKID PIPING AND INSTRUMENTATION DIAGRAM			
SCALE	NTS	DWG	0213048085.2102/01
REV.	2		