

NOTES

ENGINEERING COMPANY PERMIT STAMP

REGISTERED PROFESSIONAL ENGINEER STAMP



REF	DRAWING NUMBER	DRAWING TITLE					
REFERENCE DRAWINGS							
1D	11-07-19	ISSUED FOR CONSTRUCTION					
1C	11-05-05	ISSUED FOR APPROVAL/HAZOP	AS	TDR	RD	RD	RD
1B	11-04-07	ISSUED FOR APPROVAL	TAR	TDR	RD	RD	RD
1A	11-03-30	ISSUED FOR REVIEW	TAR	TDR	RD	RD	RD
REV	DATE	DESCRIPTION	BY	CHK	ENG	APR	

REVISION HISTORY

Husky Oil Operations Limited

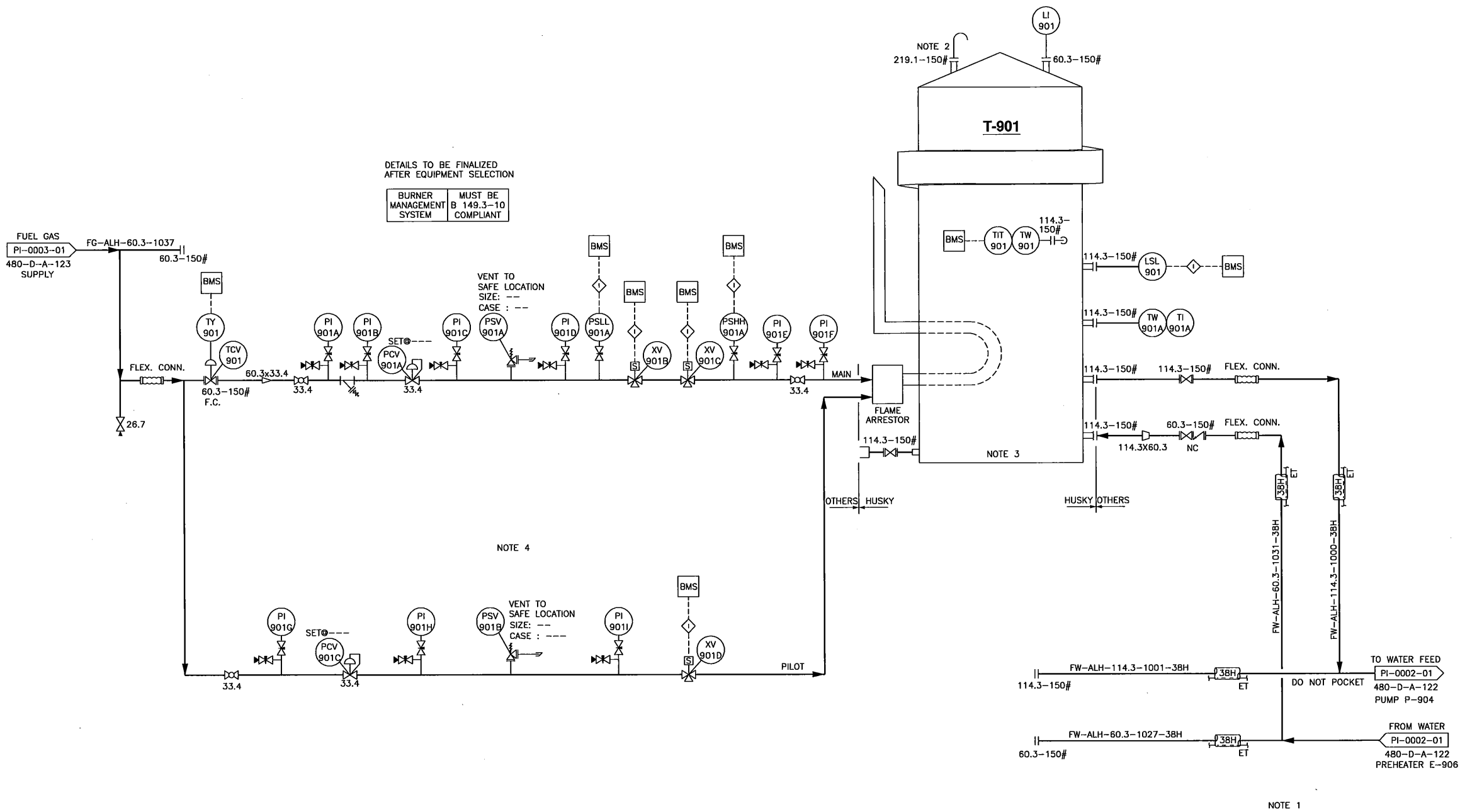
DARSI ENGINEERING **Triumph EPCM**

111/10-04-050-24W3/00 SWB

TITLE HOT WATER VAPOUR PROCESS (HWVP) - PILOT PROJECT
WATER INJECTION & HEATER
PROCESS FLOW DIAGRAM

SURFACE LOCATION	10-04-050-24W3	REV NO
ALTERNATE DWG NUMBER	480-D-A-101	1D
HUSKY DWG NUMBER	10-04-050-24W3-PF-0001-01	SCALE
VENDOR DWG NUMBER	N/A	NTS
AMU/FLOC NUMBER	-	
DCN NO	PROJECT NO	14898

T-901
SOFT WATER SUPPLY TANK
CAPACITY: 750BBL 119m³
DIMENSIONS: 4648mm Dia. x 7315mm H
DESIGN TEMPERATURE: TBD
DESIGN PRESSURE: ATM



NOTES

1. DRAINS AND VENTS TO BE FIELD LOCATED AT HIGH AND LOW POINTS.
2. VENT TO BE TRACED & INSULATED.
3. HUSKY TO PROVIDE & INSTALL TANK.
4. HUSKY TO PROVIDE & INSTALL FUEL GAS TRAIN & BMS.

Association of Professional Engineers & Geoscientists of Saskatchewan

CERTIFICATE OF AUTHORIZATION

Triumph EPCM Ltd.
Number C20153

Permission to Consult held by:

Discipline *Mech* Sk. Reg. No. *16041* Signature *[Signature]*

ENGINEERING COMPANY PERMIT STAMP

REGISTERED PROFESSIONAL ENGINEER STAMP

PROFESSIONAL ENGINEER
AD HEAVEN
MEMBER 16843
K022
VPL, LNC, DIV
SASKATCHEWAN

REF	DRAWING NUMBER	DRAWING TITLE
1F	11-08-18	RE-ISSUED FOR CONSTRUCTION
1E	11-07-15	ISSUED FOR CONSTRUCTION
1D	11-07-06	ISSUED FOR DESIGN
1C	11-06-21	ISSUED FOR FINAL APPROVAL
1B	11-05-04	ISSUED FOR REVIEW/HAZOP
1A	11-03-30	ISSUED FOR REVIEW (INTERNAL)

REVISION HISTORY

Husky Oil Operations Limited

DARSI ENGINEERING **Triumph EPCM**

111/10-04-050-24W3/00 SWB

TITLE

HOT WATER VAPOUR PROCESS (HWVP) - PILOT PROJECT
SOFT WATER SUPPLY TANK T-901
PIPING AND INSTRUMENTATION DIAGRAM

SURFACE LOCATION 10-04-050-24W3

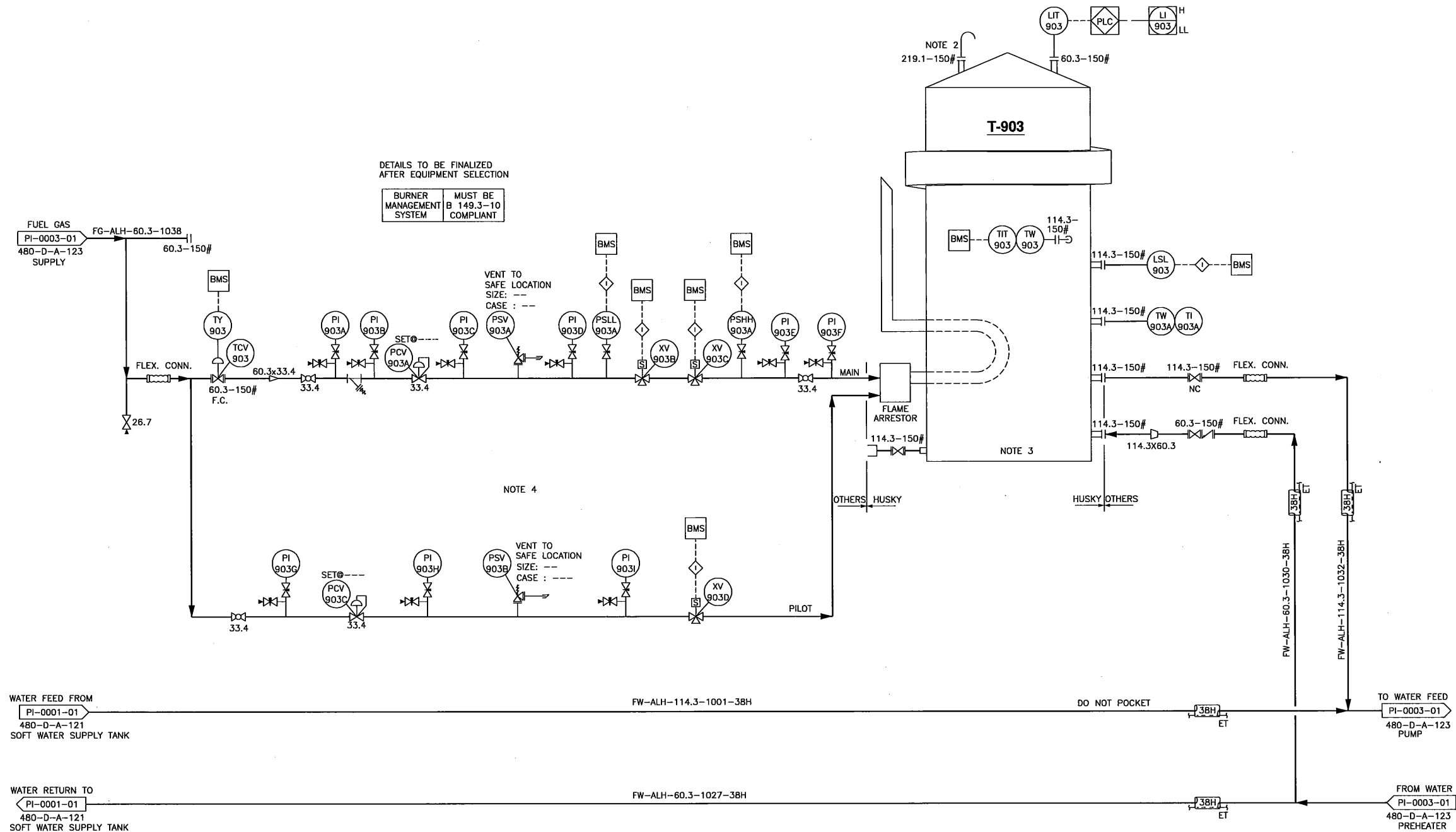
ALTERNATE DWG NUMBER	480-D-A-121	REV NO
HUSKY DWG NUMBER	10-04-050-24W3-PI-0001-01	1F
VENDOR DWG NUMBER	N/A	SCALE
AMU/FLOC NUMBER	-	NTS
DCN NO	PROJECT NO	14898

**T-903
SOFT WATER RETURN TANK**

CAPACITY: 750BBL 119m³
DIMENSIONS: 4648mm Dia. x 7315mm H
DESIGN TEMPERATURE: TBD
DESIGN PRESSURE: ATM

DETAILS TO BE FINALIZED
AFTER EQUIPMENT SELECTION

BURNER
MANAGEMENT
SYSTEM
MUST BE
B 149.3-10
COMPLIANT



NOTES

1. DRAINS AND VENTS TO BE FIELD LOCATED AT HIGH AND LOW POINTS.
2. VENT TO BE TRACED & INSULATED.
3. HUSKY TO PROVIDE & INSTALL TANK.
4. HUSKY TO PROVIDE & INSTALL FUEL GAS TRAIN & BMS.

**Association of Professional Engineers & Geoscientists
of Saskatchewan**

CERTIFICATE OF AUTHORIZATION

Triumph EPCM Ltd.

Number C20153

Permission to Consult held by:

Discipline Mech Sk. Reg. No. 16341 Signature [Signature]

ENGINEERING COMPANY PERMIT STAMP

REGISTERED PROFESSIONAL ENGINEER STAMP



REF DRAWING NUMBER DRAWING TITLE

REFERENCE DRAWINGS				IF W/ CRB			
1F	11-08-18	RE-ISSUED FOR CONSTRUCTION	DIF	LW	RD	RD	RD
1E	11-07-15	ISSUED FOR CONSTRUCTION	LZ	JZ	RD	RD	RD
1D	11-07-06	ISSUED FOR DESIGN	LZ	JZ	RD	RD	RD
1C	11-06-21	ISSUED FOR FINAL APPROVAL	LZ	JZ	RD	RD	RD
1B	11-05-04	ISSUED FOR REVIEW/HAZOP	AS	TDR	RD	RD	RD
1A	11-03-30	ISSUED FOR REVIEW (INTERNAL)	AS	TDR	RD	RD	RD
REV	DATE	DESCRIPTION	BY	CHK	ENG	APR	

REVISION HISTORY

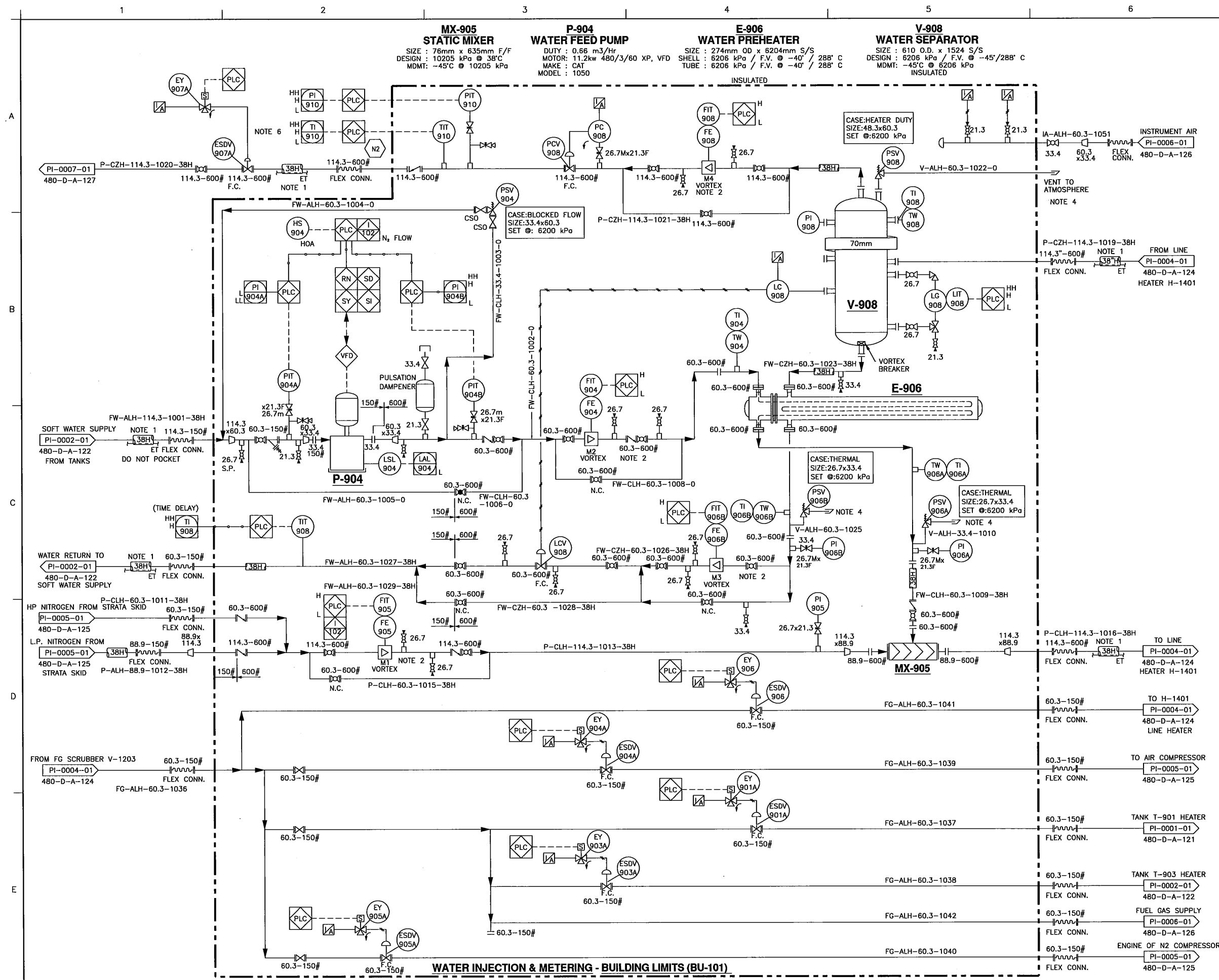
Husky Oil Operations Limited

DARSI ENGINEERING **Triumph EPCM**

111/10-04-050-24W3/00 SWB

TITLE
HOT WATER VAPOUR PROCESS (HWVP) - PILOT PROJECT
SOFT WATER RETURN TANK T-903
PIPING AND INSTRUMENTATION DIAGRAM

SURFACE LOCATION	10-04-050-24W3	REV NO	
ALTERNATE DWG NUMBER	480-D-A-122	1 F	
HUSKY DWG NUMBER	10-04-050-24W3-PI-0002-01	SCALE	
VENDOR DWG NUMBER	N/A	NTS	
AMU/FLOC NUMBER	-		
DCN NO	PROJECT NO	14898	



NOTES

- HEAT TRACE OUTSIDE ONLY
- VORTEX METER REQUIRES 10 DIA. UPSTREAM 5 DIA. DOWNSTREAM.
- DRAINS AND VENTS TO BE FIELD LOCATED AT HIGH AND LOW POINTS.
- PSV'S TO VENT/DRAIN TO SAFE LOCATION
- NITROGEN TO FLOW FOR 10 MINUTES PRIOR TO P-904 STARTING
- ESDV-907A TO BE PROVIDED WITH MANUAL LATCHES
- FLEX HOSE CONNECTIONS TO BE INSULATED WITH THERMAL BLANKETS

Association of Professional Engineers & Geoscientists
 of Saskatchewan

CERTIFICATE OF AUTHORIZATION
Triumph EPCM Ltd.
 Number C20153

Permission to Consult held by:

Discipline Mech Sk. Reg. No. 16843 Signature [Signature]

ENGINEERING COMPANY PERMIT STAMP

REGISTERED PROFESSIONAL ENGINEER STAMP

PROFESSIONAL ENGINEER
D.T. HEAVEN
MEMBER 16843
1/08/22
SASKATCHEWAN

REF	DRAWING NUMBER	DRAWING TITLE				
1F	11-08-18	RE-ISSUED FOR CONSTRUCTION				
1E	11-07-18	ISSUED FOR CONSTRUCTION				
1D	11-07-06	ISSUED FOR DESIGN				
1C	11-06-21	ISSUED FOR FINAL APPROVAL				
1B	11-05-04	ISSUED FOR REVIEW/HAZOP				
1A	11-03-30	ISSUED FOR REVIEW (INTERNAL)				
REV	DATE	DESCRIPTION	BY	CHK	ENG	APR

REVISION HISTORY

Husky Oil Operations Limited

DARSI ENGINEERING **Triumph EPCM**

111/10-04-050-24W3/00 SWB

TITLE
 HOT WATER VAPOUR PROCESS (HWVP) - PILOT PROJECT
 WATER INJECTION AND METERING PACKAGE
 PIPING AND INSTRUMENTATION DIAGRAM

SURFACE LOCATION 10-04-050-24W3

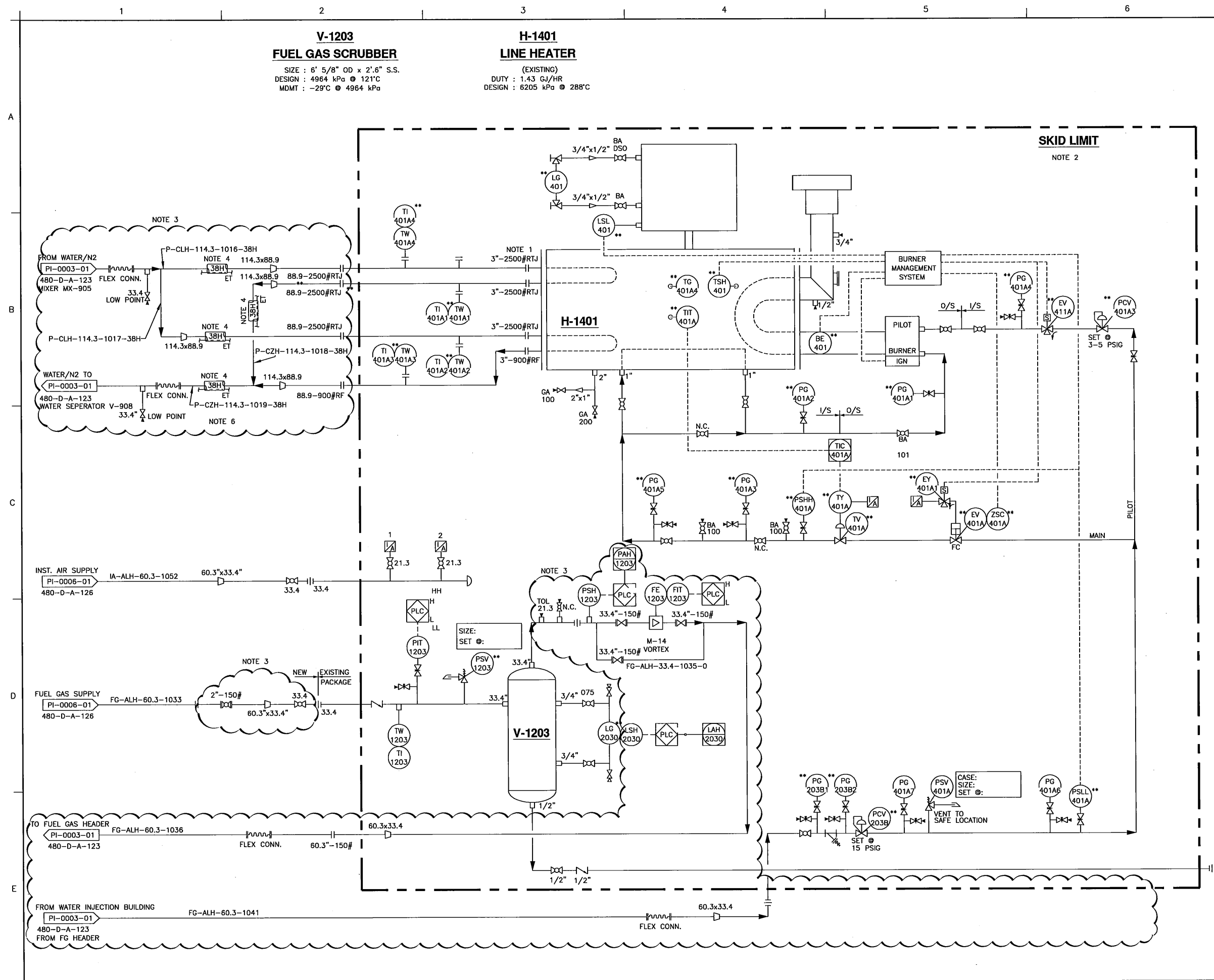
ALTERNATE DWG NUMBER 480-D-A-123

HUSKY DWG NUMBER 10-04-050-24W3-PI-0003-01

VENDOR DWG NUMBER N/A

AMU/FLOC NUMBER -

DCN NO PROJECT NO 14898



NOTES

1. MATING FLANGES TO MATCH HEATER FLANGES

2. NEW (SURPLUS) HUSKY LINE HEATER PACKAGE

3. TO BE FINALIZED AFTER LOCATION DETERMINED

4. ELECTRIC TRACE OUTSIDE

5. VORTEX METER REQUIRES 10 DIA. UPSTREAM, 5 DIA. DOWNSTREAM

** – INCLUDED IN HEATER PACKAGE.

6. DRAINS AND VENTS TO BE FIELD LOCATED AT HIGH AND LOW POINTS.

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of Saskatchewan

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Triumph EPCM Ltd.

Number C20153

Permission to Consult held by:

Discipline

Sk. Reg. No.

Signature

MECH

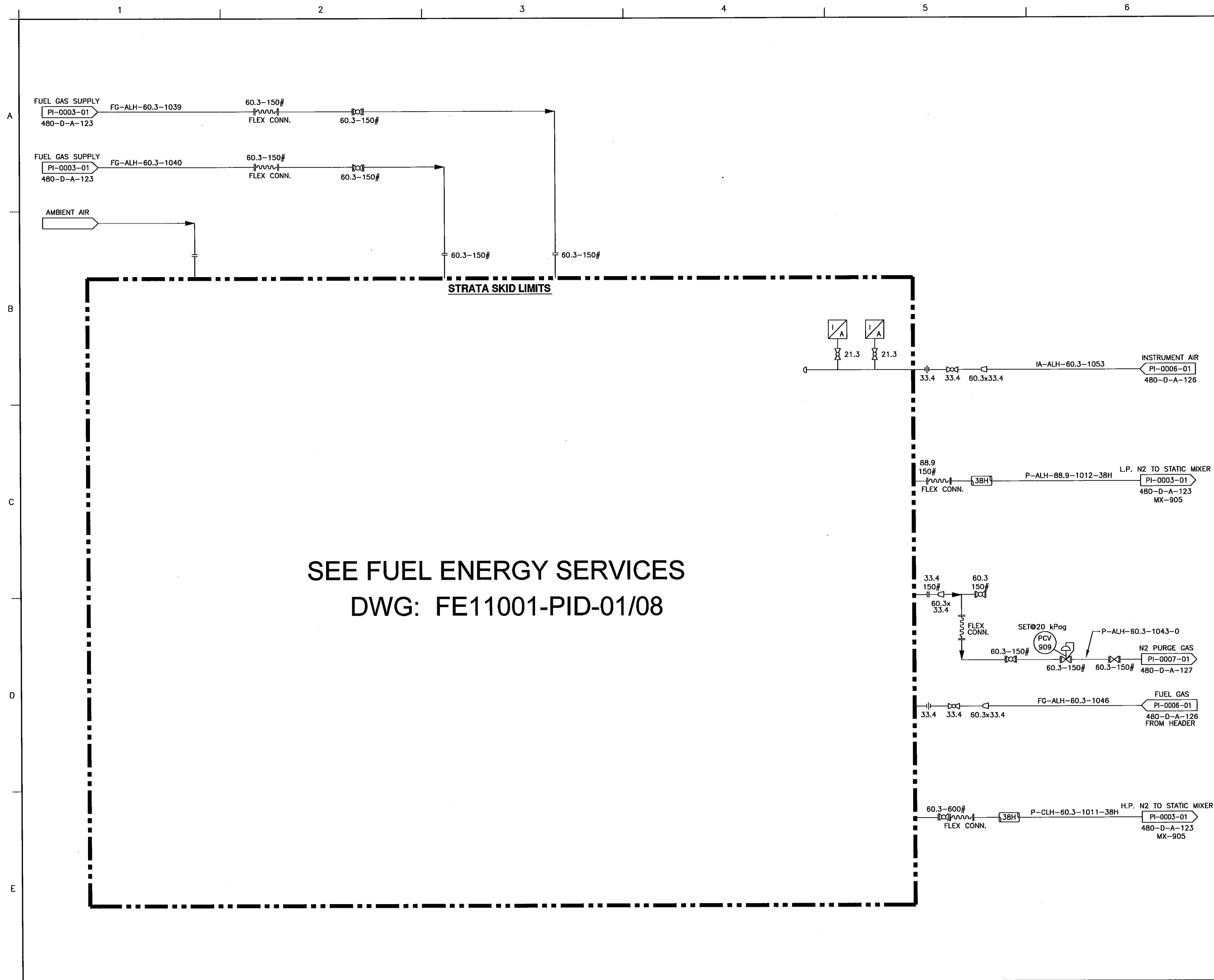
16843

[Signature]

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REGISTERED PROFESSIONAL ENGINEER STAMP

REF	DRAWING NUMBER	DRAWING TITLE
REFERENCE DRAWINGS		
1F	11-08-18	RE-ISSUED FOR CONSTRUCTION
1E	11-07-18	ISSUED FOR CONSTRUCTION
1D	11-07-06	ISSUED FOR DESIGN
1C	11-06-21	ISSUED FOR FINAL APPROVAL
1B	11-05-04	ISSUED FOR REVIEW/HAZOP
1A	11-03-30	ISSUED FOR REVIEW (INTERNAL)
REV	DATE	DESCRIPTION



NOTES

1. SEE VENDOR DRAWING FOR DETAILS OF THE N2 PACKAGE
2. DRAINS AND VENTS TO BE FIELD LOCATED AT HIGH AND LOW POINTS.

Association of Professional Engineers & Geoscientists
of Saskatchewan

CERTIFICATE OF AUTHORIZATION

Triumph EPCM Ltd.

Number C20153

Permission to Consult held by:

Discipline *Mech* Sk. Reg. No. *16341* Signature *[Signature]*

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REF DRAWING NUMBER DRAWING TITLE

REFERENCE DRAWINGS				DIF			
1F	11-08-18	RE-ISSUED FOR CONSTRUCTION		DIF	LW	RD	RD
1E	11-07-15	ISSUED FOR CONSTRUCTION		TW	JZ	RD	RD
1D	11-07-06	ISSUED FOR DESIGN		LZ	JZ	RD	RD
1C	11-06-21	ISSUED FOR FINAL APPROVAL		LZ	JZ	RD	RD
1B	11-05-04	ISSUED FOR REVIEW/HAZOP		AS	TDR	RD	RD
1A	11-03-30	ISSUED FOR REVIEW (INTERNAL)		TAR	TDR	RD	RD
REV	DATE	DESCRIPTION		BY	CHK	ENG	APR

REVISION HISTORY

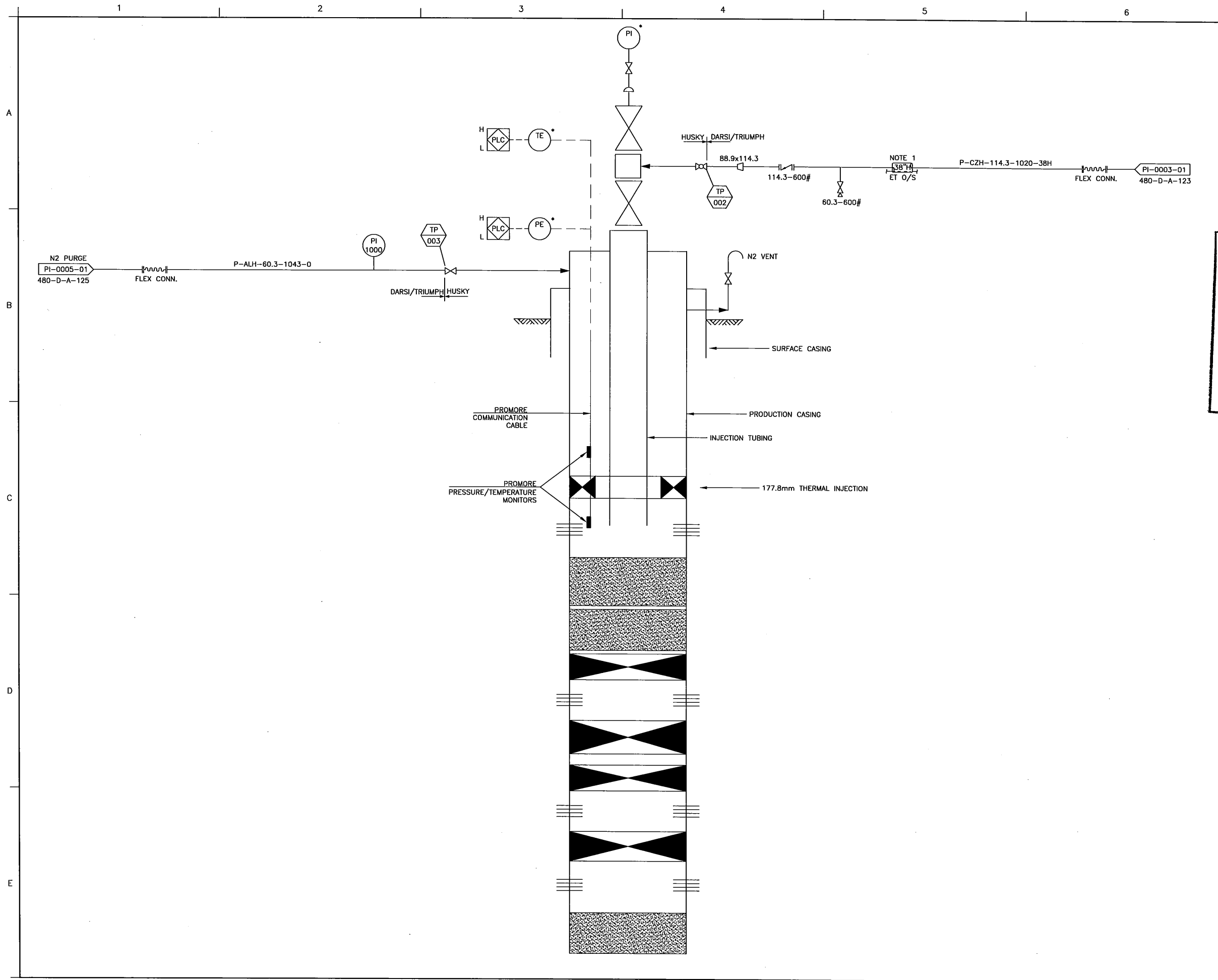
Husky Oil Operations Limited

DARSI ENGINEERING Triumph EPCM

111/10-04-050-24W3/00 SWB

TITLE
HOT WATER VAPOUR PROCESS (HWVP) - PILOT PROJECT
NITROGEN UNIT
PIPING AND INSTRUMENTATION DIAGRAM

SURFACE LOCATION	10-04-050-24W3	REV NO	
ALTERNATE DWG NUMBER	480-D-A-125		
HUSKY DWG NUMBER	10-04-050-24W3-PI-0005-01	1F	
VENDOR DWG NUMBER	N/A	SCALE	
AMU/FLOC NUMBER	-	NTS	
DCN NO	PROJECT NO	14898	



- NOTES
1. HEAT TRACE OUTSIDE ONLY.
 2. DRAINS AND VENTS TO BE FIELD LOCATED AT HIGH AND LOW POINTS.
- * SUPPLIED BY HUSKY

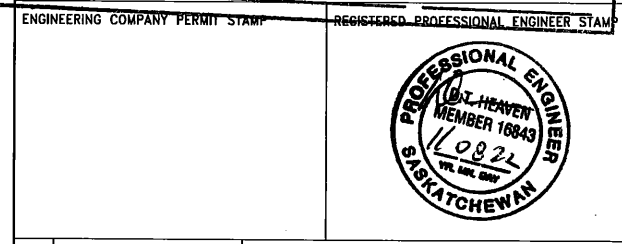
Association of Professional Engineers & Geoscientists
of Saskatchewan

CERTIFICATE OF AUTHORIZATION

Triumph EPCM Ltd.
Number C20153

Permission to Consult held by:

Discipline *ME* Sk. Reg. No. *16843* Signature *[Signature]*



REF	DRAWING NUMBER		DRAWING TITLE					
			REFERENCE DRAWINGS			11E 11F 11G 11H 11I 11J 11K 11L 11M 11N 11O 11P 11Q 11R 11S 11T 11U 11V 11W 11X 11Y 11Z		
1F	11-08-18	RE-ISSUED FOR CONSTRUCTION	11F	LW	RD	RD	RD	RD
1E	11-07-15	ISSUED FOR CONSTRUCTION	11E	JZ	RD	RD	RD	RD
1D	11-07-06	ISSUED FOR DESIGN	11D	LZ	JZ	RD	RD	RD
1C	11-06-21	ISSUED FOR FINAL APPROVAL	11C	TW	JZ	RD	RD	RD
1B	11-05-04	ISSUED FOR REVIEW/HAZOP	11B	AS	TDR	RD	RD	RD
1A	11-03-30	ISSUED FOR REVIEW (INTERNAL)	11A	TAR	TDR	RD	RD	RD
REV	DATE	DESCRIPTION	BY	CHK	ENG	APR		

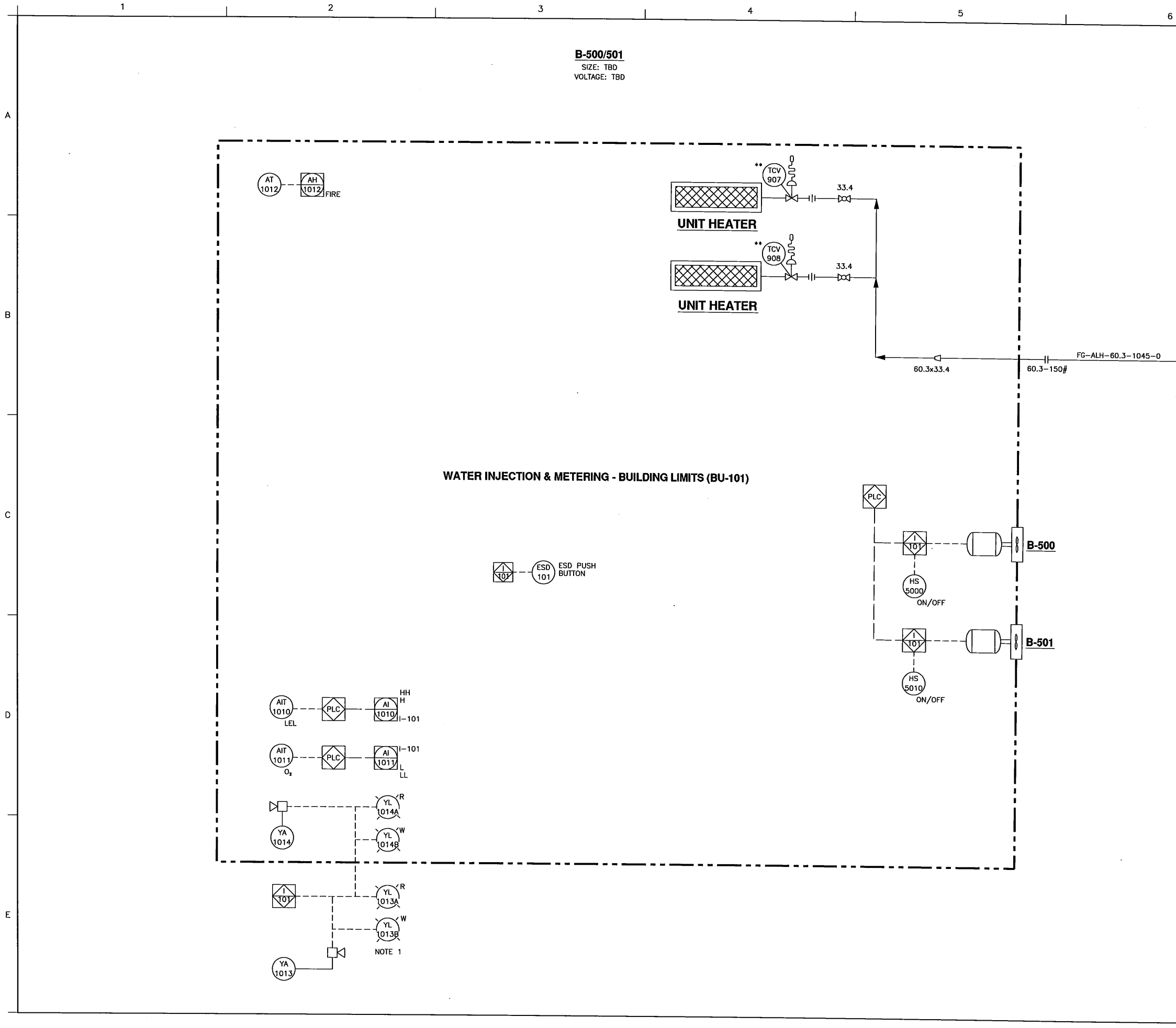
Husky Oil Operations Limited

DARSI ENGINEERING Triumph EPCM

111/10-04-050-24W3/00 SWB

TITLE
HOT WATER VAPOUR PROCESS (HWVP) - PILOT PROJECT
WELLBORE
PIPING AND INSTRUMENTATION DIAGRAM

SURFACE LOCATION		10-04-050-24W3	
ALTERNATE DWG NUMBER		480-D-A-127	REV NO
HUSKY DWG NUMBER		10-04-050-24W3-PI-0007-01	
VENDOR DWG NUMBER		N/A	SCALE
AMU/FLOC NUMBER		-	NTS
DCN NO		PROJECT NO	14898



NOTES

1. BEACONS & ALARMS TO BE LOCATED OUTSIDE DOOR OF BU-101.
 2. ESD PUSH BUTTON TO BE MOUNTED ON THE OUTSIDE WALL OF THE BUILDING ON THE SAME SIDE AS THE DOOR KNOB.
 3. DRAINS AND VENTS TO BE FIELD LOCATED AT HIGH AND LOW POINTS.
- ** INCLUDED WITH UNIT HEATER.

Association of Professional Engineers & Geoscientists
of Saskatchewan

CERTIFICATE OF AUTHORIZATION

Triumph EPCM Ltd.

Number C20153

Permission to Consult held by:

Discipline

Sk. Reg. No.

Signature

Mel

16243

[Signature]

ENGINEERING COMPANY PERMIT STAMP

REGISTERED PROFESSIONAL ENGINEER STAMP



REF	DRAWING NUMBER		DRAWING TITLE			
REFERENCE DRAWINGS			DIF			
1F	11-08-18	RE-ISSUED FOR CONSTRUCTION	DIF	LW	RD	RD
1E	11-07-18	ISSUED FOR CONSTRUCTION	LZ	JZ	BS	RD
1D	11-07-06	ISSUED FOR DESIGN	LZ	JZ	RD	RD
1C	11-06-21	ISSUED FOR FINAL APPROVAL	SA	JZ	RD	RD
1B	11-05-04	ISSUED FOR REVIEW/HAZOP	AS	TDR	RD	RD
1A	11-03-30	ISSUED FOR REVIEW (INTERNAL)	TA	TDR	RD	RD
REV	DATE	DESCRIPTION	BY	CHK	ENG	AP

REVISION HISTORY

Husky Oil Operations Limited

DARSI ENGINEERING **Triumph** EPCM

111/10-04-050-24W3/00 SWB

TITLE HOT WATER VAPOUR PROCESS (HWVP) - PILOT PROJECT
FIRE, GAS AND ALARM SYSTEM
PIPING AND INSTRUMENTATION DIAGRAM

SURFACE LOCATION	10-04-050-24W3	REV NO	
ALTERNATE DWG NUMBER	480-D-A-128	1F	
HUSKY DWG NUMBER	10-04-050-24W3-PI-0008-01	SCALE	
VENDOR DWG NUMBER	N/A	NTS	
AMU/FLOC NUMBER	-		
DCN NO	PROJECT NO	14898	