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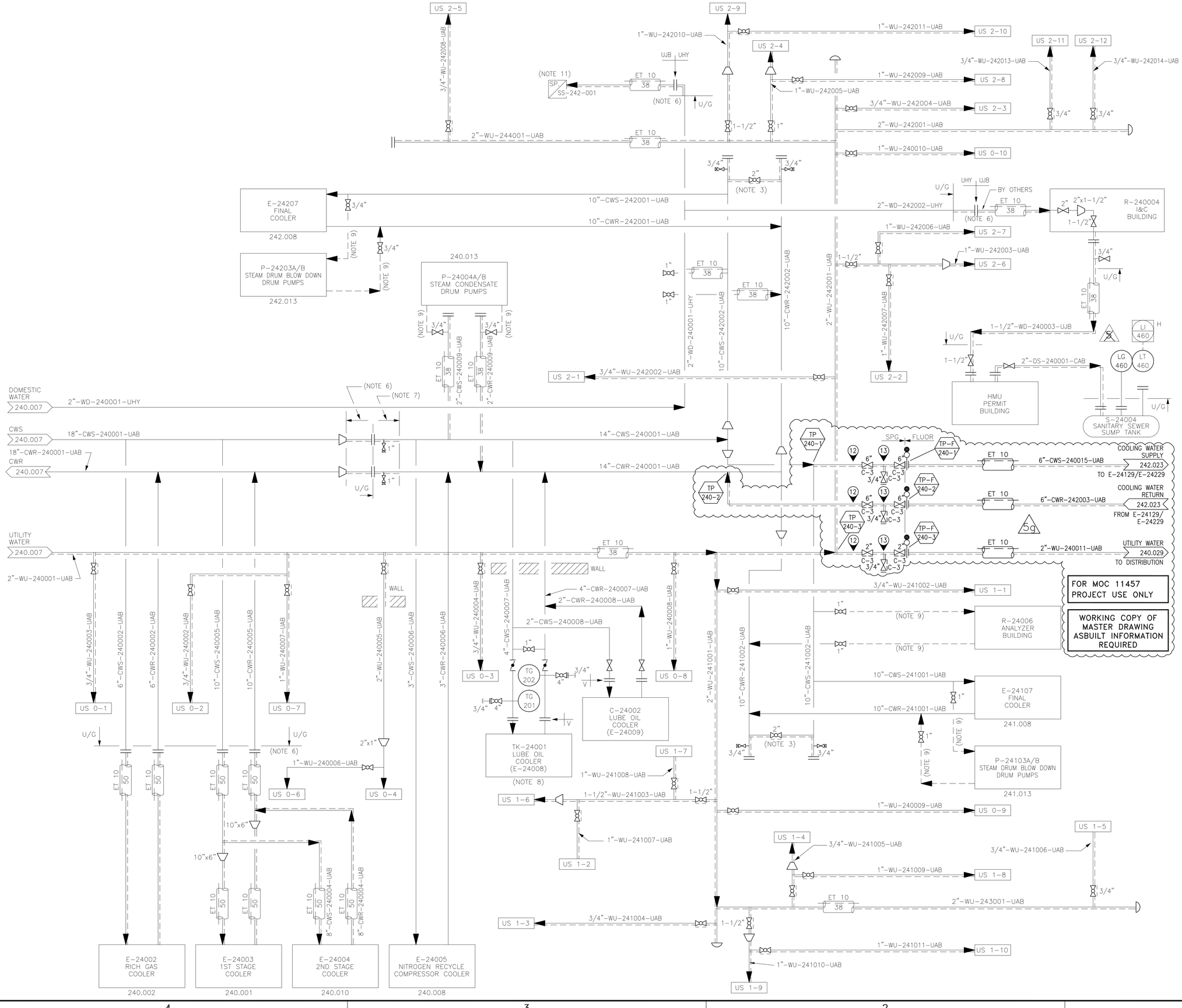

NOTES

1. ALL DOMESTIC WATER LATERALS TO SAFETY SHOWERS TO BE ELECTRICALLY TRACED TO MAINTAIN 10°C, WITH 38 mm INSULATION.
2. SEE ESTG 3-1.01, FIGURE A-10 FOR HIGH PRESSURE STEAM BLOW OFF DETAILS.
3. ELECTRIC TRACE END OF COOLING WATER HEADERS FOR FREEZE PROTECTION. ET 10 / 38
4. SEE ESTG 3-1.01, PARAGRAPH 4.8.1 AND FIGURES A-18 THRU A-21 FOR UTILITY STATION DETAILS.
5. 3/4" UTILITY STATION LINES INCLUDE TUBING RUNS, TUBING INTERFACES AT PIPERACK AND UTILITY STATION SHOWN ON PIPING ISOMETRICS.
6. TRACE AND INSULATE TO 150 mm BELOW FROST LINE. ET 10 / 63
7. TRACE AND INSULATE TO 150 mm ABOVE DRAIN CONNECTION. ET 10 / 63
8. SEE FLUID SYSTEMS P&ID F1389-1 FOR DETAILS.
9. COOLING WATER FOR SAMPLE AND PUMP SEAL COOLER SYSTEM. TUBING OR PIPE FROM BLOCK VALVES BY FIELD.

KEY PLAN

NOTES: (CONT'D)

10. UTILITY WATER LINES TRACED. SYMBOL NOT SHOWN ON EACH LINE. ET 10 / 38
11. REFER TO VENDOR P&ID FOR FURTHER DETAILS. (ENCON SAFETY PRODUCTS, DWG. #D1792)
12. SPG TO PROVIDE INSULATION AND EHT FOR THEIR TIE-IN SCOPE.
13. BLOCK AND BLIND VENT TO BE CONSIDERED BY SPG.
14. TIE-IN POINTS- SPG TIE-IN SHOWN AS TP-240-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-240-#.

MOC 11457

REFERENCE DRAWINGS

REV	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP
5g	07/11/11	ISSUED FOR PHA III						
5f	04/20/11	ISSUED FOR ESTIMATE						
5e	03/01/11	ISSUED FOR PHA II						
5d	01/10/11	ISSUED FOR CLIENT REVIEW						
5c	12/02/10	ISSUED FOR INTERNAL REVIEW						
5b	11/04/10	ISSUED FOR PRELIMINARY REVIEW						
5	MAY 3, 10	SEE CHANGE LIST 240.0000.000.041.003	DRS	RM				
4	04 JUN 14	SEE CHANGE LIST 240.0000.000.041.003	JKL	HWF				
2	02 SEP 18	AS-BUILT	LWM	EG	AAI	MWP		HRM
1	01 MAY 17	IFC: REVISED AS NOTED	WZF	EG	RAM	CMWP		HRM
0	09 SEP 29	IFC: ISSUED FOR CONSTRUCTION	LWM	SW	SW	DLA		HRM

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SHELL CANADA LTD.
ATHABASCA OIL SANDS
DOWNSTREAM PROJECT

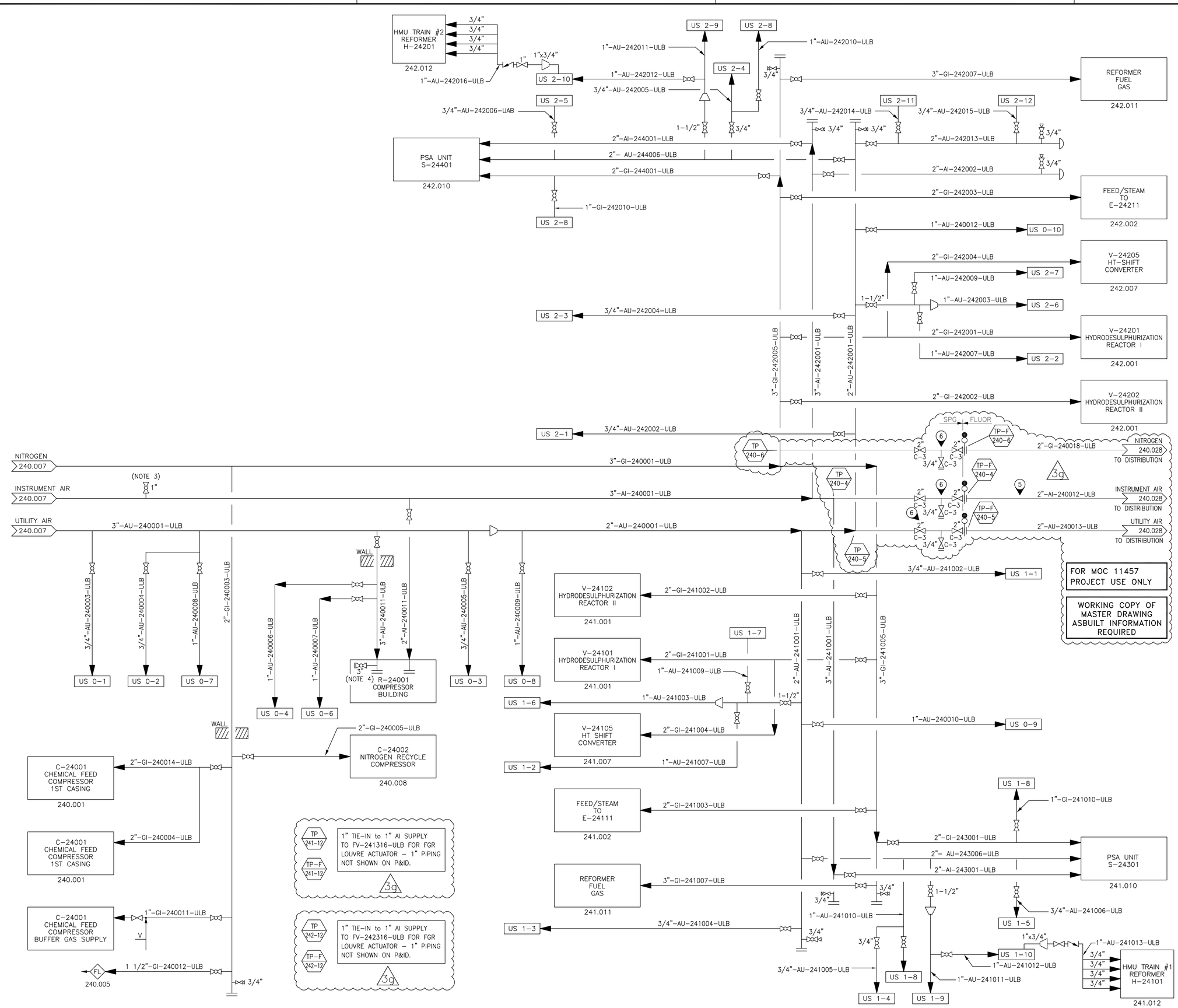
PARSONS . KRUPP UHDE . TRI OCEAN

PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN MANUFACTURING UNIT COOLING WATER, DOMESTIC WATER AND UTILITY WATER QUEST TIE-INS

SCALE: NTS	TOE DWG. No.: 99049-0-DG-BC-00003.1	
SHELL DWG NO.: 240.0000.000.041.003		REV. 5g

FORMAT A1

0031-b93



NOTES

1. USE 2-INCH NITROGEN LINE TO EACH PSA UNIT FOR PURGING.
2. 3/4" UTILITY STATION LINES INCLUDE TUBING RUNS. TUBING INTERFACES AT PIPERACK AND UTILITY STATION SHOWN ON PIPING ISOMETRICS.
3. TYPICAL EVERY 6 m IN THE PIPERACKS.
4. VALVE FOR AIR SUPPLY TO COMPRESSOR BUILDING CRANE. MOC 11457
5. INSTRUMENT AIR HEADER PRESSURE IS REGULATED BY 240PC333. HEADER PRESSURE IS PRODUCED BY 100 kPa.
6. BLOCK AND BLIND VENT TO BE CONSIDERED BY SPG.
7. 1" TIE-IN TO 1" AI SUPPLY UPSTREAM OF FV-242316-ULB FOR HMU 2 FGR LOUVRE ACTUATOR AND 1" TIE-IN TO 1" AI SUPPLY UPSTREAM OF FV-241316-ULB FOR HMU 1 FGR LOUVRE ACTUATOR - 1" PIPING IS NOT SHOWN ON P&ID.
8. TIE-IN POINTS- SPG TIE-IN SHOWN AS TP-240-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-240-#.

KEY PLAN

REFERENCE DRAWINGS

REV	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP
3g	07/11/11	ISSUED FOR PHA III						
3f	04/20/11	ISSUED FOR ESTIMATE						
3e	03/01/11	ISSUED FOR PHA II						
3d	01/10/11	ISSUED FOR CLIENT REVIEW						
3c	12/02/10	ISSUED FOR INTERNAL REVIEW						
3b	11/04/10	ISSUED FOR PRELIMINARY REVIEW						
~~3~~	~~04 JUN 23~~	CHANGE LIST 240.0000.000.041.004	MXS	HWF				
~~2~~	~~02 SEP 18~~	AS-BUILT	RVM	EG	AAI	MWP		HRM
~~1~~	~~01 MAY 17~~	IFC: REVISED AS NOTED	WZF	EG	RAM	MWP		HRM
~~0~~	~~00 OCT 02~~	IFC: ISSUED FOR CONSTRUCTION	LWM	SW	SW	DLA		HRM

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ATHABASCA OIL SANDS DOWNSTREAM PROJECT

PARSONS . KRUPP UHDE . TRI OCEAN

PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN MANUFACTURING UNIT PLANT AIR, INSTRUMENT AIR AND NITROGEN QUEST TIE-INS

SCALE: NTS | TOE DWG. No.: 99049-0-DG-BC-00004.1

SHELL DWG NO.: 240.0000.000.041.004 | REV. 3g

FORMAT A1

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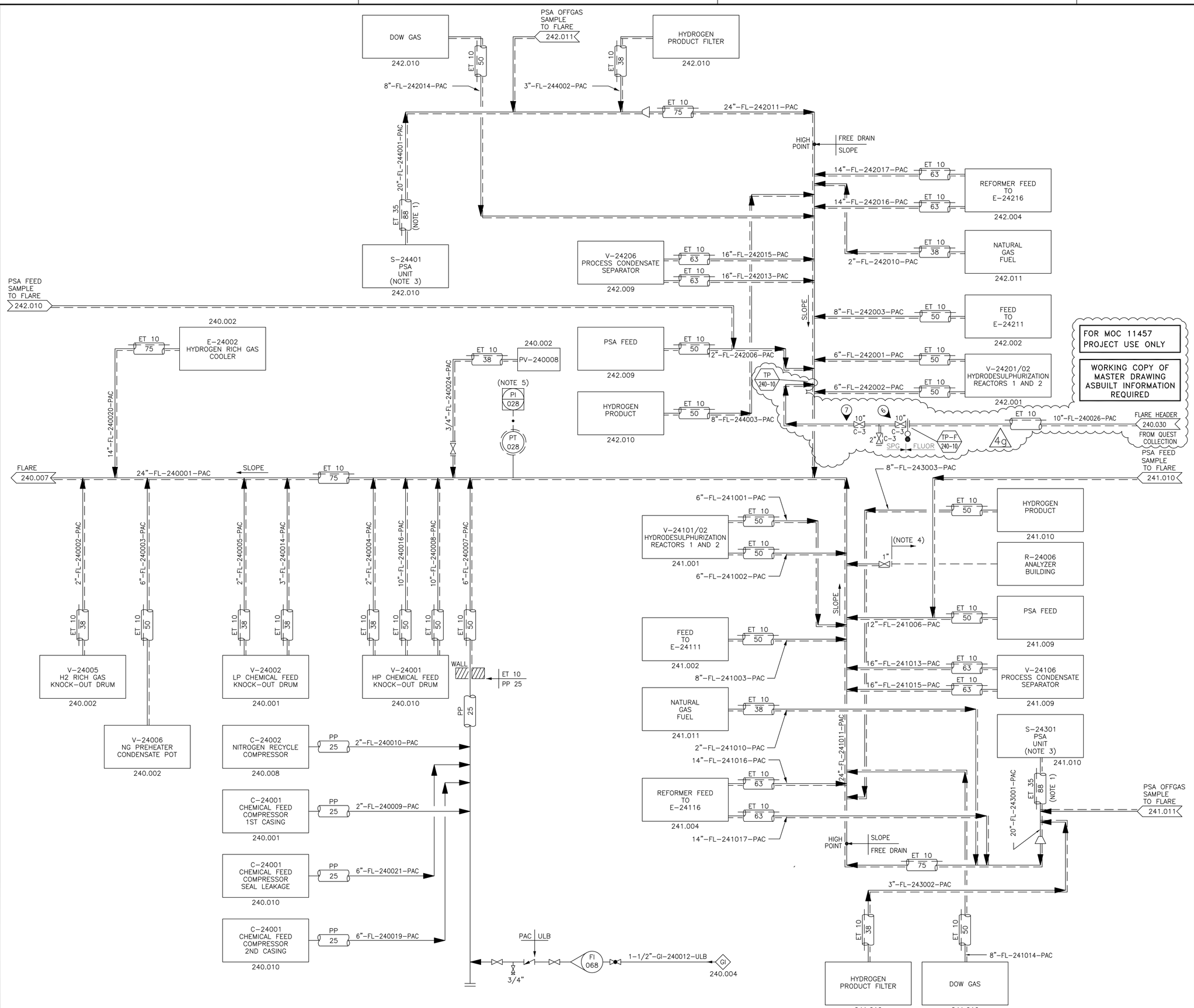

NOTES

1. HEAT TRACE TO MAINTAIN 35 DEG. C ON PSA FLARE HEADER UP TO TIE–IN TO HMU FLARE, THEN HEAT TRACE TO MAINTAIN 10 DEG. C.
2. THE UNIT NUMBER, 240 HAS BEEN OMITTED FROM THE INSTRUMENTATION IDENTIFICATION NUMBERS FOR IMPROVED READABILITY.
3. NITROGEN PURGE TO BE INSTALLED BY PSA VENDOR ON PSA FLARE HEADER. PSA UNITS HAVE BOOT IN FLARE HEADER THAT CAN BE DRAINED TO OILY WATER SEWER.
4. TUBING OR PIPE FROM BLOCK VALVE BY OTHERS.
5. FLARE HEADER PRESSURE VALUE USED BY PSA LOGIC FOR PDI–243183. SEE P&ID 00–0–9995 P&ID 0001 SHEET 9.

MOC 11457

6. BLOCK AND BLIND VENT TO BE CONSIDERED BY SPG.
7. SPG TO PROVIDE INSULATION AND EHT TO THEIR TIE–IN SCOPE.
8. TIE–IN POINTS– SPG TIE–IN SHOWN AS TP–240–# AND FLUOR QUEST TIE–IN SHOWN AS TP–F–240–#.

KEY PLAN

FOR MOC 11457 PROJECT USE ONLY

WORKING COPY OF MASTER DRAWING ASBUILT INFORMATION REQUIRED

REFERENCE DRAWINGS

REV	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP
4g	07/11/11	ISSUED FOR PHA III						
4f	04/20/11	ISSUED FOR ESTIMATE						
4e	03/01/11	ISSUED FOR PHA II						
4d	01/10/11	ISSUED FOR CLIENT REVIEW						
4c	12/02/10	ISSUED FOR INTERNAL REVIEW						
4b	11/04/10	ISSUED FOR PRELIMINARY REVIEW						
4	~~03 FEB 03~~	CHANGE LIST 240.0000.000.041.005	HLR	JA	GS			
3	02 SEP 18	~~AS–BUILT~~	LWM	EG	AAI	MWP		HRM
2	01 OCT 29	~~IFC: REVISED AS NOTED~~	LWM	EG	GSZ	MWP		HRM
1	01 MAY 17	~~IFC: REVISED AS NOTED~~	WZF	EG	RAM	MWP		HRM
0	~~00 OCT 02~~	IFC: ISSUED FOR CONSTRUCTION	LWM	SW	SW	DLA		HRM

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ATHABASCA OIL SANDS DOWNSTREAM PROJECT

PARSONS . KRUPP UHDE . TRI OCEAN

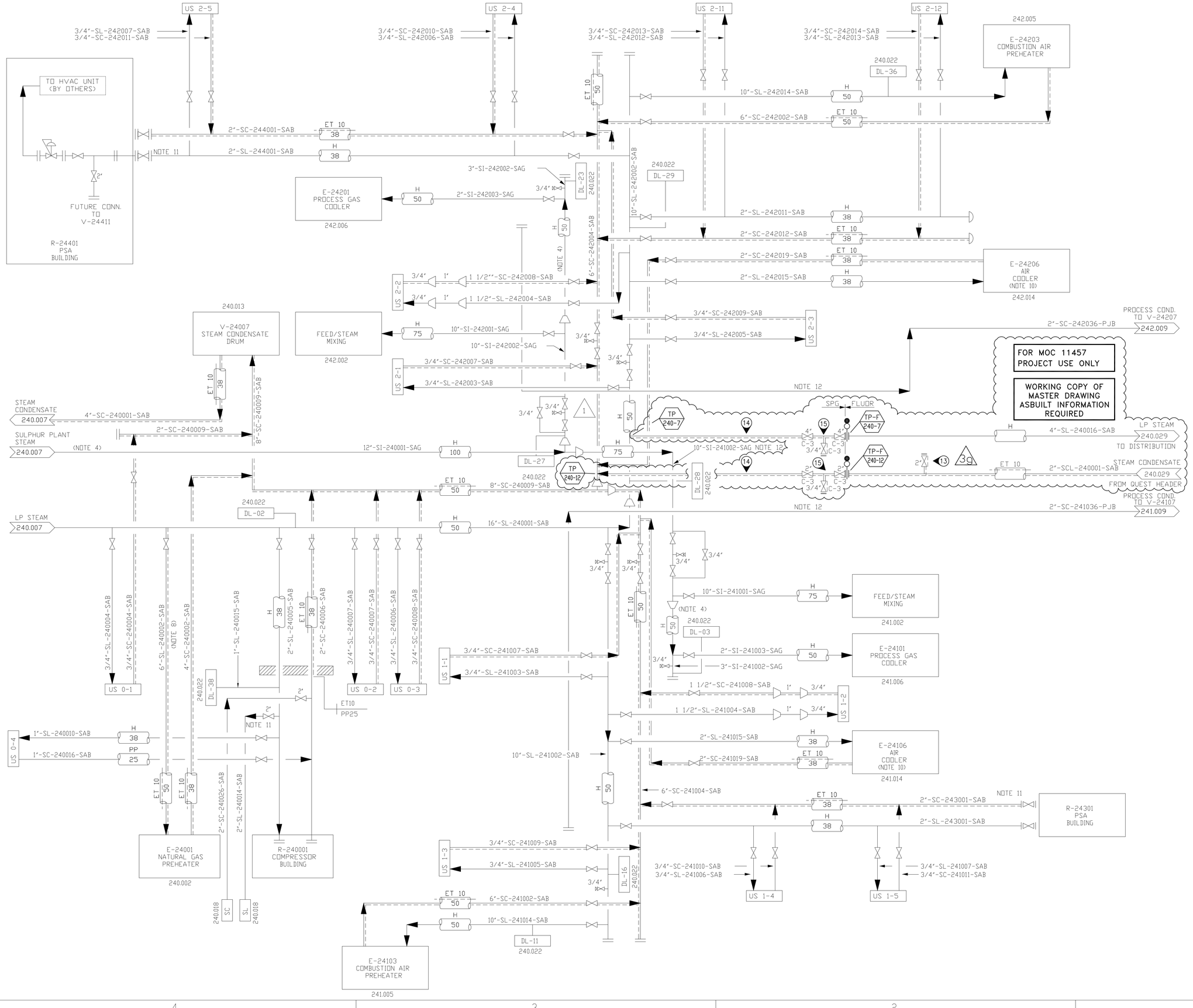
PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN MANUFACTURING UNIT FLARE QUEST TIE–INS

SCALE: NTS | TOE DWG. No.: 99049–0–DG–BC–00005.1

SHELL DWG NO.: 240.0000.000.041.005 | REV. 4g

FORMAT A1

0051–b94



NOTES

1. SEE ESTG 3-1.01, PARAGRAPH 4.8.1 AND FIGURES A-18 THRU A-21 FOR UTILITY STATION DETAILS.
2. SEE ESTG 3-1.01, FIGURES A-8, A-13, AND A-14 FOR TYPICAL CONDENSATE BOOT AND DRIP LEG HOOK-UPS.
3. SEE ESTG 3-1.01, FIGURE A-10 FOR HIGH PRESSURE STEAM BLOW OFF DETAILS.
4. SATURATED STEAM. TRAP AT ALL LOW POINTS AND IN HEADERS PER ESTG, INCLUDING END OF RUNS.
5. 3/4" UTILITY STATION LINES INCLUDE TUBING RUNS, TUBING INTERFACES AT PIPERACK AND UTILITY STATION SHOWN ON PIPING ISOMETRICS.
6. ALL 1" STEAM CONDENSATE RETURNS FROM UTILITY STATIONS TO BE INSULATED (H 38) AND TRACED (ET 10).
7. ALL 1" STEAM LINES TO UTILITY STATIONS TO BE INSULATED (H 38).
8. TRACE SECTION OF LINE NOT PROTECTED BY STEAM TRAPS.
9. PROVIDE WEEP HOLE AT LOW POINT PER ESTG 25-1.02 SECTION 5.3.3
10. TOTAL OF FOUR STEAM LINES AND FOUR CONDENSATE RETURN LINES PER TRAIN. FOR TRAIN 241, STEAM LINES ARE 241015/20/21/22. CONDENSATE LINES ARE 241019/20/21/22.
11. FLANGES PROVIDED FOR HVAC VENDOR HEATING REQUIREMENTS. PIPING BY OTHERS.

KEY PLAN

12. PROCESS STEAM TRAP SUB HEADER (SEE DWG. 240.022).
13. STEAM BLOW CONNECTION.
14. SPG TO PROVIDE INSULATION AND EHT TO THEIR TIE-IN SCOPE.
15. BLOCK AND BLIND VENT TO BE CONSIDERED BY SPG.
16. TIE-IN POINTS- SPG TIE-IN SHOWN AS TP-240-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-240-#.

MOC 11457

REFERENCE DRAWINGS

CRITICAL DOCUMENT

AS-BUILT INFORMATION REQUIRED

REV.	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP
3g	07/11/11	ISSUED FOR PHA III						
3f	04/20/11	ISSUED FOR ESTIMATE						
3e	03/01/11	ISSUED FOR PHA II						
3d	01/10/11	ISSUED FOR CLIENT REVIEW						
3c	12/02/10	ISSUED FOR INTERNAL REVIEW						
3b	11/04/10	ISSUED FOR PRELIMINARY REVIEW						
3	10/04/16	SEE CHANGE LIST 240.0000.000.041.006	DRS	RM				
2	02 SEP 18	AS BUILT	RVM	EG	AAI	MWP		HRM
1	01 MAY 17	IFC: REVISED AS NOTED	WZF	EG	RAM	CMWP		HRM
0	00 DEC 05	IFC: ISSUED FOR CONSTRUCTION	WF	SW	SW	DLA		HRM

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ATHABASCA OIL SANDS
DOWNSTREAM PROJECT

PARSONS . KRUPP UHDE . TRI OCEAN

PIPING AND INSTRUMENTATION DIAGRAM
HYDROGEN MANUFACTURING UNIT
STEAM AND STEAM CONDENSATE
QUEST TIE-INS

SCALE: NTS

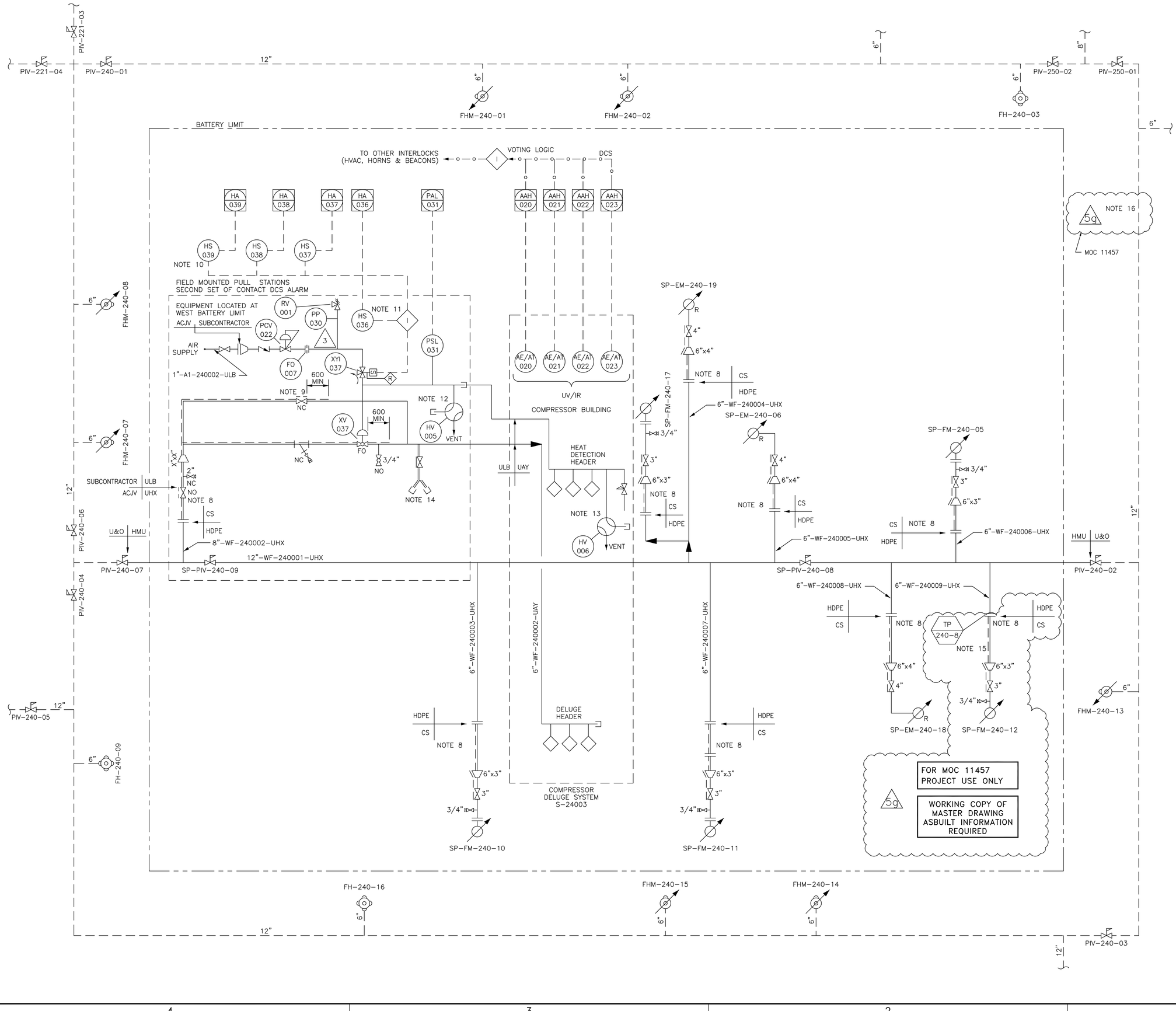
TOE DWG. No.: 99049-0-DG-BC-00006.1

SHELL DWG NO.: 240.0000.000.041.006

REV. 3g

FORMAT A1

99049-0-0001



NOTES

1. FIRE WATER AND FIRE PROTECTION SYSTEM SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH ESTG 21-1.03 "FIRE WATER SYSTEMS" AND ESTG 21-1.02 "FIRE PROTECTION AND PERSONNEL SAFETY".
2. ALL LATERALS TO FIRE HYDRANTS AND FIRE MONITORS SHALL COMPLY WITH ESTG 3-1.01 "PIPING DESIGN" AND ESTG 3-1.03 "PIPE, VALVES AND FITTINGS-PIPING CLASSES".
3. HYDRANTS SHALL BE DESIGNED FOR FREEZE PROTECTION DUE TO THE HIGH WATER TABLE.
4. FIRE HYDARNTS AND FIRE MONITORS SHALL BE IDEALLY BE LOCATED 1 TO 3 METRES FROM THE CURB OR EDGE OF THE ROAD AND AT LEAST 10 METRES FROM INTERSECTIONS OR BUILDINGS.
5. FIXED MONITORS ARE TO BE SPOTTED APPROXIMATELY 20 METRES FROM THE EQUIPMENT TO BE PROTECTED AND OUTSIDE THE EXPECTED DRAINAGE ROUTES.
6. MONITOR COVERAGE IS THROW LENGTH. HYDRANT COVERAGE IS 100 METRES HOSE LENGTH PLUS THROW LENGTH.
7. OUTSIDE BATTERY LIMIT INSTALLATION BY OTHERS.
8. RISER INSTALLED SEPARATELY SHALL BE INSULATED AND ELECTRIC TRACED U/G TO THE FROST LINE. 38 mm INSULATION ON TRACED LINES 4" AND SMALLER; 50 mm 6" AND LARGER.
9. FULL SIZE BYPASS FOR DELUGE CONTROL VALVE.
10. PULL STATIONS TO BE LOCATED AT COMPRESSOR BUILDING ACCESS DOORS.
11. PULL STATION TO BE LOCATED NEAR DELUGE VALVE.
12. PNEUMATIC DUMP VALVE TO BE LOCATED NEAR DELUGE VALVE.
13. TEST VALVE.
14. EXTEND HEAT TRACE AND INSULATION TO INCLUDE HOSE CONNECTION MANIFOLD. MOC 11457
15. DEMOLISH AND RELOCATE DETAILS TBD.
16. FIRE HYDRANT FH-240-004 HAS BEEN RELOCATED ACROSS THE 'G' STREET TO RCDU (258.0000.000.041.004).

5g

LEGEND

- FIXED MONITOR (FM)
- ELEVATED FIXED MONITOR (EM)
- FIRE HYDRANT (FH)
- FIRE HYDRANT WITH MONITOR (FHM)
- POST INDICATOR GATE VALVE (PIV)
- FLUSH CONNECTION
- OPEN SPRAY HEAD

REV	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP.
5g	07/11/11	ISSUED FOR PHA III						
5f	04/20/11	ISSUED FOR ESTIMATE						
5e	03/01/11	ISSUED FOR PHA II						
5d	01/10/11	ISSUED FOR CLIENT REVIEW						
5c	12/02/10	ISSUED FOR INTERNAL REVIEW						
5b	11/04/10	ISSUED FOR INFORMATION						
~~5~~	~~03 APR 30~~	CHANGE LIST 240.0000.000.041.011 (PIT# 1004)	HLR	HH				
4	02 SEP 18	AS-BUILT	LWM	EG	AAI	MWP		HRM
3	01 OCT 05	REVISED PER DCR 0293 & 0297	LWM	EG	MWP	MWP		HRM
2	01 MAY 17	IFC: REVISED AS NOTED	WZF	EG	RAM	CMWP		HRM
1	00 NOV 23	IFC: ISSUED FOR CONSTRUCTION	WZF	CJB	RAM	CMWP	MWP	HRM
0	~~00 OCT 02~~	IFC: ISSUED FOR CONSTRUCTION	LWM	SW	SW	DLA		~~HRM~~

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ATHABASCA OIL SANDS DOWNSTREAM PROJECT

PARSONS . KRUPP UHDE . TRI OCEAN

PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN MANUFACTURING UNIT FIREWATER DISTRIBUTION QUEST TIE-INS

SCALE: NTS | TOE DWG. No.: 99049-0-DG-BC-00011.1

SHELL DWG NO.: 240.0000.000.041.011 | REV. 5g

FORMAT A1

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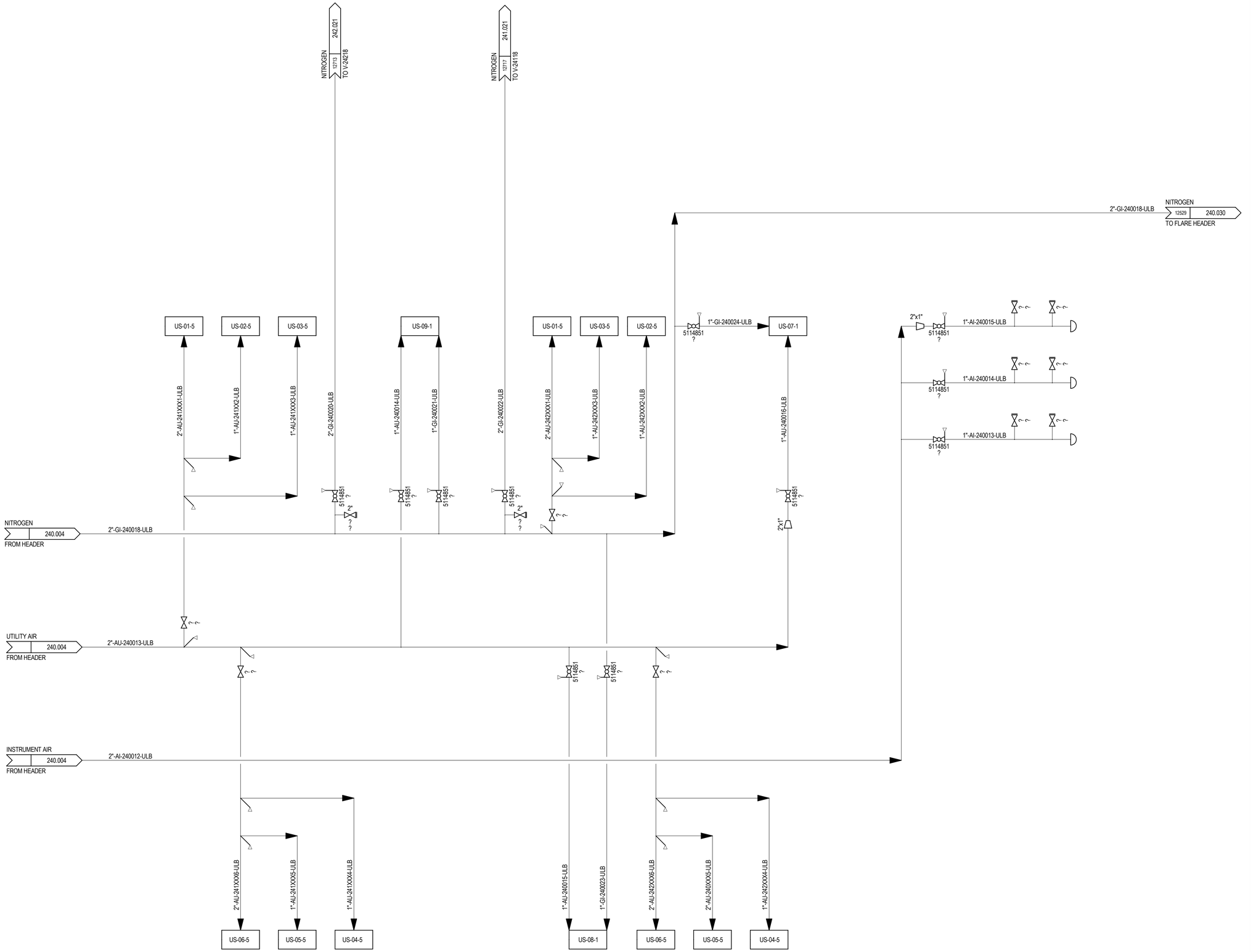

NOTES:

1. SEE DRAWINGS 200.0000.000.041.007 THRU 016 FOR SYMBOL IDENTIFICATION GENERAL NOTES & CONNECTION DETAILS.
2. ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY"240' UNLESS OTHERWISE STATED.
3. ESTG 3-1.01, PARAGRAPH 4.8.1 AND FIGURES A-18 THRU A-21 FOR UTILITY STATION DETAILS.
4. PIPING HEADER BRANCH CONNECTIONS SHALL BE MADE ON TOP OF PIPE AND BE VALVED.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP.
G	07/11/11	ISSUED FOR PHA III									
F	04/20/11	ISSUED FOR ESTIMATE									
E	03/01/11	ISSUED FOR PHA II									
D	01/10/11	ISSUED FOR CLIENT REVIEW									
C	12/02/10	ISSUED FOR INTERNAL REVIEW									
B		ISSUED FOR PRELIMINARY REVIEW									

SHELL CANADA

QUEST CCS PROJECT

FLUOR®

PIPING AND INSTRUMENT DIAGRAM
QUEST CCS PROJECT
UNIT 240 - HYDROGEN MANUFACTURING UNIT
INSTR. AIR UTILITY AIR AND NITROGEN DISTRIBUTION

SCALE: NONE

SHELL DWG NO.: 240.0000.000.041.028

REV. G

240.028
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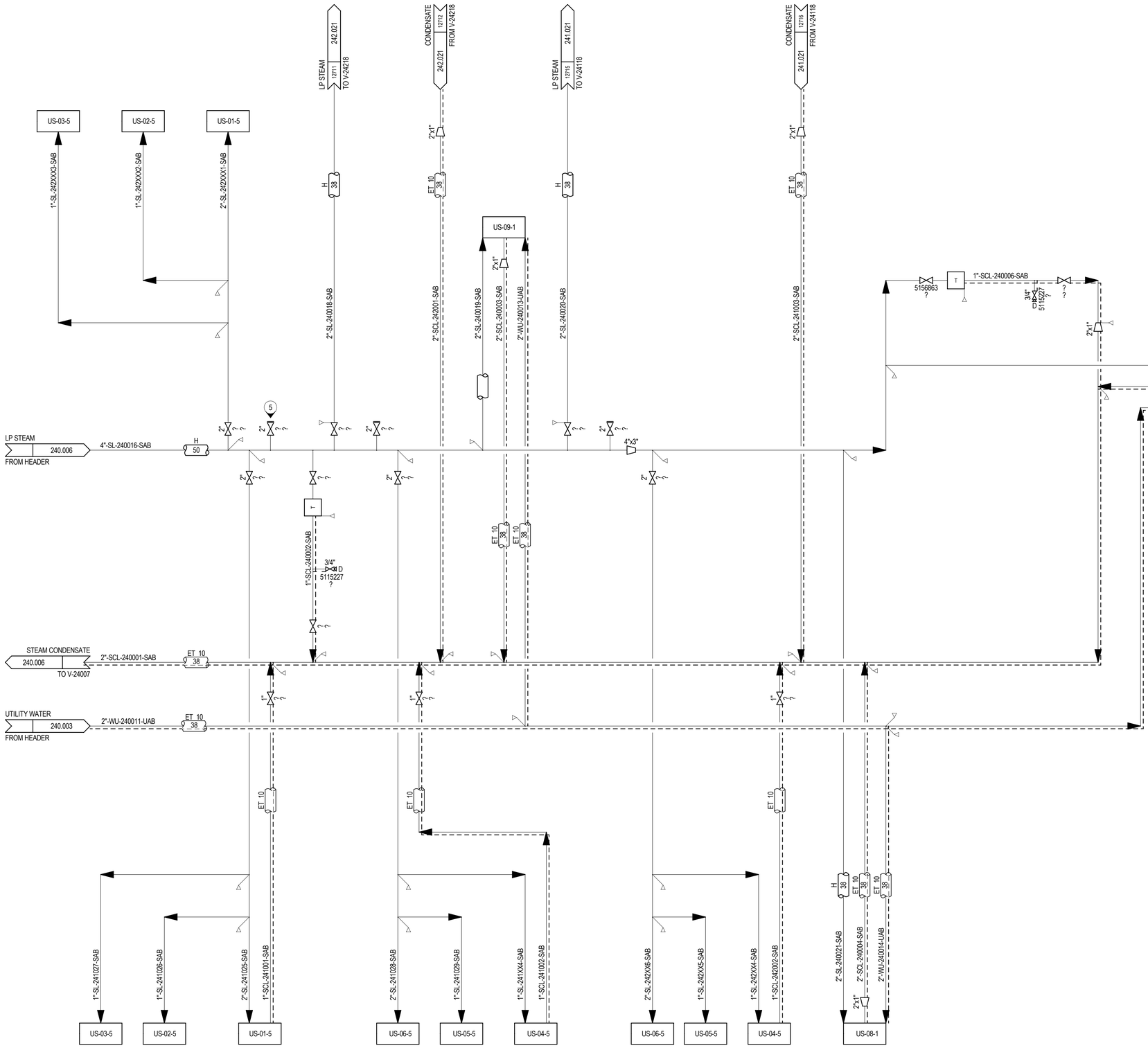

1 . SEE DRAWINGS 200.0000.000.041.007 THRU 016 FOR SYMBOL IDENTIFICATION GENERAL NOTES & CONNECTION DETAILS.
2 . ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY"240' UNLESS OTHERWISE STATED.
3 . ESTG 3-1.01, PARAGRAPH 4.8.1 AND FIGURES A-18 THRU A-21 FOR UTILITY STATION DETAILS.
4 . SATURATED STEAM TRAP AT ALL LOW POINTS AND IN HEADERS PER ESTG, INCLUDING END OF RUNS.
5 . STEAM BLOW CONNECTION.
6 . PIPING HEADER BRANCH CONNECTIONS SHALL BE MADE ON TOP OF PIPE AND BE VALVED.

HOLDS:

- NUMBER OF RVs AND SIZING TO BE CONFIRMED DURING DETAILED ENGINEERING.
- INSTRUMENT SIZING TO BE CONFIRMED DURING DETAILED ENGINEERING.
- NUMBER OF UTILITY STATIONS PER COLUMN TO BE DETERMINED IN DETAILED DESIGN.
- STEAM LINE SIZING FOR STEAM-OUT.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
G	07/11/11	ISSUED FOR PHA III									
F	04/20/11	ISSUED FOR ESTIMATE									
E	03/01/11	ISSUED FOR PHA II									
D	01/10/11	ISSUED FOR CLIENT REVIEW									
C	12/02/10	ISSUED FOR INTERNAL REVIEW									
B		ISSUED FOR PRELIMINARY REVIEW									

SHELL CANADA

QUEST CCS PROJECT

FLUOR®

PIPING AND INSTRUMENT DIAGRAM
QUEST CCS PROJECT
UNIT 240 - HYDROGEN MANUFACTURING UNIT
LP STEAM COND. AND UTILITY WATER DISTRIBUTION

SCALE: NONE

SHELL DWG NO.: 240.0000.000.041.029 REV. G

240.029

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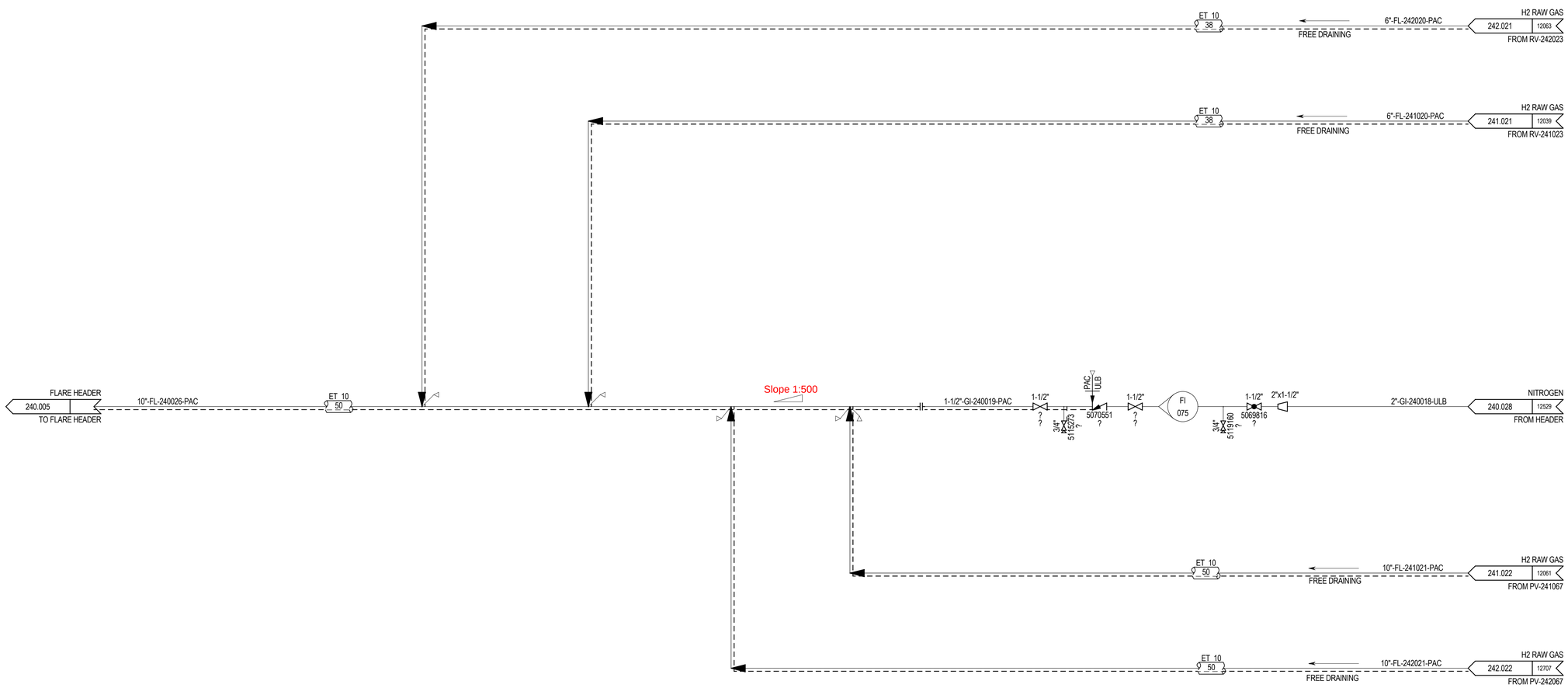


1 . SEE DRAWINGS 200.0000.000.041.007 THRU 016 FOR SYMBOL IDENTIFICATION GENERAL NOTES & CONNECTION DETAILS.

2 . ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY"240' UNLESS OTHERWISE STATED.

HOLDS:

- INSTRUMENT SIZING TO BE CONFIRMED DURING DETAILED ENGINEERING.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
G	07/11/11	ISSUED FOR PHA III									
F	04/20/11	ISSUED FOR ESTIMATE									
E	03/01/11	ISSUED FOR PHA II									
D	01/10/11	ISSUED FOR CLIENT REVIEW									
C	12/02/10	ISSUED FOR INTERNAL REVIEW									
B		ISSUED FOR PRELIMINARY REVIEW									

SHELL CANADA

QUEST CCS PROJECT

FLUOR®

PIPING AND INSTRUMENT DIAGRAM
QUEST CCS PROJECT
UNIT 240 - HYDROGEN MANUFACTURING UNIT
ABSORBER AREA RELIEF COLLECTION

SCALE: NONE

SHELL DWG NO.: 240.0000.000.041.030 REV. G

240.030

FILE:\\F:\1025\DRAWINGS\HMU\240\240.030.pid MODEL DATE:7/4/2011 11:22:06 AM BY:ahm14887

1 . SEE DRAWINGS 200.0000.000.041.007 THRU 016 FOR SYMBOL IDENTIFICATION GENERAL NOTES & CONNECTION DETAILS.

2 . SEE 240.2315.000.050.011.

3 . STORM WATER FROM UNIT 246 "QUEST CAPTURE" TO BE ROUTED TO NEW CATCH BASIN IN HMU 1 & 2 ABSORBER AREA.

4 . NEW CATCH BASIN TO DRAIN TO TIE-IN AT MH #06.

REV.	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
G	07/11/11	ISSUED FOR PHA III									

SHELL CANADA

QUEST CCS PROJECT

FLUOR®

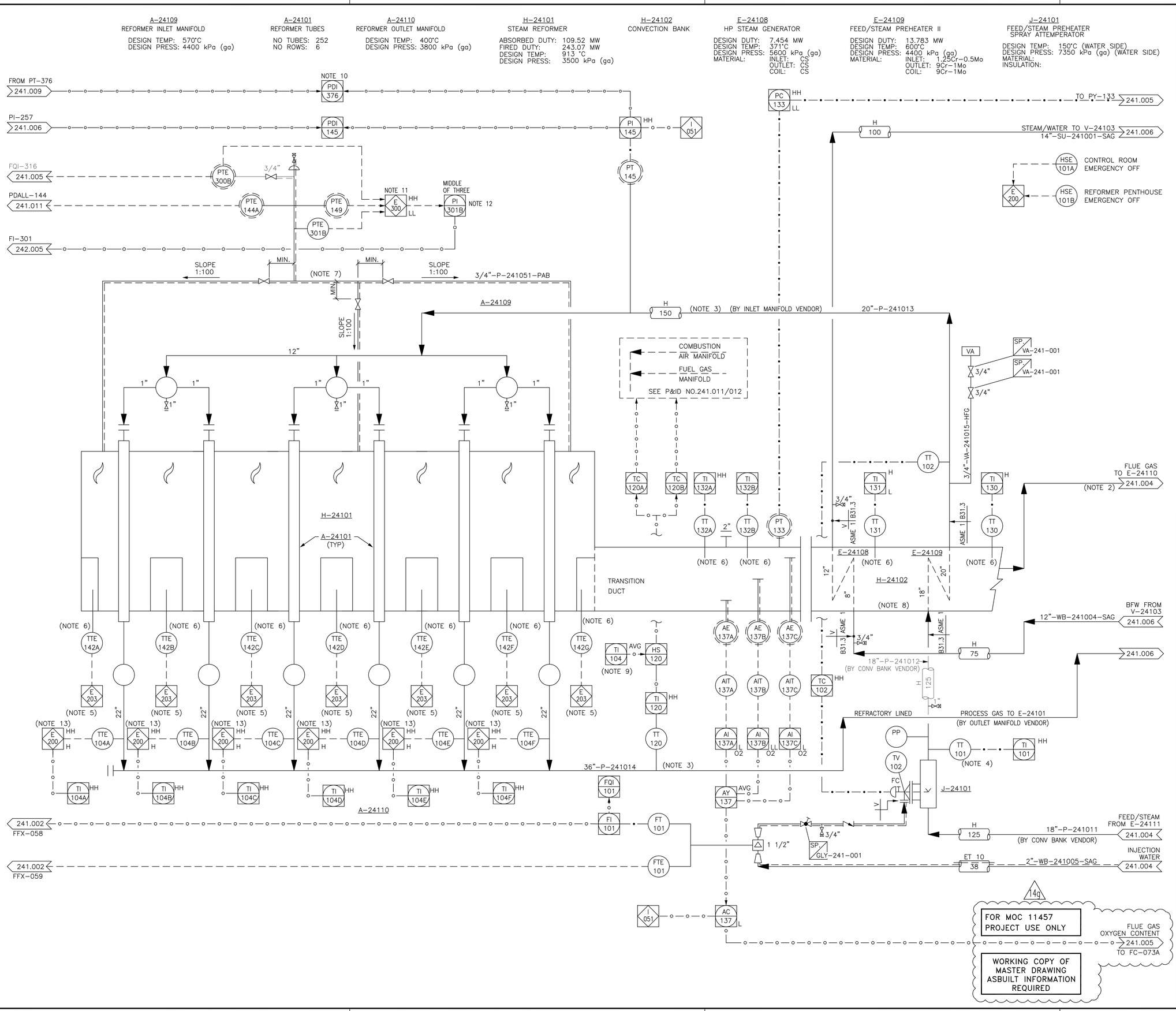
PIPING AND INSTRUMENT DIAGRAM
QUEST CCS PROJECT
UNIT 240 - HYDROGEN MANUFACTURING UNIT
STORM WATER DRAINAGE & POTENTIALLY OILY SWS

SCALE: NONE

SHELL DWG NO.: 240.0000.000.041.032 REV. G

240.032

FILE:\\F:\1025\DRAWINGS\HMU\240\240.032.pid MODEL DATE:7/10/2011 9:25:14 PM BY:mik422596



NOTES

1. THE UNIT NUMBER, 241, HAS BEEN OMITTED FROM THE INSTRUMENTATION IDENTIFICATION NUMBERS FOR IMPROVED READABILITY.
2. CONTINUATION OF CONVECTION BANK.
3. REFORMER DISTRIBUTION PIPING SPECIFIED WITH THE REFORMER.
4. MIN. DISTANCE BETWEEN SPRAY ATTEMPERATOR AND DOWN STREAM TE REQUIRED DURING DETAILED ENGINEERING.
5. RESTART PERMISSIVE FOR PSA OFF GAS, FLUE GAS TEMPERATURE GREATER THAN 600°C.
6. CERAMIC THERMOWELL WITH INTEGRATED THERMOELEMENT. REMOTE MOUNT TRANSMITTER.
7. SAMPLE LINES TO BE SLOPED TO PREVENT CONDENSATE ACCUMULATING AT THE TRANSMITTER.
8. REFRACTORY LINED.
9. TI-104AVG IS AN AVERAGE OF TTE-104A THROUGH TTE-104F.
10. PDI-376 HIGH ALARM SET AT 600kPa FOR REFORMER TUBE PROTECTION. REFER TO MOC-7702 FOR FURTHER DETAIL. HMU REFORMER TUBES TO BE RE-RATED TO 3800kPa UPON REPLACEMENT.
11. BOTH STEAM REFORMER HIGH AND LOW BOX PRESSURE SHUTDOWNS EACH REQUIRE 2 OUT OF 3 TRIP VOTE IN SIS.
12. VOTED OUTPUT FROM SIS.
13. REFORMER HIGH HIGH TRIP REQUIRES 2oo6 TO TRIP. VOTING TO BE DONE IN SIS.

KEY PLAN

REFERENCE DRAWINGS

REV	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP
14g	11 JUL 06	ISSUED FOR PHA III						
14	11 FEB 01	CHANGE LIST 241.0000.000.041.003	DRS	RWM				
~~10~~	~~09 OCT 02~~	~~CHANGE LIST 241.0000.000.041.003~~	TC	AJ	JD			
3	03 NOV 25	CHANGE LIST 241.0000.000.041.003	JFK					
2	01 SEP 24	REVISED PER DCR 0236, 0280, 0281	LWM	EG	NJM	MWP		HRM
1	01 MAY 17	IFC: REVISED AS NOTED	WZF	EG	RAM	MWP		HRM
0	~~09 SEP 29~~	IFC: ISSUED FOR CONSTRUCTION	LWM	SW	SW	DLA		HRM

DRAWING REVISION "0" AFFIXED WITH P.ENG. STAMP ON 00.10.16 AND STAMPED BY: ROBERT A. MACDONALD.

FULL SIZE VERSION OF THIS DRAWING STAMPED WITH PERMIT TO PRACTICE AT REV.0

SHELL CANADA LTD.
ATHABASCA OIL SANDS DOWNSTREAM PROJECT

PARSONS . KRUPP UHDE . TRI OCEAN

6
HYDROGEN MANUFACTURING UNIT
TRAIN #1 STEAM REFORMER

SCALE: NTS
TOE DWG. No.: 99049-1-DG-BC-00003.1
SHELL DWG NO.: 241.0000.000.041.003
REV. 14g

FORMAT A1

0031-b9g

UPDATED ON 10/31/07 AT 09:30 by BBurgess

E-24117
COMBUSTION AIR HEATER

DESIGN DUTY: 14.15 MW
DESIGN TEMP: 400°C
DESIGN PRESS: 10 kPa (DIFFERENTIAL PRESS.)
INSULATION: 100 mm

S-24101
COMBUSTION AIR SILENCER

E-24103
COMBUSTION AIR PREHEATER

DESIGN DUTY: 9.371 MW
DESIGN TEMP: – STEAMSIDE: 250°C
– AIRSIDE: 250°C
DESIGN PRESS: – STEAMSIDE: 500 kPa (ga)
– AIRSIDE: 5 kPa (ga)
– FULL VAC @ TEMP. IF REQUIRED
INSULATION: 38 mm

S-24103
STACK

4000 mm ID x 50000 mm
DESIGN TEMP: 250°C
MATERIAL: C.S.
INSULATION: 100 mm EXTERNAL
ELEVATION: 674.300 (TOP OF STACK)

S-24104
FLUE GAS SILENCER

NOTES:
16. SIS COMBUSTION AIR FLOW CALCULATED USING DIFF. PRESS ACROSS THE BURNERS. CALCULATION IS TEMPERATURE USING TIE-302. THIS FLOW RATE IS USED FOR SIS LOW FLOW TRIP.
17. DCS COMBUSTION AIR FLOW CALCULATED USING DIFF. PRESS ACROSS THE BURNERS AND THE BURNERS AND THE SIS TEMPERATURE. THE FLOW RATE IS USED FOR COMBUSTION AIR/FLOW RATION CONTROL TRIP.

241.003 PC-133

FLUE GAS FROM E-24116 241.004 (NOTE 2) (BY CONV BANK VENDOR)

E-24117

(BY VENDOR) (SURFACE METAL TEMP)

TE 600 TE 601 TE 602 TE 603

TT 600 TT 601 TT 602 TT 603

TI 600 L HH TI 601 L HH TI 602 L HH TI 603 L HH

(NOTE 13) (TYP)

PP DRAFT

AP 001 (BY FAN VENDOR)

PY 133 I/P

PV 133A PV 133B (NOTE 1)

LINKAGE FL FL

C-24102 (NOTE 9) (NOTE 10) 2" 2" 2" 2" (NOTE 13) (TYP)

AP-241012

S-24104

AITE 017 AE 017 AP 017 TP-F 241-10 2" TP 241-10

AITE 018 AE 018 AP 018 TP-F 241-11 2" TP 241-11

E 303 LL AI 018 AI 017 O2 L

FI 316 (NOTE 22) HS 316 FT 316 FTE 316 PT 301A PTE 300 TTE 302

E 200 (NOTE 14) FI 301 NOTE 17 PT-301B 241.003 241.003 PTE-300B

FI 300 L NOTE 16 FQI 316 REFORMER PURGE (NOTE 8) E 200 LL E 201

COMBUSTION AIR TO H-24101 241.012

AP-241004 96" (BY STEEL VENDOR)

START ALLOWANCE E 302 CL

HS 327 RUN/ STOP

E 300 I 302 HS 327A HOA E 302

H 100 (NOTE 13) (TYP)

H 50 (BY FAN VENDOR)

FI 062

AI 330 PI 330 TI 331 CEMS (NOTE 15)

AIT 330 PT 330 TT 331

AE 330 6" 4"

FT 062 EXTERNAL INSULATION H

(NOTE 4) 800x1000 MANWAY S-24103 4"

FX 073A

TT 330 (NOTE 24) AX 330 FC 073B FX 073B M SP (NOTE 20)

TI 330 L HH (NOTE 23) FT 073 FX 073C f(x) FI 073C (NOTE 21)

PROCESS GAS FLOW 241.002 FROM FC-051

FX 051D f(x) (NOTE 25)

C-24103

IAS

AP-241XXX 1.1 m Rec

XYE 022 XZTE 022 S F XV 022 FC

START ALLOWANCE E 303 CL

HS 315 RUN/STOP O/C XHIS 022 HOA HS 315A

E 303 I 301 E 301

AP-241003 (BY FAN VENDOR)

FY 316 I/P

TP 241-7 TP 241-8 TT 317 TC 317 HH AIR INTAKE START ALLOWANCE E 301 CL

TP-F 241-7 TP 241-6 TP-F 241-6 AP-241XXX 1.1 m Rec

(NOTE 27)

(NOTE 19) HOLIM FC 073A L

FLUE GAS OXYGEN CONTENT 241.003 FROM AC-137

PP DRAFT TP-F 241-9

H 38 (BY FAN VENDOR)

ET 10 38 3"-VA-241008-PAB (NOTE 6) 3"x2" RV 314 SET @ 500 kPa (ga) 3"x1-1/2" CSO

VA (NOTE 6) VA (NOTE 6) VA

S-24101

AP-241001 (BY FAN VENDOR)

2"-SL-241018-SAB 2"-SL-241019-SAB 3"-SL-241017-SAB ET 10 38

(NOTE 5) E-24103

TI 312 TT 312 PP DRAFT H 38 (BY FAN VENDOR)

AP-241002

FV 316A FV 316B LINKAGE FL FL

C-24101 (NOTE 9) (NOTE 10) 2" 2" (NOTE 13) (TYP) (NOTE 18)

(NOTE 1)

(NOTE 12) VA 2" (NOTE 12)

(NOTE 7) FE 050

LG 318 LT 318 MAG (NOTE 11) 2"

240.006 SL H 50 10"-SL-241014-SAB 3/4" 3/4" 12"x10"

RSP LC 318

LV 318 ET 10 50 6"-SC-241002-SAB 3"FC 3/4"

TI 310 L TT 310 ET 10 38

SC 240.006 ET 10 50 6"-SC-241002-SAB 4"-SC-241002-SAB

LOCAL/ VFD REMOTE FAULT SI XXX XL 021 XA 021

E 303 I VFD FX 073D f(x)

FEED FORWARD CONTROL OF CO2 CAPTURED 241.022 FROM FFC-073D

HOA HS 021A I 303 R/S HS 021

26. TIE-IN POINTS- SPG TIE-IN SHOWN AS TP-241-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-241-#.
27. RELOCATE TT-317 UPSTREAM OF FGR TIE-IN. TW SHALL BE INSTALLED DURING TURNAROUND, FLUOR TO RELOCATE INSTRUMENT.

HOLDS: 9g

1. FLUE GAS RECIRCULATION CONTROL ON HOLD.
2. CONFIRM AVAILABILITY OF DCS AND SIS INTERLOCK SEQUENCE NUMBERS ADDED FOR QUEST.

C-24101
FORCED DRAFT (COMBUSTION AIR) FAN

RATED FLOW: 227,905 m3/h
DIFF PRESSURE: 4.6 kPa
INSULATION: 38 mm
DRIVER: 675 kW @ 1200 RPM

C-24102
INDUCED DRAFT (FLUE GAS) FAN

RATED FLOW: 282,386 m3/h
DIFF PRESSURE: 3.8 kPa
INSULATION: 50 mm
DRIVER: 935 kW @ 1200 RPM

FOR MOC 11457 PROJECT USE ONLY

WORKING COPY OF MASTER DRAWING ASBUILT INFORMATION REQUIRED 9g

C-24103
FLUE GAS RECIRCULATION FAN

RATED FLOW: 75297 m3/h
DIFF PRESSURE: 4.4 kPa
INSULATION:
DRIVER:

18. DELETED.
19. COMBUSTION AIR FLOW.
20. TOTAL CONVECTION SECTION FLOW.
21. FLUE GAS RECIRCULATION FLOW.
22. TOTAL FGR AND COMBUSTION AIR.
23. TI-330 USED TO TEMPERATURE COMPENSATE FX-073C.
24. AX-330 IS FOR THE OPERATOR TO MANUALLY BIAS THE CONTROLLER OUTPUT TO OPTIMISE NOx EMISSIONS.
25. FX-051D DETERMINES THE SETPOINT FOR THE CONVECTION SECTION FLOW BASED ON THE HMU LOAD.

NOTES
1. MECHANICAL MINIMUM STOP AT 25% OPEN. FIELD TEST TO DETERMINE ACTUAL MECHANICAL STOP POSITION FOR 30% AIRFLOW.
2. CONTINUATION OF CONVECTION BANK.
3. THE UNIT NUMBER 241, HAS BEEN OMITTED FROM THE INSTRUMENTATION IDENTIFICATION NUMBERS FOR IMPROVED READABILITY.
4. THREE SETS OF NOZZLES:
SET 1 – MANUAL SAMPLE PORTS, 4", 150# FFWN C/W BLIND AND 4" NPT CAPPED NIPPLE. 4 @ 90°
SET 2 – CEMS SAMPLE PORTS, 4", 150# FFWN. 2 @ 180°
SET 3 – ANNUBAR PORT, 4", 150# FFWN. 2 @ 180°
5. HEAT PIPE EXCHANGER.
6. PROVIDE WEEP HOLE AT LOW POINT PER ESTG 25-1.02, SECTION 5.3.3. TRACE ONLY TO WEEPHOLE.
7. TEST ORIFICE. MINIMUM BETA 0.75
8. REFORMER START-UP PURGE FLOW TOTALIZER (FQI-241316).
9. SEE P&ID 241.0000.000.041.015 FOR LUBE OIL SYSTEM, ONE SYSTEM FOR BOTH FANS.
10. SEE P&ID 241.0000.000.041.015 FOR VIBRATION MONITORING.
11. VENT STEAM CHEST BOTH ENDS.
12. OBSERVATION/INSPECTION PORT (BLINDED).
13. ACCESS DOOR.
14. TTE-241302 USED TO TEMP COMPENSATE FI-241316 AND FC-241316.
15. SEE P&ID 240.0000.000.041.024 FOR ADDITIONAL ANALYZER INFORMATION.

KEY PLAN

REFERENCE DRAWINGS

REV	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP.
9g	07/11/11	ISSUED FOR PHA III						
9f	04/20/11	ISSUED FOR ESTIMATE						
9e	03/14/11	ISSUED FOR PHA II						
9d	01/10/11	ISSUED FOR CLIENT REVIEW						
9c	12/02/10	ISSUED FOR INTERNAL REVIEW						
9b	11/04/10	ISSUED FOR INFORMATION						
~~9~~	~~09 OCT 02~~	CHANGE LIST 242.0000.000.041.005	TC	AJ	JD			
4	03 FEB 12	CHANGE LIST 241.0000.000.041.005	KJB	WR		GS		
3	02 SEP 18	AS-BUILT	RVM	EG	AAI	MWP		HRM
2	01 SEP 24	REVISED PER DCR-0281/0284	LWM	VD	NJM	MWP		HRM
1	01 MAY 17	IFC: REVISED AS NOTED	WZF	EG	RAM	MWP		HRM
0	~~00 SEP 29~~	IFC: ISSUED FOR CONSTRUCTION	LWM	SW	SW	DLA		HRM

DRAWING REVISION "0" AFFIXED WITH P.ENG. STAMP ON 00.10.16 AND STAMPED BY: ROBERT A. MACDONALD.

FULL SIZE VERSION OF THIS DRAWING STAMPED WITH PERMIT TO PRACTICE AT REV.0

SHELL CANADA LTD.
ATHABASCA OIL SANDS DOWNSTREAM PROJECT

PARSONS . KRUPP UHDE . TRI OCEAN

PIPING AND INSTRUMENTATION DIAGRAM
HYDROGEN MANUFACTURING UNIT
TRAIN #1 COMBUSTION AIR HEATING AND FLUE GAS STACK

SCALE: NTS
TOE DWG. No.: 99049-1-DG-BC-00005.1
SHELL DWG NO.: 241.0000.000.041.005
REV. 9g

FORMAT A1

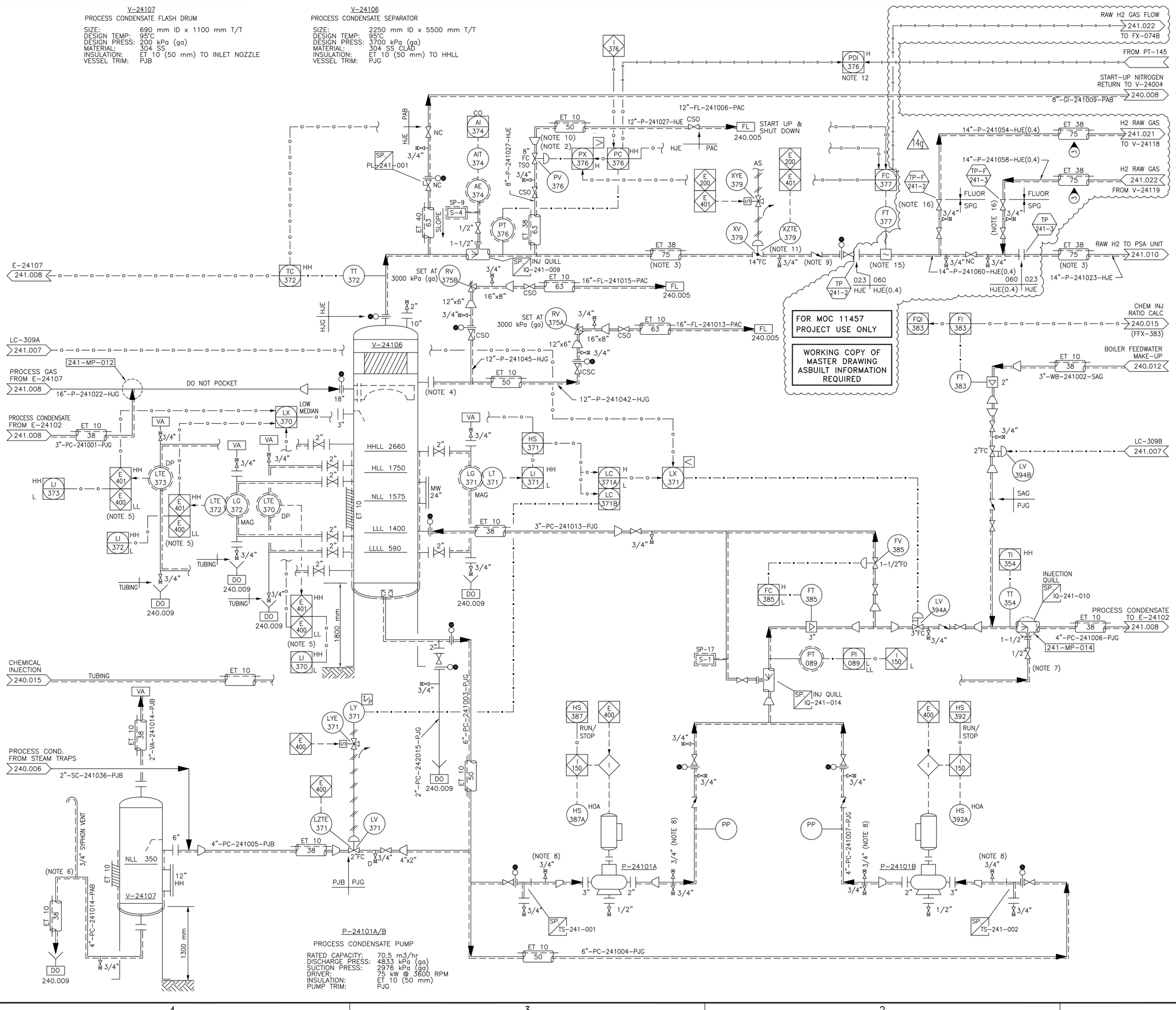
0051-b9i

V-24107
PROCESS CONDENSATE FLASH DRUM

SIZE: 690 mm ID x 1100 mm T/T
DESIGN TEMP: 95°C
DESIGN PRESS: 200 kPa (ga)
MATERIAL: 304 SS
INSULATION: ET 10 (50 mm) TO INLET NOZZLE
VESSEL TRIM: PJB

V-24106
PROCESS CONDENSATE SEPARATOR

SIZE: 2250 mm ID x 5500 mm T/T
DESIGN TEMP: 95°C
DESIGN PRESS: 3700 kPa (ga)
MATERIAL: 304 SS CLAD
INSULATION: ET 10 (50 mm) TO HHLL
VESSEL TRIM: PJG



P-24101A/B

PROCESS CONDENSATE PUMP

RATED CAPACITY: 70.5 m3/hr
DISCHARGE PRESS: 4833 kPa (ga)
SUCTION PRESS: 2976 kPa (ga)
DRIVER: 75 kW @ 3600 RPM
INSULATION: ET 10 (50 mm)
PUMP TRIM: PJG

NOTES

1. THE UNIT NUMBER, 241, HAS BEEN OMITTED FROM THE INSTRUMENTATION IDENTIFICATION NUMBERS FOR IMPROVED READABILITY.
2. ACTUATOR SPEED SAME AS XV-379.
3. TRACING TO OPERATE CONTINUOUSLY, MAINTAINING PIPE 3°C HIGHER THAN BULK FLUID.
4. ONE RELIEF VALVE IN SERVICE.
5. PROCESS CONDENSATE SEPARATOR HI HI LEVEL SHUTDOWN REQUIRES A 2 OUT OF 3 TRIP. VOTING TO BE DONE IN THE SIS.
6. LOCATE TOP OF TRAP AT SAME ELEVATION AS NLL OF PROCESS CONDENSATE FLASH DRUM.
7. VALVE FOR BOILER CHEMICAL ADDITION. LOCATE VALVE HORIZONTAL.
8. PUMP SEAL FLUSH TUBING AS PER API 610 PLAN 11 & 13 WITH SS TUBING AND SS SWAGELOCK FITTINGS. SEE DRAWING 240.0000.000.041.017
9. DUAL PLATE CHECK VALVE.
10. DUE TO DESIGN CONSTRAINTS ON THE MAIN HC FLARE SYSTEM DURING AN HRDP, THE FLARE LOAD FROM THE HMU MUST BE MINIMIZED BY SETTING PV-399B (DWG. 241.010) SUCH THAT IT VENTS PRIOR TO PV-376.
11. VALVE EQUIPPED WITH A REMOVABLE MECHANICAL STOP TO ALLOW TESTING WITHOUT CLOSING THE VALVE TO MEET SIL TESTING REQUIREMENTS.
12. PDI-376 HIGH ALARM SET AT 600kPa FOR REFORMER TUBE PROTECTION. REFER TO MOC-7702 FOR FURTHER DETAIL. HMU REFORMER TUBES TO BE RE-RATED TO 3800kPa UPON REPLACEMENT.
13. DELETED.
    MOC 11457

KEY PLAN

14. TIE-IN POINTS- SPG TIE-IN SHOWN AS TP-241-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-241-#.
15. CHANGE EXISTING 12" VORTEX FLOWMETER TO 14" ULTRASONIC FLOWMETER.
16. CHAIN OPERATOR REQUIRED ON VALVE.
    MOC 11457

REFERENCE DRAWINGS

REV	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP
14g	07/11/11	ISSUED FOR PHA III						
14f	04/20/11	ISSUED FOR ESTIMATE						
14e	03/01/11	ISSUED FOR PHA II						
14d	01/10/11	ISSUED FOR CLIENT REVIEW						
14c	12/02/10	ISSUED FOR INTERNAL REVIEW						
14b	11/04/10	ISSUED FOR INFORMATION						
14	16 AUG 10	CHANGE LIST 241.0000.000.041.009	DRS	RWM				
13	16 AUG 10	CHANGE LIST 241.0000.000.041.009	DRS	RWM				
12	10 MAR 03	SEE CHANGELIST 241.0008.000.041.005	AS	JA				
4	03 FEB 4	CHANGE LIST 241.0000.000.041.005 (MPC# 300)	HLR	WR	GS			
3	02 SEP 18	AS-BUILT	RVM	EG	AAI	MWP		HRM
2	01 SEP 24	REVISED PER DCR 0280	LWM	VD	NJM	MWP		HRM
1	01 MAY 17	IFC: REVISED AS NOTED	WZF	EG	RAMC	MWP		HRM

DRAWING REVISION "0" AFFIXED WITH P.ENG. STAMP ON 00.10.16 AND STAMPED BY: ROBERT A. MACDONALD.

FULL SIZE VERSION OF THIS DRAWING STAMPED WITH PERMIT TO PRACTICE AT REV.0

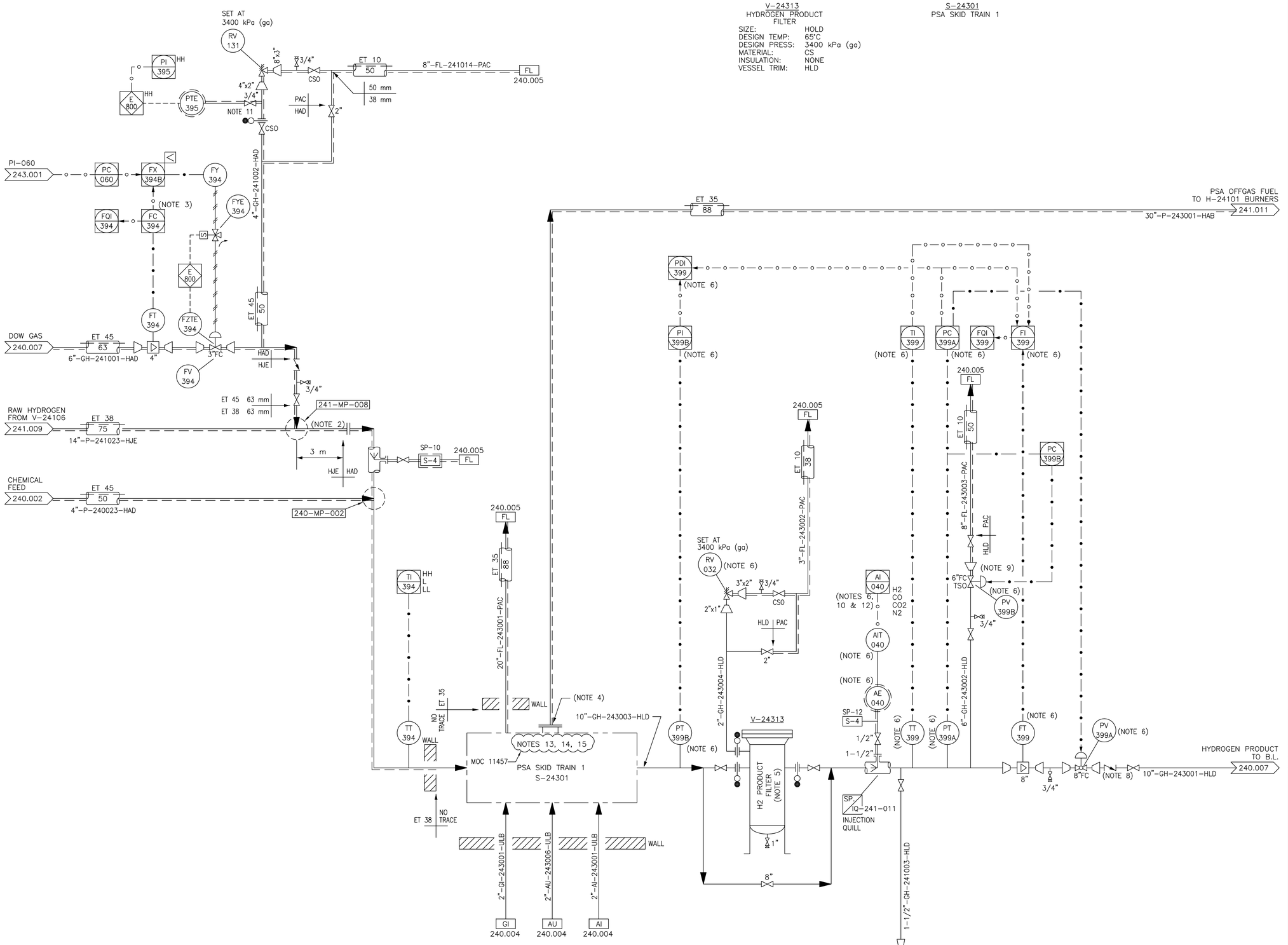
SHELL CANADA LTD.
ATHABASCA OIL SANDS DOWNSTREAM PROJECT

PARSONS . KRUPP UHDE . TRI OCEAN

PIPING AND INSTRUMENTATION DIAGRAM
HYDROGEN MANUFACTURING UNIT
TRAIN #1 FINAL SEPARATOR AND PROCESS CONDENSATE PUMP

SCALE: NTS
TOE DWG. No.: 99049-1-DG-BC-00009.1
SHELL DWG NO.: 241.0000.000.041.009
REV. 14g

FORMAT A1
0091-b9n



NOTES

1. THE UNIT NUMBER, 241, HAS BEEN OMITTED FROM THE INSTRUMENTATION IDENTIFICATION NUMBERS FOR IMPROVED READABILITY.
2. TRACING TO OPERATE CONTINOUSLY.
3. PRESSURE AND TEMPERATURE FLOW COMPENSATION – SEE 240.007.
4. FLANGE CONNECTION IS AT PSA SURGE DRUM OUTLET NOZZLE.
5. HYDROGEN PRODUCT FILTERS SUPPLIED BY PSA VENDOR.
6. INSTRUMENTATION TAGS PREFIXED BY UNIT NUMBER 243.
7. RATIO STATION USED FOR HYDROGEN INJECTION INTO FEED STREAM WHEN RUNNING ON NATURAL GAS FEED ONLY.
8. DUAL PLATE CHECK VALVE.
9. DUE TO DESIGN CONSTRAINTS ON THE MAIN HC FLARE SYSTEM DURING AN HRDP, THE FLARE LOAD FROM THE HMU MUST BE MINIMIZED BY SETTING PV-399B SUCH THAT IT VENTS PRIOR TO PV-376 (DWG 241.009).
10. SEE P&ID 240.0000.000.041.024 FOR FURTHER DETAILS.
11. DRAIN VALVE REPLACED BY DOUBLE BLOCK AND BLEED ROOT VALVE AS PART OF MOC-5650.
12. AI-243040A HAS A HIGH ENGINEERED ALARM.

KEY PLAN

13. MODIFICATIONS TO THE PSA UNIT TO BE DETERMINED BY FLUOR.
14. LOGIC CHANGES FOR PSA REQUIRED FOR SWITCHING BETWEEN LEAN AND RICH CO_2 CASES BY SHELL SCOTFORD. (13g)
15. REPLACE PSA ADSORBENT.

FOR MOC 11457
PROJECT USE ONLY

WORKING COPY OF MASTER DRAWING ASBUILT INFORMATION REQUIRED

REFERENCE DRAWINGS

AIR PRODUCTS P&ID's:
00-0-9995 P&ID 0001 SHTS 1-13

MASTER DRAWING
AS BUILT
INFORMATION REQUIRED

REV	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP
13g	07/11/11	ISSUED FOR PHA III						
13f	04/20/11	ISSUED FOR ESTIMATE						
13e	03/01/11	ISSUED FOR PHA II						
13d	01/10/11	ISSUED FOR CLIENT REVIEW						
13c	12/02/10	ISSUED FOR INTERNAL REVIEW						
13b	11/04/10	ISSUED FOR INFORMATION						
13	10/07/14	CHANGELIST 240.0000.000.041.001	DRS					
12	10/01/11	CHANGELIST 240.0000.000.041.001	RYU	RWM				
11	09 OCT 02	CHANGELIST 240.0000.000.041.001	TC	AJ	JD			
3	02 SEP 18	AS-BUILT	LWM	EG	AAI	MWP		HRM
2	01 SEP 24	REVISED PER DCR 0280 & 0282	LWM	VD	NJM	MWP		HRM
1	01 MAY 17	IFC: REVISED AS NOTED	WZF	EG	RAM	MWP		HRM
0	00 SEP 29	IFC: ISSUED FOR CONSTRUCTION	WF	SW	SW	DLA		HRM

DRAWING REVISION "0" AFFIXED WITH P.ENG. STAMP ON 00.10.16 AND STAMPED BY: ROBERT A. MACDONALD.

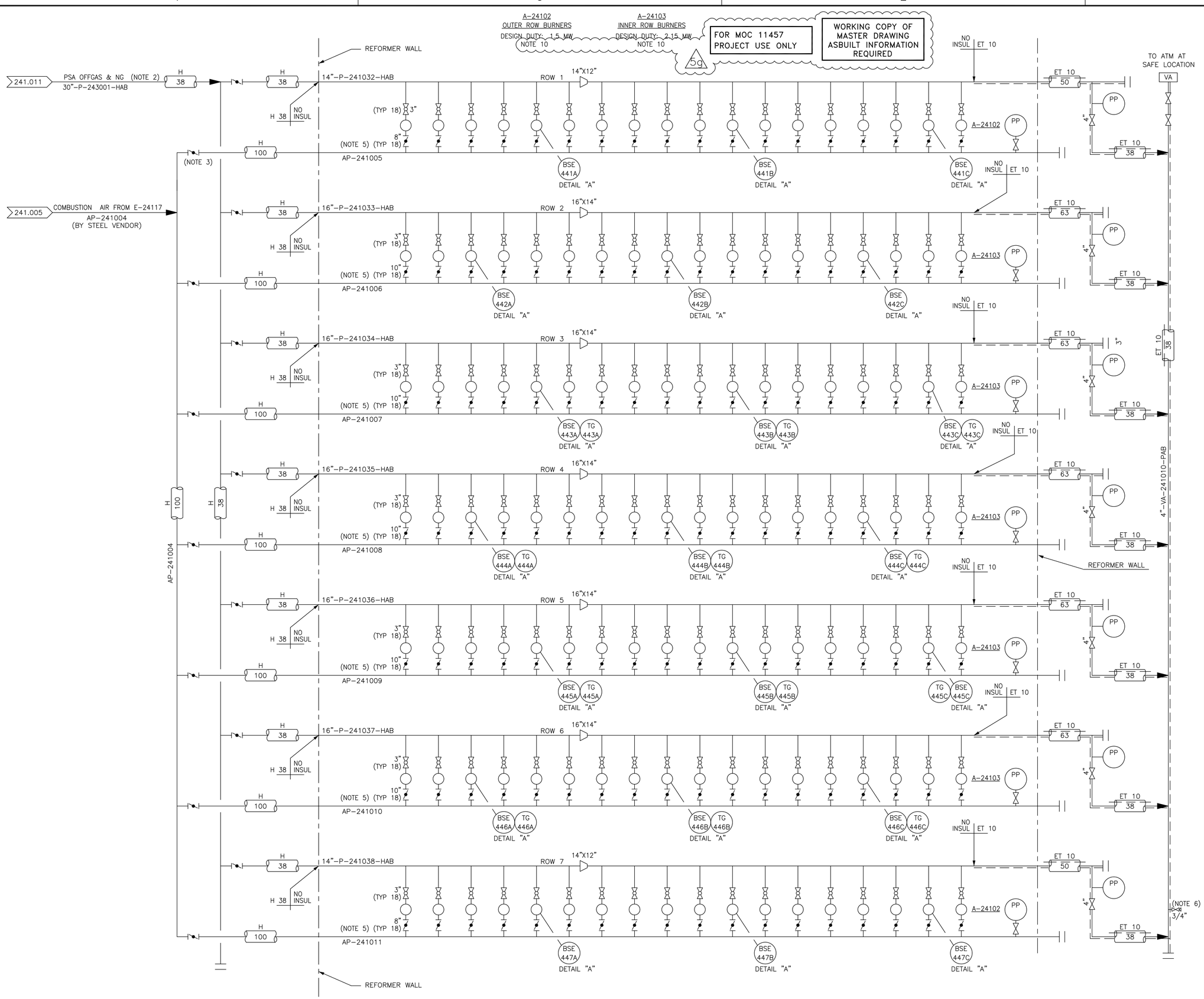
FULL SIZE VERSION OF THIS DRAWING STAMPED WITH PERMIT TO PRACTICE AT REV.0

SHELL CANADA LTD.
ATHABASCA OIL SANDS DOWNSTREAM PROJECT
PARSONS . KRUPP UHDE . TRI OCEAN

PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN MANUFACTURING UNIT TRAIN #1 PRODUCT PURIFICATION

SCALE: NTS
TOE DWG. No.: 99049-1-DG-BC-00010.1
SHELL DWG NO.: 241.0000.000.041.010
REV. 13g

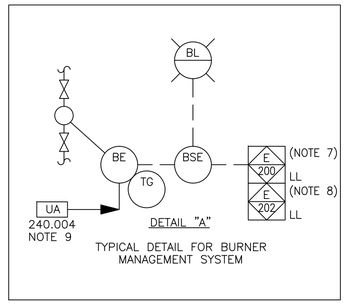
FORMAT A1
0101-09m



NOTES

1. THE UNIT NUMBER , 241, HAS BEEN OMITTED FROM THE INSTRUMENTATION IDENTIFICATION NUMBERS FOR IMPROVED READABILITY.
2. ADD 12 INCH BOOT ON RISER TO THE HEATER, TRACE BOOT ET-10 50 mm, SLOPE PIPING TO THE BOOT.
3. LOCKABLE BUTTERFLY VALVES SUPPLIED BY STEEL STRUCTURAL VENDOR. PRESSURE GUAGE SHOULD BE VISIBLE FROM THE VALVE, TYPICAL.
4. OUTER ROW DUTY 70% OF INNER ROWS.
5. SPECIAL DAMPER FOR COMBUSTION AIR SUPPLIED WITH BURNER (TYPICAL).
6. LOW POINT BLEED.
7. REFORMER SHUT-DOWN LOGIC REQUIRES 10 OUT OF 21 FLAME SCANNERS TO ACKNOWLEDGE LOSS OF FLAME BEFORE INITIATING A REFORMER TRIP.
8. REFORMER START-UP PERMISSIVE REQUIRES 17 OUT OF 21 FLAME SCANNERS TO ACKNOWLEDGE A FLAME TO RESET THE REFORMER E-202 INTERLOCK.
9. UTILITY AIR SUPPLIED TO BSE-241443A/B/C, BSE-241444A/B/C, BSE-241445A/B/C & BSE-241446A/B/C FROM US 1-10.
10. EXISTING BURNER LANCES TO BE REPLACED WITH LANEMARK LOW NOx BURNERS. — MOC 11457

KEY PLAN



TYPICAL DETAIL FOR BURNER MANAGEMENT SYSTEM

REFERENCE DRAWINGS

REV	ISSUED DATE	DESCRIPTION	DWN	CHKD	ENG	APP	APP	CLNT APP
5g	07/11/11	ISSUED FOR PHA III						
5f	04/20/11	ISSUED FOR ESTIMATE						
5e	03/01/11	ISSUED FOR PHA II						
5d	01/10/11	ISSUED FOR CLIENT REVIEW						
5c	12/02/10	ISSUED FOR INTERNAL REVIEW						
5b	11/04/10	ISSUED FOR INFORMATION						
~~5~~	~~07 MAR 08~~	CHANGE LIST 241.0000.000.041.012	JAM	MK				
4	04 JUN 23	CHANGE LIST 241.0000.000.041.012	MXS	HWF				
3	03 FEB 12	CHANGE LIST 241.0000.000.041.012	KJB	WR		GS		
2	02 SEP 18	AS-BUILT	RVM	EG	AAI	MWP		HRM
1	01 MAY 17	IFC: REVISED AS NOTED	WZF	EG	RAM	MWP		HRM
0	~~00 SEP 29~~	IFC: ISSUED FOR CONSTRUCTION	LWM	SW	SW	DLA		HRM

DRAWING REVISION "0" AFFIXED WITH P.ENG. STAMP ON 00.10.16 AND STAMPED BY: ROBERT A. MACDONALD.

FULL SIZE VERSION OF THIS DRAWING STAMPED WITH PERMIT TO PRACTICE AT REV.0

SHELL CANADA LTD.
ATHABASCA OIL SANDS
DOWNSTREAM PROJECT

PARSONS . KRUPP UHDE . TRI OCEAN

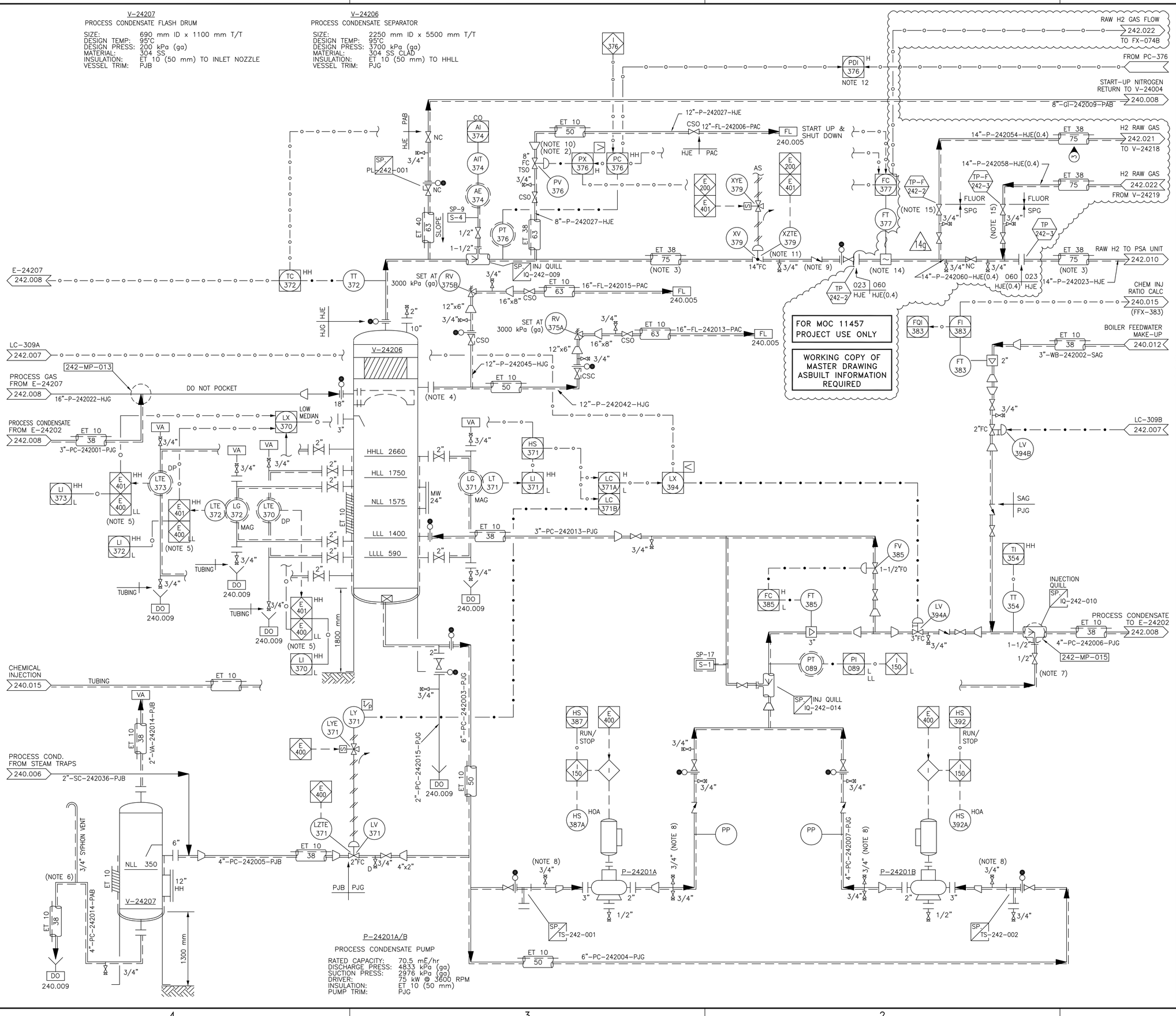
PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN MANUFACTURING UNIT TRAIN #1 BURNER SYSTEM

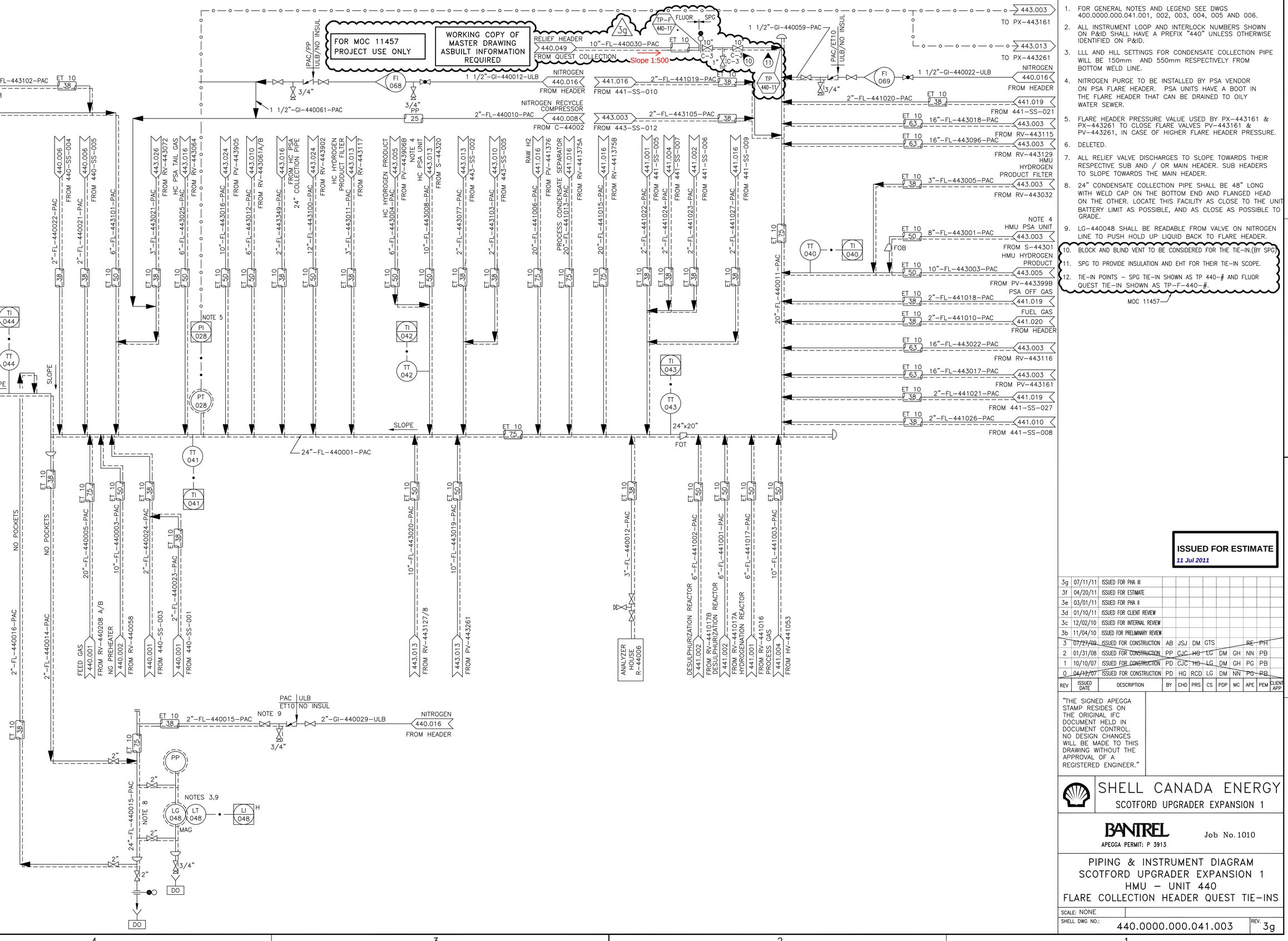
SCALE: NTS | TOE DWG. No.: 99049-1-DG-BC-00012.1

SHELL DWG NO.: 241.0000.000.041.012 | REV. 5g

FORMAT A1

0121-b9p


V-24207
PROCESS CONDENSATE FLASH DRUM
SIZE: 690 mm ID x 1100 mm T/T
DESIGN TEMP: 95°C
DESIGN PRESS: 200 kPa (ga)
MATERIAL: 304 SS
INSULATION: ET 10 (50 mm) TO INLET NOZZLE
VESSEL TRIM: PJB
V-24206
PROCESS CONDENSATE SEPARATOR
SIZE: 2250 mm ID x 5500 mm T/T
DESIGN TEMP: 95°C
DESIGN PRESS: 3700 kPa (ga)
MATERIAL: 304 SS CLAD
INSULATION: ET 10 (50 mm) TO HHLL
VESSEL TRIM: PJG
RAW H2 GAS FLOW 242.022 TO FX-074B
FROM PC-376
START-UP NITROGEN RETURN TO V-24004 240.008
8"-GI-242009-PAB
12"-P-242027-HJE
12"-FL-242006-PAC
FL 240.005
START UP & SHUT DOWN
HJE PAC
14"-P-242054-HJE(0.4)
H2 RAW GAS 242.021 TO V-24218
14"-P-242058-HJE(0.4)
H2 RAW GAS 242.022 FROM V-24219
14"-P-242060-HJE(0.4)
14"-P-242023-HJE
RAW H2 TO PSA UNIT 242.010
CHEM INJ RATIO CALC 240.015 (FFX-383)
BOILER FEEDWATER MAKE-UP 240.012
3"-WB-242002-SAG
LC-309B 242.007
LV 394B
SAG PJG
INJECTION QUILL SP. IQ-242-010
PROCESS CONDENSATE TO E-24202 242.008
4"-PC-242006-PJG
242-MP-015
(NOTE 7)
SP. INJ QUILL IQ-242-014
SP-17 S-1
PT 089
PI 089
I 150
TI 354
TT 354
FV 385
FT 385
FC 385
LV 394A
1-1/2"FO
3"FC
3"
1-1/2"
1/2"
3/4"
FOR MOC 11457 PROJECT USE ONLY
WORKING COPY OF MASTER DRAWING ASBUILT INFORMATION REQUIRED
E-24207 242.008
TC 372
TT 372
HH
SET AT 3000 kPa (ga)
RV 375B
RV 375A
SP. INJ QUILL IQ-242-009
16"-FL-242015-PAC
16"-FL-242013-PAC
16"x8" CSO
12"x6"
12"-P-242045-HJG
12"-P-242042-HJG
LC-309A 242.007
242-MP-013
PROCESS GAS FROM E-24207 242.008
16"-P-242022-HJG
DO NOT POCKET
V-24206
HJG HJE
PROCESS CONDENSATE FROM E-24202 242.008
3"-PC-242001-PJG
LX 370
LOW MEDIAN
HHLL 2660
HLL 1750
NLL 1575
LLL 1400
LLLL 590
MW 24"
MAG
LG 371
LT 371
LC 371A
LC 371B
LX 394
HS 371
LI 371
LTE 373
LTE 372
LG 372
LTE 370
LG 370
LI 373
LI 372
LI 370
E 401
E 400
(NOTE 5)
DP
TUBING
DO 240.009
1800 mm
3"-PC-242013-PJG
FC 377
FT 377
TP-F 242-2
TP 242-2
TP-F 242-3
TP 242-3
FLUOR SPG
(NOTE 15)
(NOTE 14)
(NOTE 9)
(NOTE 3)
(NOTE 4)
14g
023 HJE
060 HJE(0.4)
FQI 383
FI 383
FT 383
2"FC
LV 394B
CHEMICAL INJECTION 240.015
TUBING
VA
2"-VA-242014-PJB
PROCESS COND. FROM STEAM TRAPS 240.006
2"-SC-242036-PJB
3/4" SIPHON VENT
NLL 350
12" HH
V-24207
4"-PC-242014-PAB
1300 mm
6"
4"-PC-242005-PJB
2"FC
4"x2"
PJB PJG
6"-PC-242003-PJG
2"-PC-242015-PJG
LY 371
LZE 371
LZTE 371
LV 371
HS 387
HS 387A
HS 392
HS 392A
RUN/STOP
HOA
I 150
PP
3/4" (NOTE 8)
4"-PC-242007-PJG
P-24201A
P-24201B
SP. TS-242-001
SP. TS-242-002
6"-PC-242004-PJG
P-24201A/B
PROCESS CONDENSATE PUMP
RATED CAPACITY: 70.5 m³/hr
DISCHARGE PRESS: 4833 kPa (ga)
SUCTION PRESS: 2976 kPa (ga)
DRIVER: 75 kW @ 3600 RPM
INSULATION: ET 10 (50 mm)
PUMP TRIM: PJG
NOTES
1. THE UNIT NUMBER, 242, HAS BEEN OMITTED FROM THE INSTRUMENTATION IDENTIFICATION NUMBERS FOR IMPROVED READABILITY.
2. ACTUATOR SPEED SAME AS XV-379.
3. TRACING TO OPERATE CONTINUOUSLY, MAINTAINING PIPE 3°C HIGHER THAN BULK FLUID.
4. ONE RELIEF VALVE IN SERVICE.
5. PROCESS CONDENSATE SEPARATOR HI HI LEVEL SHUTDOWN REQUIRES A 2 OUT OF 3 TRIP. VOTING TO BE DONE IN THE SIS.
6. LOCATE TOP OF TRAP AT SAME ELEVATION AS NLL OF PROCESS CONDENSATE FLASH DRUM.
7. VALVE FOR BOILER CHEMICAL ADDITION. LOCATE VALVE HORIZONTAL.
8. PUMP SEAL FLUSH TUBING AS PER API 610 PLAN 11 & 13 WITH SS TUBING AND SS SWAGELOCK FITTINGS.SEE DWG 240.0000.000.041.017
9. DUAL PLATE CHECK VALVE.
10. DUE TO DESIGN CONSTRAINTS ON THE MAIN HC FLARE SYSTEM DURING AN HRDP, THE FLARE LOAD FROM THE HMU MUST BE MINIMIZED BY SETTING PV-399B (DWG. 242.010) SUCH THAT IT VENTS PRIOR TO PV-376.
11. VALVE EQUIPPED WITH A REMOVABLE MECHANICAL STOP TO ALLOW TESTING WITHOUT CLOSING THE VALVE TO MEET SIL TESTING REQUIREMENTS.
12. PDI-376 HIGH ALARM SET AT 600kPa FOR REFORMER TUBE PROTECTION. REFER TO MOC-7702 FOR FURTHER DETAIL. HMU REFORMER TUBES TO BE RE-RATED TO 3800kPa UPON REPLACEMENT.
KEY PLAN
13. TIE-IN POINTS- SPG TIE-IN SHOWN AS TP-242-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-242-#.
14. CHANGE EXISTING 12" VORTEX FLOWMETER TO 14" ULTRASONIC FLOWMETER.
15. CHAIN OPERATOR REQUIRED ON VALVE.
MOC 11457
REFERENCE DRAWINGS
14g 07/11/11 ISSUED FOR PHA III
14f 04/20/11 ISSUED FOR ESTIMATE
14e 03/01/11 ISSUED FOR PHA II
14d 01/10/11 ISSUED FOR CLIENT REVIEW
14c 12/02/10 ISSUED FOR INTERNAL REVIEW
14b 11/04/10 ISSUED FOR INFORMATION
14 17 AUG 10 SEE CHANGELIST 241.0008.000.041.005 DRS RWM
13 16 AUG 10 SEE CHANGELIST 241.0008.000.041.005 DRS RWM
12 10 MAR 03 SEE CHANGELIST 241.0008.000.041.005 AS IA
4 03 FEB 04 CHANGE LIST 242.0000.000.041.009 (MCF 300) HLR WR GS
3 02 SEP 18 AS-BUILT RVM EG AAI MWP HRM
2 01 SEP 24 REVISED PER DCR 0280 LWM VD NJM MWP HRM
1 01 MAY 17 IFC: REVISED AS NOTED WZF EG RAM CMWP HRM
REV ISSUED DATE DESCRIPTION DWN CHKD ENG APP APP CLNT APP
DRAWING REVISION "0" AFFIXED WITH P.ENG. STAMP ON 00.10.16 AND STAMPED BY: ROBERT A. MACDONALD.
FULL SIZE VERSION OF THIS DRAWING STAMPED WITH PERMIT TO PRACTICE AT REV.0
SHELL CANADA LTD.
ATHABASCA OIL SANDS DOWNSTREAM PROJECT
PARSONS . KRUPP UHDE . TRI OCEAN
PIPING AND INSTRUMENTATION DIAGRAM HYDROGEN MANUFACTURING UNIT TRAIN #2 FINAL SEPARATOR AND PROCESS CONDENSATE PUMP
SCALE: NTS
TOE DWG. No.: 99049-2-DG-BC-00009.1
SHELL DWG NO.: 242.0000.000.041.009
REV. 14g
FORMAT A1
pg4-1600



NOTES

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "440" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. LLL AND HLL SETTINGS FOR CONDENSATE COLLECTION PIPE WILL BE 150mm AND 550mm RESPECTIVELY FROM BOTTOM WELD LINE.
4. NITROGEN PURGE TO BE INSTALLED BY PSA VENDOR ON PSA FLARE HEADER. PSA UNITS HAVE A BOOT IN THE FLARE HEADER THAT CAN BE DRAINED TO OILY WATER SEWER.
5. FLARE HEADER PRESSURE VALUE USED BY PX-443161 & PX-443261 TO CLOSE FLARE VALVES PV-443161 & PV-443261, IN CASE OF HIGHER FLARE HEADER PRESSURE.
6. DELETED.
7. ALL RELIEF VALVE DISCHARGES TO SLOPE TOWARDS THEIR RESPECTIVE SUB AND / OR MAIN HEADER. SUB HEADERS TO SLOPE TOWARDS THE MAIN HEADER.
8. 24" CONDENSATE COLLECTION PIPE SHALL BE 48" LONG WITH WELD CAP ON THE BOTTOM END AND FLANGED HEAD ON THE OTHER. LOCATE THIS FACILITY AS CLOSE TO THE UNIT BATTERY LIMIT AS POSSIBLE, AND AS CLOSE AS POSSIBLE TO GRADE.
9. LG-440048 SHALL BE READABLE FROM VALVE ON NITROGEN LINE TO PUSH HOLD UP LIQUID BACK TO FLARE HEADER.
10. BLOCK AND BLIND VENT TO BE CONSIDERED FOR THE TIE-IN.(BY SPG)
11. SPG TO PROVIDE INSULATION AND EHT FOR THEIR TIE-IN SCOPE.
12. TIE-IN POINTS – SPG TIE-IN SHOWN AS TP 440-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-440-#.

MOC 11457

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
3g	07/11/11	ISSUED FOR PHA III									
3f	04/20/11	ISSUED FOR ESTIMATE									
3e	03/01/11	ISSUED FOR PHA II									
3d	01/10/11	ISSUED FOR CLIENT REVIEW									
3c	12/02/10	ISSUED FOR INTERNAL REVIEW									
3b	11/04/10	ISSUED FOR PRELIMINARY REVIEW									
3	07/27/09	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS				RE	PH
2	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
1	10/10/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	GH	PG	PB	
0	04/12/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

"THE SIGNED APEGGA STAMP RESIDES ON THE ORIGINAL IFC DOCUMENT HELD IN DOCUMENT CONTROL. NO DESIGN CHANGES WILL BE MADE TO THIS DRAWING WITHOUT THE APPROVAL OF A REGISTERED ENGINEER."

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BANTREL
APEGGA PERMIT: P 3913

Job No. 1010

PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU – UNIT 440
FLARE COLLECTION HEADER QUEST TIE-INS

SCALE: NONE

SHELL DWG NO.: 440.0000.000.041.003 REV. 3g

FOR MOC 11457
PROJECT USE ONLY

WORKING COPY OF
MASTER DRAWING
ASBUILT INFORMATION
REQUIRED

NOTES

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "440" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. ELECTRIC TRACE END OF COOLING WATER HEADERS FOR FREEZE PROTECTION.
4. DELETED.
5. BLOCK AND BLIND VENT TO BE CONSIDERED FOR THE TIE-IN.(BY SPG)
6. SPG TO PROVIDE INSULATION AND EHT FOR THEIR TIE-IN SCOPE.
7. TIE-IN POINTS – SPG TIE-IN SHOWN AS TP 440-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-440-#.

MOC 11457

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
3g	07/11/11	ISSUED FOR PHA III									
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3d	01/10/11	ISSUED FOR CLIENT REVIEW									
3c	12/02/10	ISSUED FOR INTERNAL REVIEW									
3b	11/04/10	ISSUED FOR PRELIMINARY REVIEW									
3	07/27/09	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS			RE	PH	
2	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
1	10/10/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	GH	PG	PB	
0	03/26/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

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SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BANTREL
APEGGA PERMIT: P 3913

Job No. 1010

PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU – UNIT 440
COOLING WATER QUEST TIE-INS

SCALE: NONE

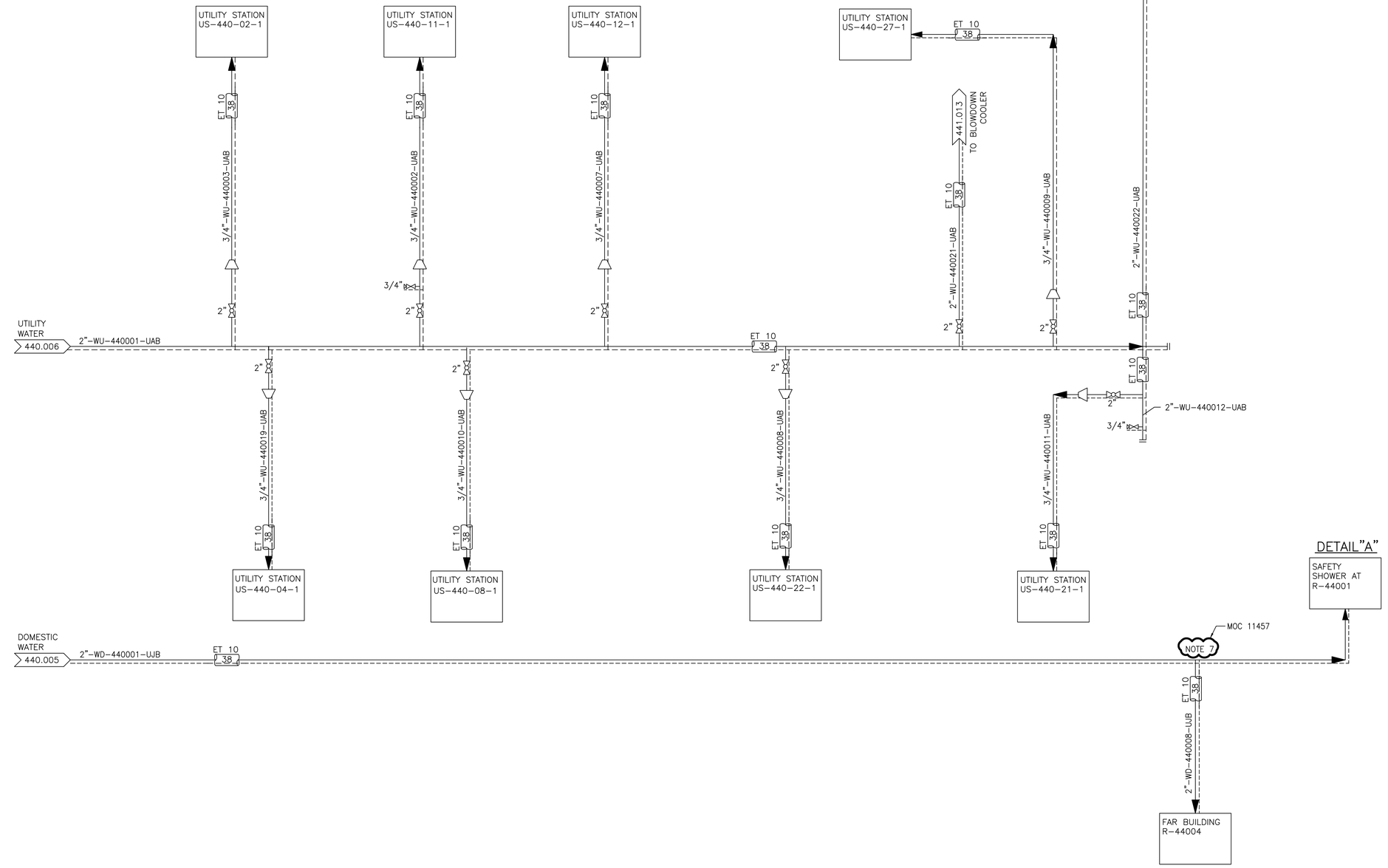
SHELL DWG NO.: 440.0000.000.041.012 REV. 3g

440.0000.000.041.012.DWG

BANTREL File: W:\1010\PIPING\HMU\UNIT-440\REV-3\440.0000.000.041.012 29/07/2009 2:15pm KENOVK

FOR MOC 11457
PROJECT USE ONLY

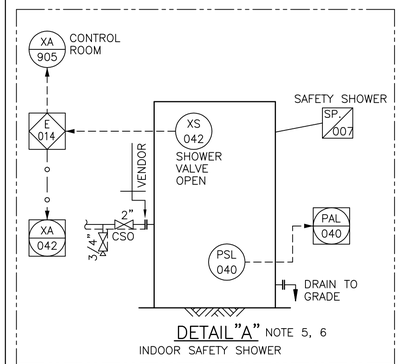
WORKING COPY OF
MASTER DRAWING
ASBUILT INFORMATION
REQUIRED



NOTES

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. DELETED.
3. DELETED.
4. SEE ESTG 3-1.01, PARAGRAPH 4.8.1 AND FIGURES A-18 THRU A-21 FOR UTILITY STATION DETAILS.
5. LOCATE SAFETY SHOWER AND EYEWASH STATION IN HEATED ENCLOSURE.
6. FOR SAFETY SHOWER DETAILS SEE VENDOR DRAWINGS, 25183-C10-V1A-PY10-00009.
7. QUEST SAFETY SHOWER TO BE REVIEWED. CONSIDER USE OF STANDALONE, SELF-CONTAINED PACKAGE.
8. BLOCK AND BLIND VENT TO BE CONSIDERED FOR THE TIE-IN.(BY SPG)
9. TIE-IN POINTS – SPG TIE-IN SHOWN AS TP 440-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-440-#.

MOC 11457



DETAIL"A" NOTE 5, 6
INDOOR SAFETY SHOWER

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
3g	07/11/11	ISSUED FOR PHA III									
3f	04/20/11	ISSUED FOR ESTIMATE									
3e	03/01/11	ISSUED FOR PHA II									
3d	01/10/11	ISSUED FOR CLIENT REVIEW									
3c	12/03/10	ISSUED FOR INTERNAL REVIEW									
3b	11/04/10	ISSUED FOR PRELIMINARY REVIEW									
3	2009-07-28	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS			RE	PH	
2	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
1	10/10/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	NN	PG	PB	
0	03/20/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

"THE SIGNED APEGGA STAMP RESIDES ON THE ORIGINAL IFC DOCUMENT HELD IN DOCUMENT CONTROL. NO DESIGN CHANGES WILL BE MADE TO THIS DRAWING WITHOUT THE APPROVAL OF A REGISTERED ENGINEER."

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

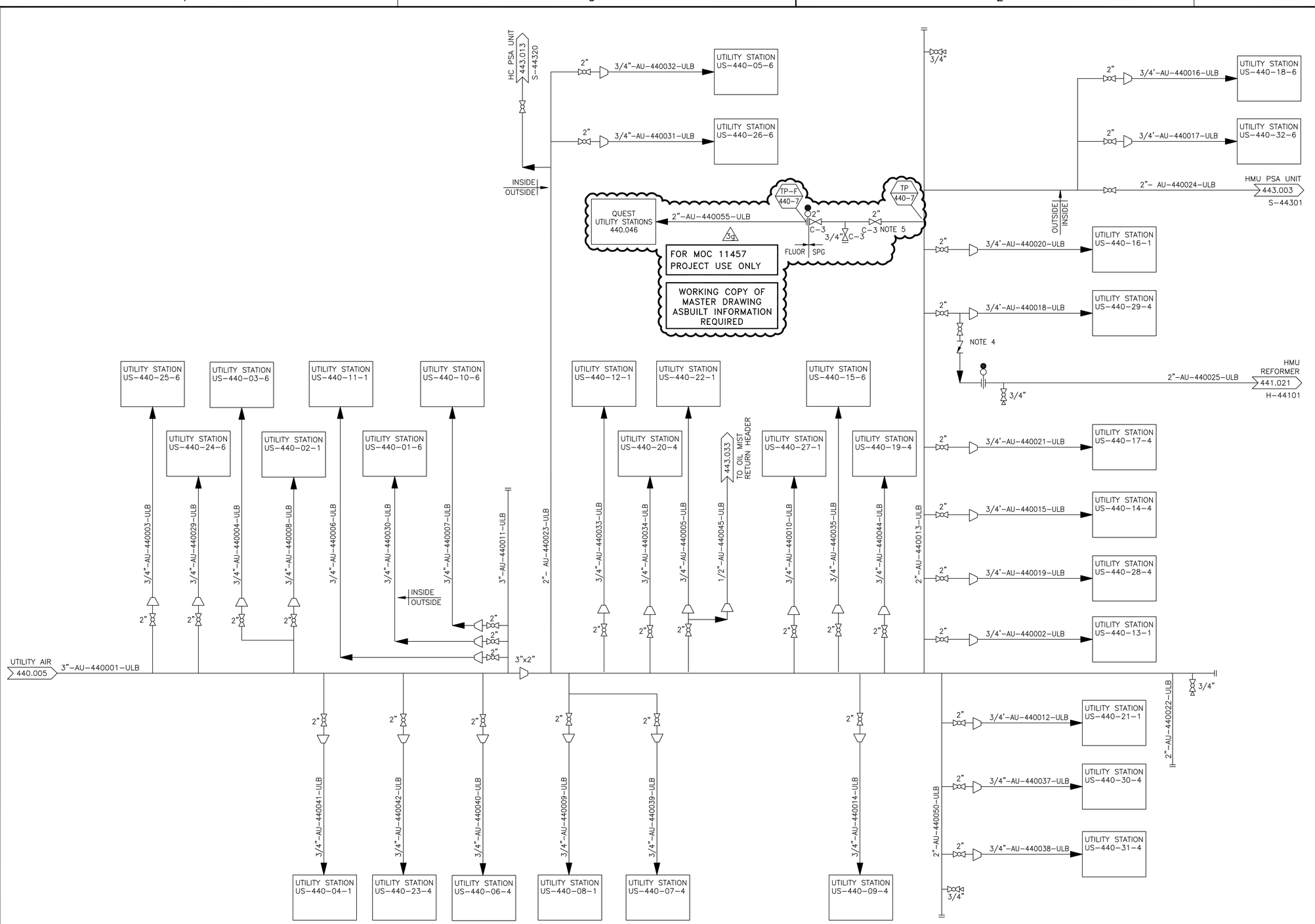
BANTREL
APEGGA PERMIT: P 3913

Job No. 1010

PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU – UNIT 440
UTILITY AND DOMESTIC WATER QUEST TIE-INS

SCALE: NONE

SHELL DWG NO.: 440.0000.000.041.014 REV. 3g



NOTES

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. DELETED.
3. DELETED.
4. LOCATE BLOCK VALVE AND CHECK VALVE CLOSE TO REFORMER.
5. BLOCK AND BLIND VENT TO BE CONSIDERED FOR THE TIE-IN.(BY SPG)
6. TIE-IN POINTS – SPG TIE-IN SHOWN AS TP 440-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-440-#

MOC 11457

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
3g	07/11/11	ISSUED FOR PHA III									
3f	04/20/11	ISSUED FOR ESTIMATE									
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3c	12/03/10	ISSUED FOR INTERNAL REVIEW									
3b	11/04/10	ISSUED FOR PRELIMINARY REVIEW									
3	07/24/09	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS			RE	PH	
2	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
1	10/10/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	NN	PG	PB	
0	03/26/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

"THE SIGNED APEGGA STAMP RESIDES ON THE ORIGINAL IFC DOCUMENT HELD IN DOCUMENT CONTROL. NO DESIGN CHANGES WILL BE MADE TO THIS DRAWING WITHOUT THE APPROVAL OF A REGISTERED ENGINEER."

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BANTREL
APEGGA PERMIT: P 3913

Job No. 1010

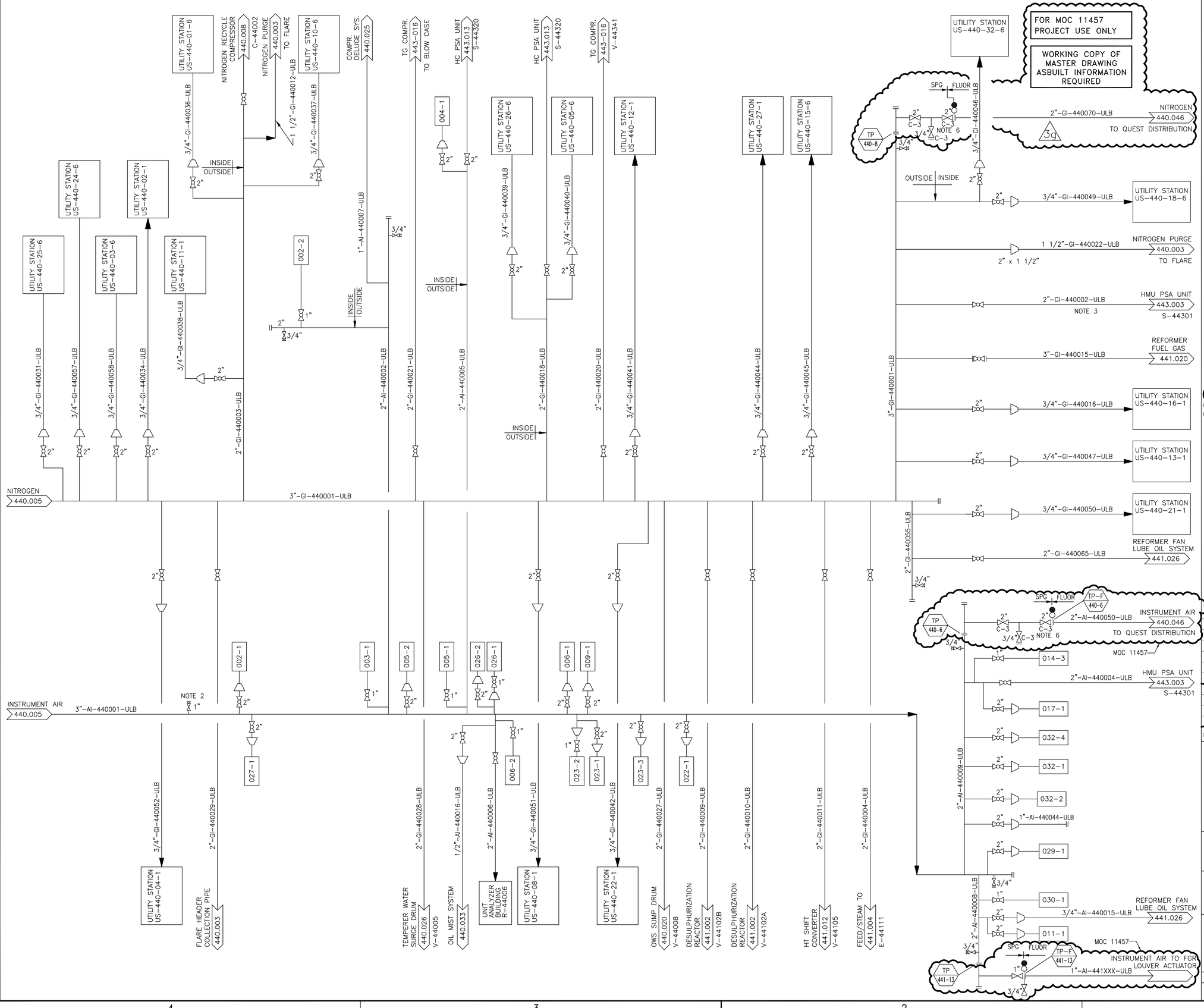
PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU – UNIT 440
PLANT AIR QUEST TIE-INS

SCALE: NONE

SHELL DWG NO.: 440.0000.000.041.015

REV. 3g

440.0000.000.041.015.DWG



NOTES

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. TYPICAL EVERY 6 m IN THE PIPERACKS.
3. USE 2-INCH NITROGEN LINE TO PSA UNIT FOR PURGING.
4. DELETED.
5. TYPICAL ON HEADERS AND SUB-HEADERS PROVIDED FOR INSTRUMENT AIR SUPPLY TO USERS (i.e. CONTROL VALVES).

NO.	MANIFOLD#	LINE NUMBER
1	M-IA440.022-1	1"-AI-440020-ULB
2	M-IA440.006-1	1"-AI-440021-ULB
3	M-IA440.006-2	1"-AI-440022-ULB
4	M-IA440.009-1	1"-AI-440023-ULB
5	M-IA440.026-1	1"-AI-440024-ULB
6	M-IA440.026-2	1"-AI-440025-ULB
7	M-IA440.005-1	1"-AI-440026-ULB
8	M-IA440.005-2	1"-AI-440027-ULB
9	M-IA440.003-1	1"-AI-440028-ULB
10	M-IA440.027-1	1"-AI-440029-ULB
11	M-IA440.002-1	1"-AI-440030-ULB
12	M-IA440.032-1	1"-AI-440031-ULB
13	M-IA440.032-2	1"-AI-440032-ULB
14	M-IA440.014-3	1"-AI-440033-ULB
15	M-IA440.032-4	1"-AI-440034-ULB
16	M-IA440.011-1	1"-AI-440035-ULB
17	M-IA440.030-1	1"-AI-440036-ULB
18	M-IA440.029-1	1"-AI-440037-ULB
19	M-IA440.017-1	1"-AI-440038-ULB
20	M-IA440.004-1	1"-AI-440039-ULB
21	M-IA440.002-2	1"-AI-440040-ULB
22	M-IA440.023-1	1"-AI-440041-ULB
23	M-IA440.023-2	1"-AI-440042-ULB
24	M-IA440.023-3	1"-AI-440043-ULB

6. BLOCK AND BLIND VENT TO BE CONSIDERED FOR THE TIE-IN.(BY SPG)
7. TIE-IN POINTS - SPG TIE-IN SHOWN AS TP 44X-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-44X-#.

MOC 11457

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
3g	07/11/11	ISSUED FOR PHA III									
3f	04/20/11	ISSUED FOR ESTIMATE									
3e	03/01/11	ISSUED FOR PHA II									
3d	01/10/11	ISSUED FOR CLIENT REVIEW									
3c	12/02/10	ISSUED FOR INTERNAL REVIEW									
3b	11/04/10	ISSUED FOR PRELIMINARY REVIEW									
3	2009-07-23	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS			RE	PH	
2	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
1	10/10/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	NN	PG	PB	
0	03/26/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

"THE SIGNED APEGGA STAMP RESIDES ON THE ORIGINAL IFC DOCUMENT HELD IN DOCUMENT CONTROL. NO DESIGN CHANGES WILL BE MADE TO THIS DRAWING WITHOUT THE APPROVAL OF A REGISTERED ENGINEER."

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BANTREL
APEGGA PERMIT: P 3913

Job No. 1010

PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU - UNIT 440
INSTRUMENT AIR AND NITROGEN QUEST TIE-INS

SCALE: NONE

SHELL DWG NO.: 440.0000.000.041.016 REV. 3g

440.0000.000.041.016.DWG

BANTREL File: W:\1010\PIPING\HMU\UNIT-440\REV-3\440.0000.000.041.016 13/07/2009 1:06pm GORDONA

BUILDING NO. R-44001			
ITEM NUMBER	LP STEAM HEADER / BRANCH NO.	LP STEAM LINE FROM	CONDENSATE HEADER NO.
SUB-HEADER 1	4"-SL-440078-SAB	–	2"-SCL-440079-SAB
SUB-HEADER 2	3"-SL-440014-SAB	–	2"-SCL-440006-SAB
E-44010 A	2"-SL-440014-SAB	1 1/2"-SL-440082-SAB	2"-SCL-440006-SAB
E-44010 B	2"-SL-440014-SAB	1 1/2"-SL-440083-SAB	2"-SCL-440006-SAB
E-44010 C	2"-SL-440014-SAB	1 1/2"-SL-440084-SAB	2"-SCL-440006-SAB
E-44010 D	2"-SL-440014-SAB	1 1/2"-SL-440085-SAB	2"-SCL-440006-SAB
E-44010 E	2"-SL-440078-SAB	1 1/2"-SL-440086-SAB	2"-SCL-440079-SAB
E-44010 F	2"-SL-440078-SAB	1 1/2"-SL-440087-SAB	2"-SCL-440079-SAB
E-44010 G	2"-SL-440078-SAB	1 1/2"-SL-440088-SAB	2"-SCL-440079-SAB
E-44010 H	2"-SL-440078-SAB	1 1/2"-SL-440089-SAB	2"-SCL-440079-SAB
TV-440181	4"-SL-440093-SAB	1 1/2"-SL-440081-SAB	2"-SCL-440078-SAB

BUILDING NO. R-44302			
ITEM NUMBER	LP STEAM HEADER / BRANCH NO.	LP STEAM LINE FROM	CONDENSATE HEADER NO.
SUB-HEADER	3"-SL-440080-SAB	–	2"-SCL-443006-SAB
E-44308 A	2"-SL-440080-SAB	1 1/2"-SL-443017-SAB	2"-SCL-443006-SAB
E-44308 B	2"-SL-440080-SAB	1 1/2"-SL-443018-SAB	2"-SCL-443006-SAB
E-44308 C	2"-SL-440080-SAB	1 1/2"-SL-443019-SAB	2"-SCL-443006-SAB
E-44308 D	2"-SL-440080-SAB	1 1/2"-SL-443020-SAB	2"-SCL-443006-SAB
E-44308 E	2"-SL-440080-SAB	1 1/2"-SL-443021-SAB	2"-SCL-443006-SAB
E-44308 F	2"-SL-440080-SAB	1 1/2"-SL-443022-SAB	2"-SCL-443006-SAB
E-44308 G	2"-SL-440080-SAB	1 1/2"-SL-443023-SAB	2"-SCL-443006-SAB
E-44308 H	2"-SL-440080-SAB	1 1/2"-SL-443024-SAB	2"-SCL-443006-SAB
TV-443281	3"-SL-440080-SAB	2"-SL-443016-SAB	2"-SCL-443005-SAB

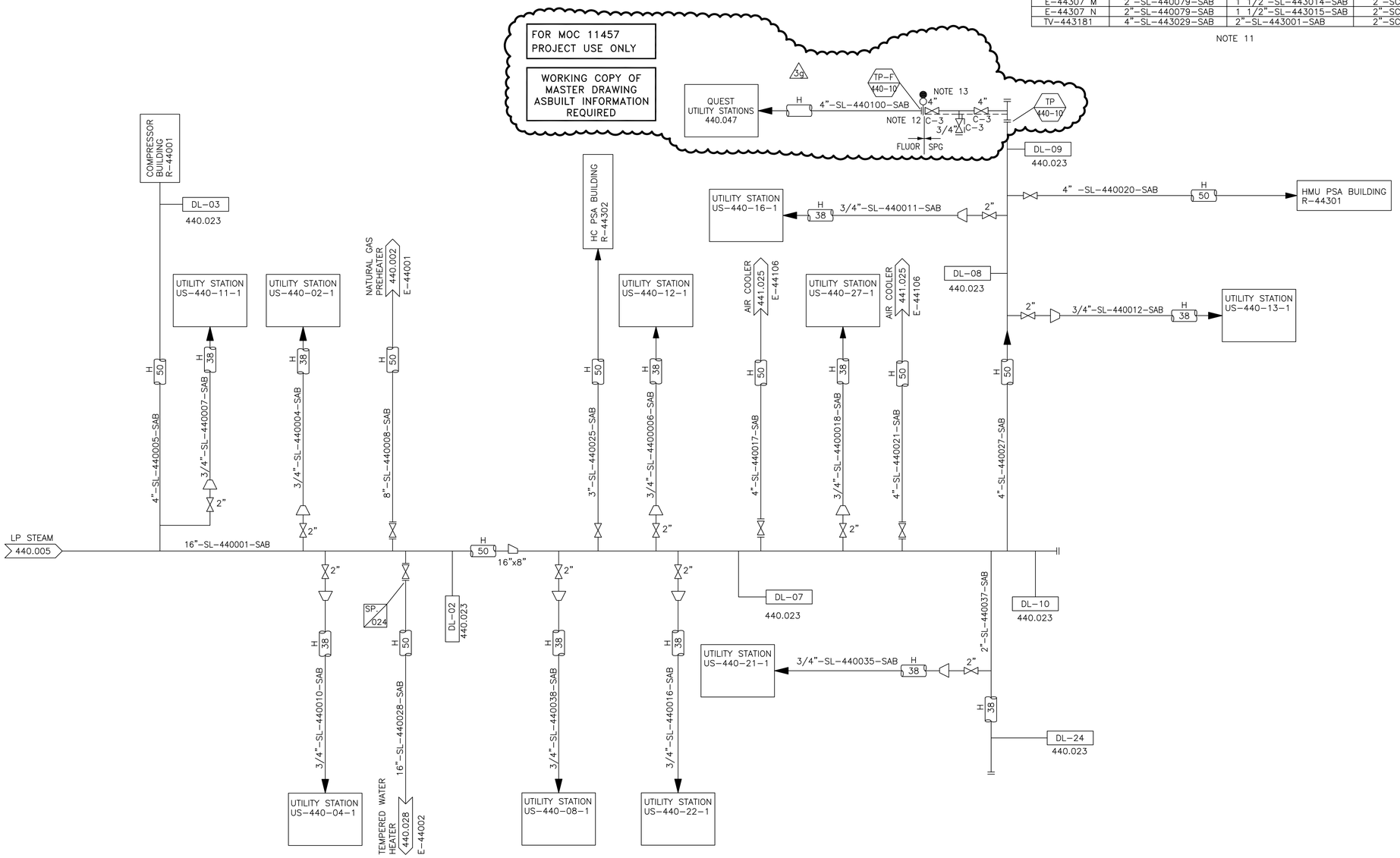
NOTE 11

BUILDING NO. R-44301			
ITEM NUMBER	LP STEAM HEADER / BRANCH NO.	LP STEAM LINE FROM	CONDENSATE HEADER NO.
SUB-HEADER	4"-SL-440079-SAB	–	3"-SCL-443004-SAB
E-44307 A	2"-SL-440079-SAB	1 1/2"-SL-443002-SAB	2"-SCL-443004-SAB
E-44307 B	2"-SL-440079-SAB	1 1/2"-SL-443003-SAB	2"-SCL-443004-SAB
E-44307 C	2"-SL-440079-SAB	1 1/2"-SL-443004-SAB	2"-SCL-443004-SAB
E-44307 D	2"-SL-440079-SAB	1 1/2"-SL-443005-SAB	2"-SCL-443004-SAB
E-44307 E	2"-SL-440079-SAB	1 1/2"-SL-443006-SAB	2"-SCL-443004-SAB
E-44307 F	2"-SL-440079-SAB	1 1/2"-SL-443007-SAB	2"-SCL-443004-SAB
E-44307 G	2"-SL-440079-SAB	1 1/2"-SL-443008-SAB	2"-SCL-443004-SAB
E-44307 H	2"-SL-440079-SAB	1 1/2"-SL-443009-SAB	2"-SCL-443004-SAB
E-44307 I	2"-SL-440079-SAB	1 1/2"-SL-443010-SAB	2"-SCL-443004-SAB
E-44307 J	2"-SL-440079-SAB	1 1/2"-SL-443011-SAB	2"-SCL-443004-SAB
E-44307 K	2"-SL-440079-SAB	1 1/2"-SL-443012-SAB	2"-SCL-443004-SAB
E-44307 L	2"-SL-440079-SAB	1 1/2"-SL-443013-SAB	2"-SCL-443004-SAB
E-44307 M	2"-SL-440079-SAB	1 1/2"-SL-443014-SAB	2"-SCL-443004-SAB
E-44307 N	2"-SL-440079-SAB	1 1/2"-SL-443015-SAB	2"-SCL-443004-SAB
TV-443181	4"-SL-443029-SAB	2"-SL-443001-SAB	2"-SCL-443003-SAB

NOTE 11

FOR MOC 11457
PROJECT USE ONLY

WORKING COPY OF MASTER DRAWING ASBUILT INFORMATION REQUIRED



NOTES

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ESTG 3-1.01, PARAGRAPH 4.8.1 AND FIGURES A-18 THRU A-21 FOR UTILITY STATION DETAILS.
3. SATURATED STEAM. TRAP AT ALL LOW POINTS AND IN HEADERS PER ESTG, INCLUDING END OF RUNS.
4. DELETED.
5. DELETED.
6. DELETED.
7. DELETED.
8. DELETED.
9. DELETED.
10. DELETED.
11. REFER TO LDT# 443.0311.000.031.027 FOR MORE INFORMATION FOR LINES WITH # A 443 AREA PREFIX.
12. BLOCK AND BLIND VENT TO BE CONSIDERED FOR THE TIE-IN.(BY SPG)
13. SPG TO PROVIDE INSULATION AND EHT FOR THEIR TIE-IN SCOPE.
14. TIE-IN POINTS – SPG TIE-IN SHOWN AS TP 440-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-440-#.

MOC 11457

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP.
3g	07/11/11	ISSUED FOR PHA III									
3f	04/20/11	ISSUED FOR ESTIMATE									
3e	03/01/11	ISSUED FOR PHA II									
3d	01/10/11	ISSUED FOR CLIENT REVIEW									
3c	12/03/10	ISSUED FOR INTERNAL REVIEW									
3b	04/11/10	ISSUED FOR PRELIMINARY REVIEW									
3	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
2	11/02/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	GH	HV	PB	
1	10/10/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	NN	PG	PB	
0	03/26/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BANTREL
APEGGA PERMIT: P 3913

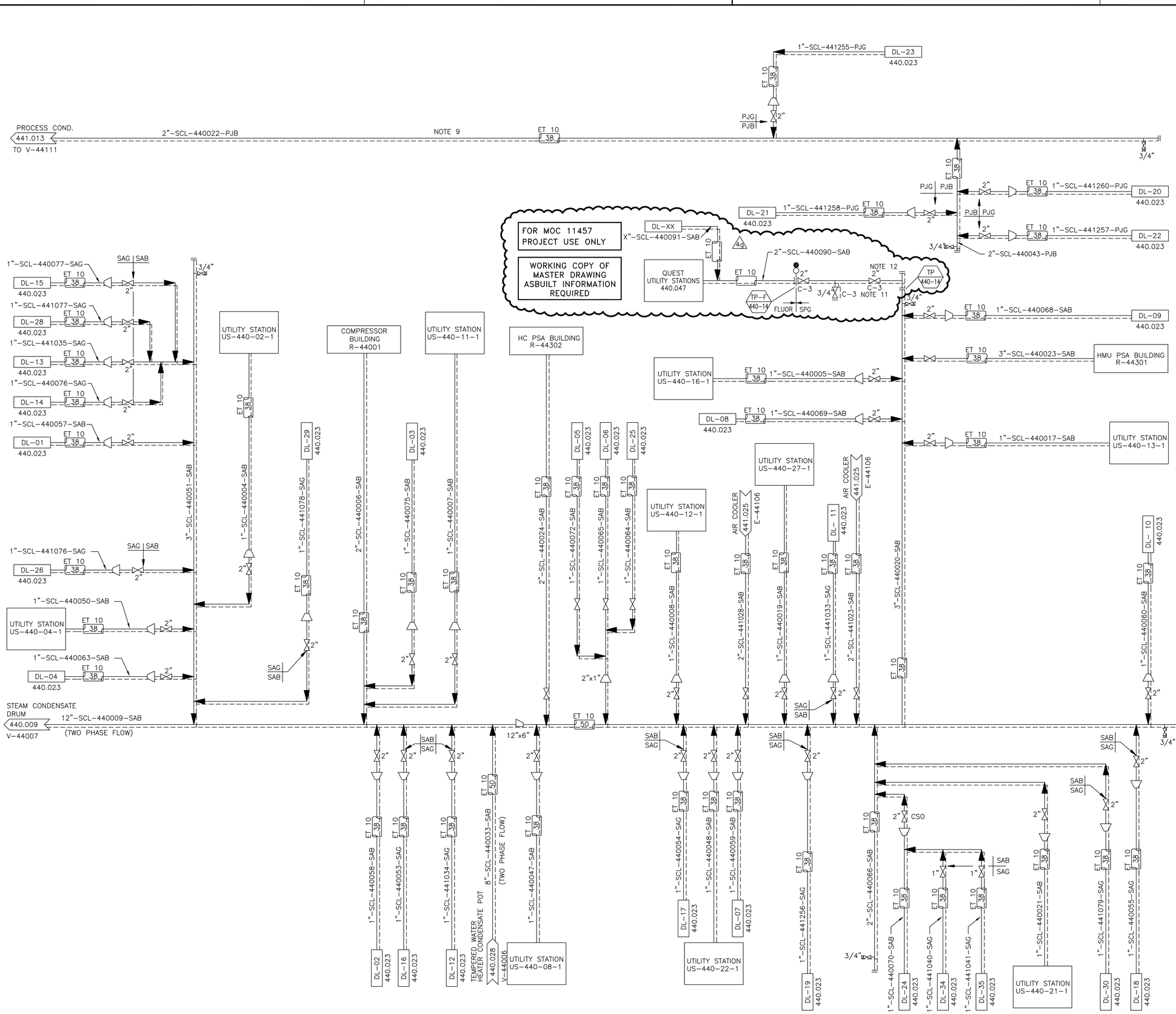
Job No. 1010

PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU – UNIT 440
LP STEAM QUEST TIE-INS

SCALE:

SHELL DWG NO.: 440.0000.000.041.018 REV. 3g

FILE: T:\1010\PIPING\HMU\UNIT-440\REV-3\440.0000.000.041.018.DWG:MODEL DATE: 01-29-2008, 8:45am PATELK



NOTES

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. SEE ESTG 3-1.01, FIGURES A-8, A-13, AND A-14 FOR TYPICAL CONDENSATE BOOT AND DRIP LEG HOOK-UPS.
3. DELETED.
4. ALL 1" STEAM CONDENSATE RETURNS FROM UTILITY STATIONS TO BE INSULATED (H 38) AND TRACED (ET 10).
5. TRACE SECTION OF LINE NOT PROTECTED BY STEAM TRAPS.
6. DELETED.
7. DELETED.
8. DELETED.
9. PROCESS STEAM TRAP SUB HEADER (SEE DWG. 440.023).
10. SEE ESTG 3-1.01, PARAGRAPH 4.8.1 AND FIGURES A-18 THRU A-21 FOR UTILITY STATION DETAILS.
11. BLOCK AND BLIND VENT TO BE CONSIDERED FOR THE TIE-IN.(BY SPG)
12. SPG TO PROVIDE INSULATION AND EHT FOR THEIR TIE-IN SCOPE.
13. TIE-IN POINTS- SPG TIE-IN SHOWN AS TP 440-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-440-#.

MOC 11457

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
4g	07/11/11	ISSUED FOR PHA III									
4f	04/20/11	ISSUED FOR ESTIMATE									
4e	03/01/11	ISSUED FOR PHA II									
4d	01/10/11	ISSUED FOR CLIENT REVIEW									
4c	12/03/10	ISSUED FOR INTERNAL REVIEW									
4b	11/04/10	ISSUED FOR PRELIMINARY REVIEW									
4	02/11/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	RR	NN	
3	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
2	10/24/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	GH	PG	PB	
1	10/10/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	GH	PG	PB	
0	03/20/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BANTREL
APEGGA PERMIT: P 3913

Job No. 1010

PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU – UNIT 440
CONDENSATE QUEST TIE-INS

SCALE: NONE

SHELL DWG NO.: 440.0000.000.041.019 REV. 4g

440.0000.000.041.019.DWG

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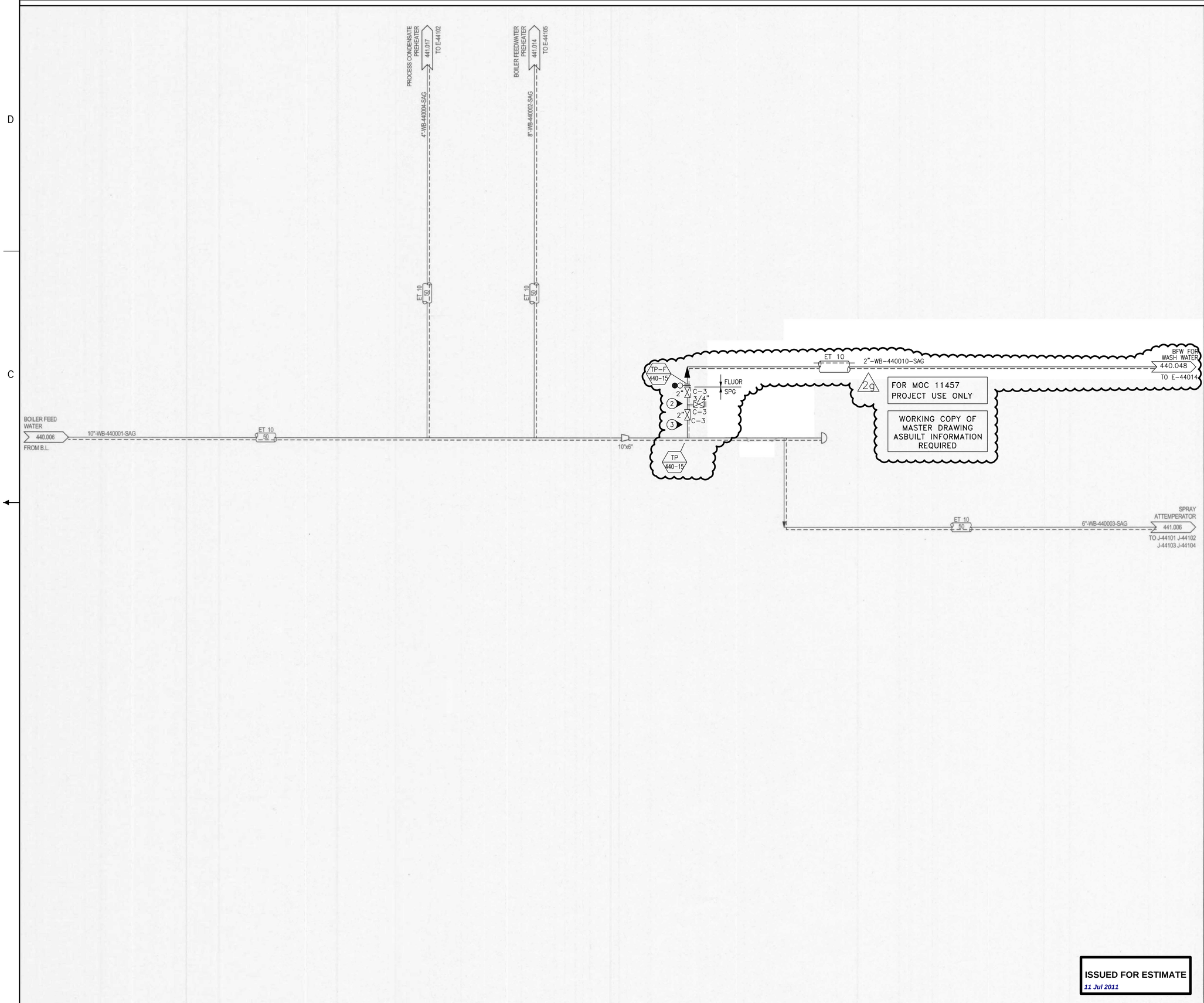


NOTES:

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000,041.001,002,003,004,005 AND 006.
2. BLOCK AND BLIND VENT TO BE CONSIDERED FOR THE TIE-IN.(BY SPG)
3. SPG TO PROVIDE INSULATION AND EHT FOR THEIR TIE-IN SCOPE.
4. TIE-IN POINTS - SPG TIE-IN SHOWN AS TP 440-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-440-#.

MOC 11457

MASTER DRAWING
AS BUILT
INFORMATION REQUIRED

FOR SUPPLEMENTARY REVISION HISTORY OF THIS DOCUMENT, REFER TO REVISION LIST 440.0000.000.041.021R.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
2g	07/11/11	ISSUED FOR PHA III									
2f	04/20/11	ISSUED FOR ESTIMATE									
2e	03/01/11	ISSUED FOR PHA II									
2d	01/10/11	ISSUED FOR CLIENT REVIEW									
2c	12/02/10	ISSUED FOR INTERNAL REVIEW									
2b	11/04/10	ISSUED FOR PRELIMINARY REVIEW									
2	09/30/10	AS BUILT WITH NO CHANGE	LWJ	SL	-	-	-	-	-	-	
1	10/10/07	ISSUED FOR CONSTRUCTION	PD	HG	HG	LG	DM	NN	PG	PB	
0	03/20/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

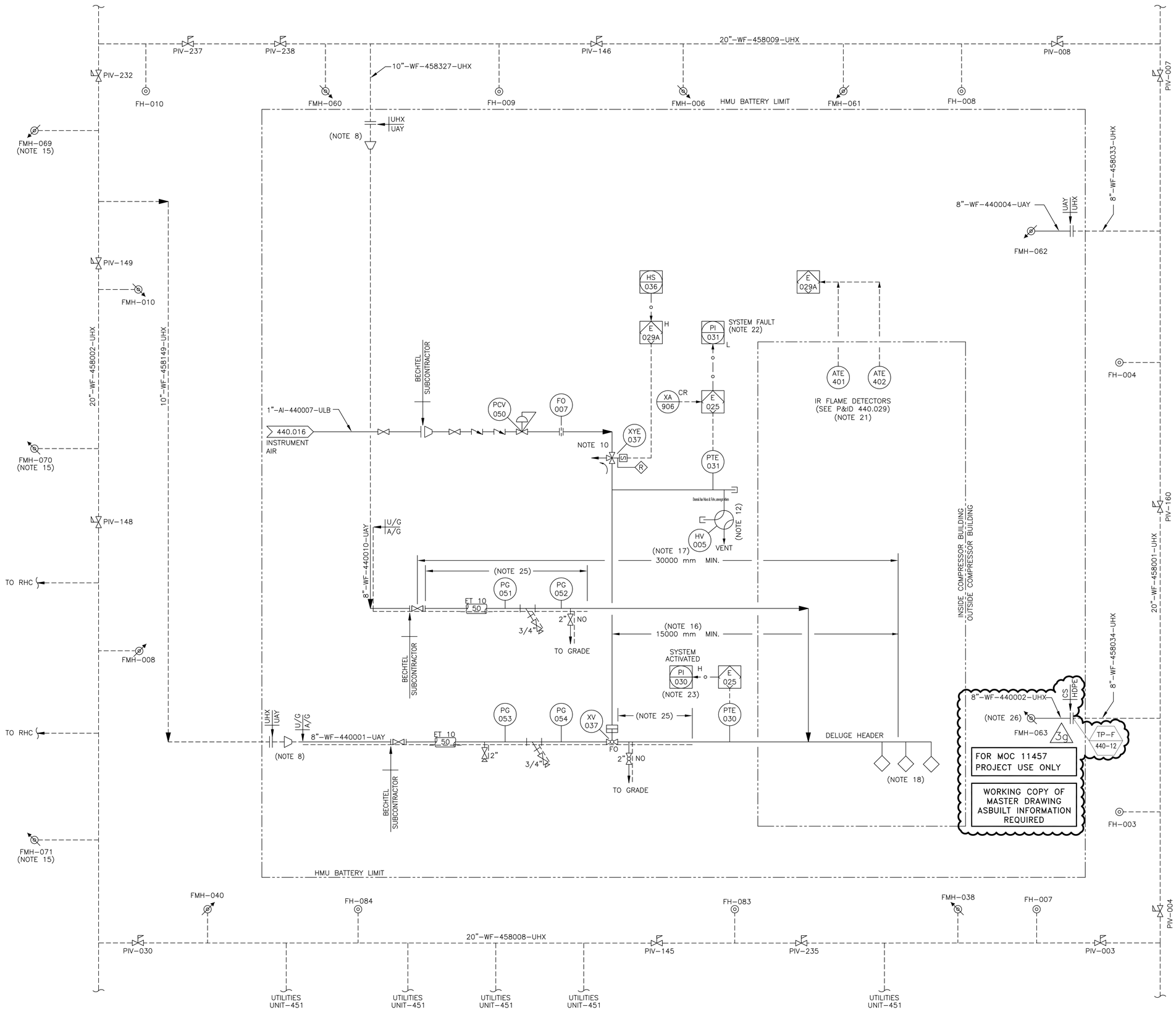
BECHTEL CANADA CO.
JOB NO. 25183

PIPING AND INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU-UNIT 440
QUEST TIE-IN

SCALE: NONE

SHELL DWG NO.: 440.0000.000.041.021 REV. 2g

440.0000.000.041.025.DWG



NOTES

1. FIRE WATER AND FIRE PROTECTION SYSTEM SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH ESTG 21-1.03 "FIRE WATER SYSTEMS" AND ESTG 21-1.02 "FIRE PROTECTION AND PERSONNEL SAFETY".
2. ALL LATERALS TO FIRE HYDRANTS AND FIRE MONITORS SHALL COMPLY WITH ESTG 3-1.01 "PIPING DESIGN" AND ESTG 3-1.03 "PIPE, VALVES AND FITTINGS-PIPING CLASSES".
3. HYDRANTS SHALL BE DESIGNED FOR FREEZE PROTECTION DUE TO THE HIGH WATER TABLE.
4. FIRE HYDARNTS AND FIRE MONITORS SHALL BE IDEALLY LOCATED 1 TO 3 METRES FROM THE CURB OR EDGE OF THE ROAD AND AT LEAST 10 METRES FROM INTERSECTIONS OR BUILDINGS.
5. FIXED MONITORS ARE TO BE SPOTTED APPROXIMATELY 20 METRES FROM THE EQUIPMENT TO BE PROTECTED AND OUTSIDE THE EXPECTED DRAINAGE ROUTES.
6. MONITOR COVERAGE IS THROW LENGTH. HYDRANT COVERAGE IS 100 METRES HOSE LENGTH PLUS THROW LENGTH.
7. OUTSIDE BATTERY LIMIT INSTALLATION BY OTHERS.
8. RISER INSTALLED SEPARATELY SHALL BE INSULATED AND ELECTRIC TRACED U/G TO THE FROST LINE. 38 mm INSULATION ON TRACED LINES 4" AND SMALLER; 50 mm 6" AND LARGER.
9. DELETED.
10. NORMALLY ENERGIZED SOLENOID VALVE.
11. DELETED.
12. PNEUMATIC DUMP VALVE TO BE LOCATED NEAR DELUGE VALVE.
13. DELETED.
14. DELETED.
15. THIS FMH IS PART OF RHC FIRE WATER SYSTEM.
16. VALVE XV-440037 SHALL BE MINIMUM OF 15 m FROM THE CENTRELINE OF THE PROTECTED EQUIPMENT.
17. MANUAL VALVE SHALL BE MINIMUM OF 30 m FROM THE CENTRELINE OF THE PROTECTED EQUIPMENT.
18. DELUGE CONCEPTUAL DESIGN PROVIDES FOR PRE-AIMED MONITORS FOR EQUIPMENT COVERAGE. HYDRAULIC ANALYSIS DURING DETAILED DESIGN BY THE VENDOR MAY INDICATE HYDRAULIC LIMITATIONS THAT MAY REQUIRE THE USE OF NORMAL NFPA-15 TYPE HEADS.
19. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
20. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "440" UNLESS OTHERWISE IDENTIFIED ON P&ID.
21. ALL INSTRUMENT CABLE SYSTEMS & OPTICAL FIRE DETECTION SUPPLIED BY BECHTEL.
22. LOW PRESSURE TO IDENTIFY SYSTEM FAULT PRIOR TO ACTIVATING FAULT.
23. HIGH PRESSURE TO IDENTIFY SYSTEM ACTIVATION.
24. DELETED.
25. TRACING DOWNSTREAM OF THE MANUAL & ACTUATED DELUGE VALVES SHALL TERMINATE AT A MINIMUM DISTANCE OF 1 m IN THE VERTICAL PORTION OF PIPE.
26. DEMOLISH AND RELOCATE DETAILS TBD.
27. TIE-IN POINTS - SPG TIE-IN SHOWN AS TP 440-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-440-#.

MOC 11457

LEGEND

- FIRE HYDRANT WITH MONITOR REQUIRES AN 8" HDPE FEED FROM HEADER (FMH)
- FIRE HYDRANT REQUIRES AN 8" HDPE FEED FROM HEADER (FH)
- POST INDICATOR GATE VALVE (PIV)
- FLUSH CONNECTION
- OPEN SPRAY HEAD

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
3g	07/11/11	ISSUED FOR PHA III									
3f	04/20/11	ISSUED FOR ESTIMATE									
3e	03/01/11	ISSUED FOR PHA II									
3d	01/10/11	ISSUED FOR CLIENT REVIEW									
3c	12/02/10	ISSUED FOR INTERNAL REVIEW									
3b	11/04/10	ISSUED FOR INFORMATION									
3	08/11/09	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS		DB	RB	RB	
2	04/02/08	ISSUED FOR CONSTRUCTION	HG	CJC	CJC	LG	DM	GH	NN	PB	
1	01/25/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
0	08/30/07	ISSUED FOR CONSTRUCTION	AH	CJC	HG	LG	DM	NN	PG	PB	

ISSUED FOR ESTIMATE
11 Jul 2011

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BANTREL
APEGGA PERMIT: P 3913

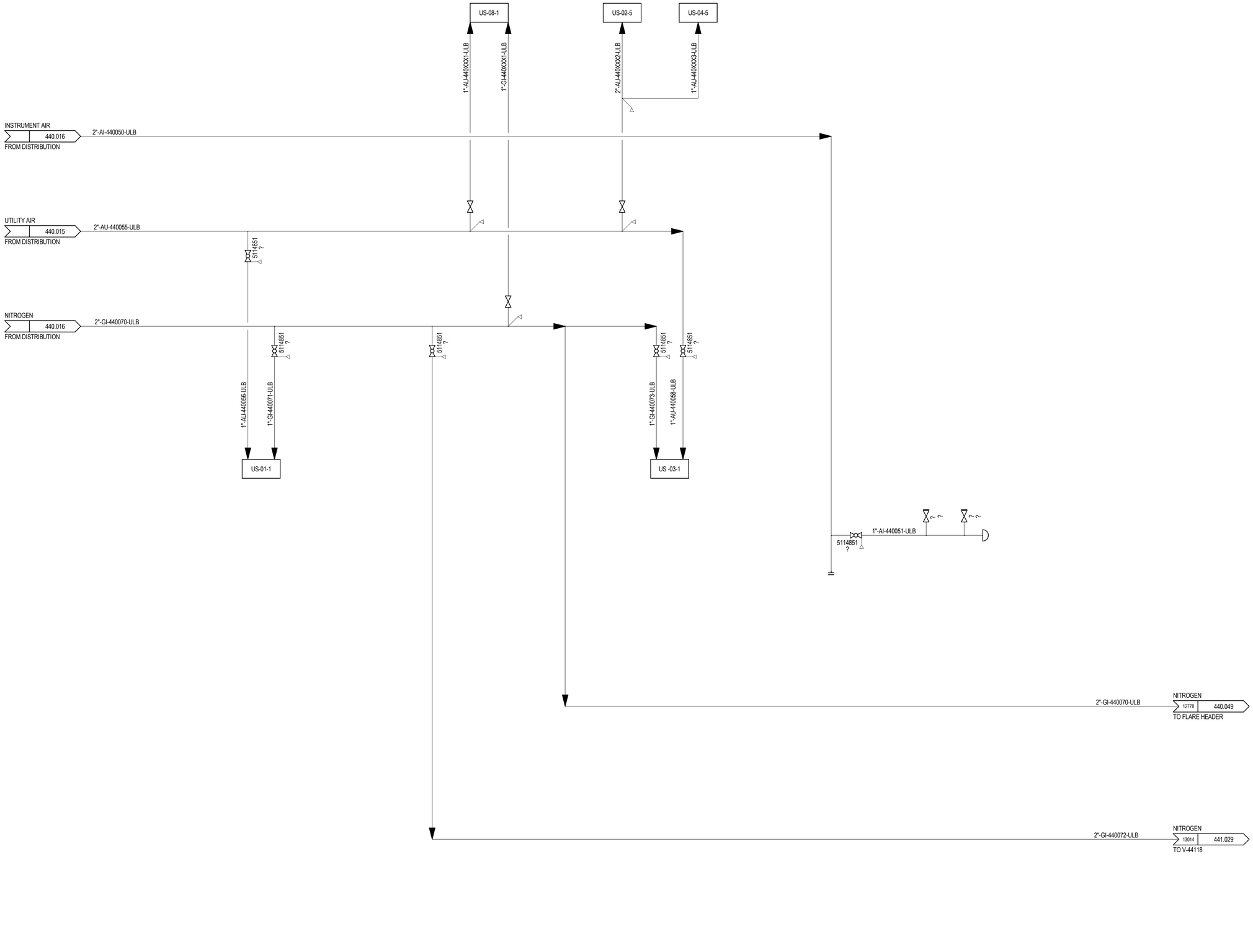
Job No. 1010

PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU - UNIT 440
FIRE WATER QUEST TIE-INS

SCALE: NONE

SHELL DWG NO.: 440.0000.000.041.025

REV. 3g



1 . SEE DRAWINGS 200.0000.000.041.007 THRU 016 FOR SYMBOL IDENTIFICATION GENERAL NOTES & CONNECTION DETAILS.
2 . ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY"440' UNLESS OTHERWISE STATED.
3 . DEP 31.38.01.11 PIPING DESIGN GENERAL REQUIREMENTS SECTION 5.8 AND FIGURE 18-2 TO 18-5 FOR UTILITY STATION DETAILS.
4 . PIPING HEADER BRANCH CONNECTIONS SHALL BE MADE ON TOP OF PIPE AND BE VALVED.

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
G	07/11/11	ISSUED FOR PHA III									
F	04/20/11	ISSUED FOR ESTIMATE									
E	03/01/11	ISSUED FOR PHA II									
D	01/10/11	ISSUED FOR CLIENT REVIEW									
C	12/02/10	ISSUED FOR INTERNAL REVIEW									
B		ISSUED FOR PRELIMINARY REVIEW									

SHELL CANADA
QUEST CCS PROJECT

FLUOR®

PIPING AND INSTRUMENT DIAGRAM
QUEST CCS PROJECT
UNIT 440 - HYDROGEN MANUFACTURING UNIT
INST. AIR, UTILITY AIR, AND NITROGEN DISTRIBUTION

SCALE: NONE
SHELL DWG NO.: 440.0000.000.041.046 REV. G

440.046
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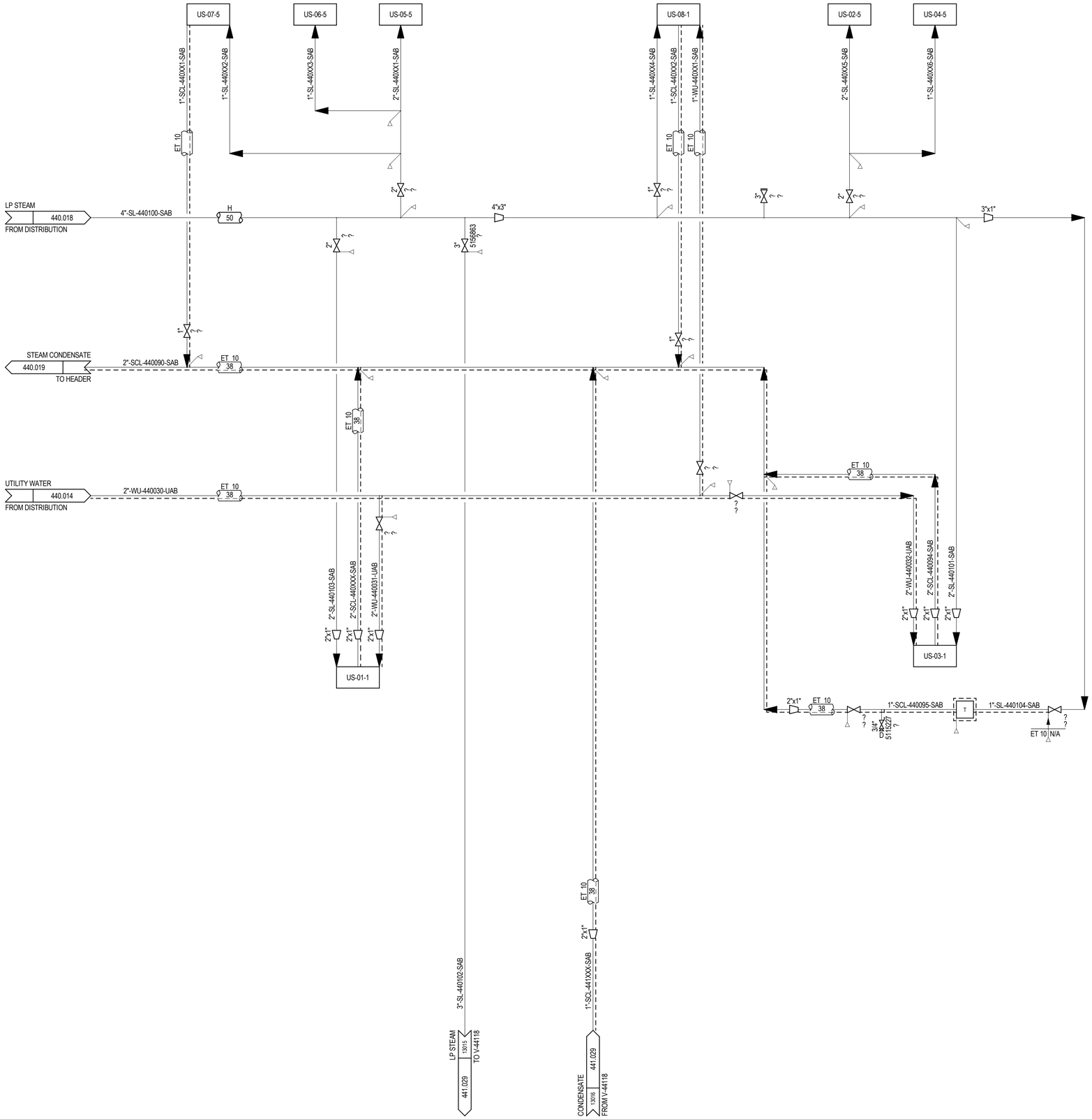

1 . SEE DRAWINGS 200.0000.000.041.007 THRU 016 FOR SYMBOL IDENTIFICATION GENERAL NOTES & CONNECTION DETAILS.
2 . ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY "440" UNLESS OTHERWISE NOTED.
3 . DEP 31.38.01.11 PIPING DESIGN GENERAL REQUIREMENTS SECTION 5.8 AND FIGURE 18-2 TO 18-5 FOR UTILITY STATION DETAILS.
4 . SATURATED STEAM TRAP AT ALL LOW POINTS AND IN HEADERS PER ESTG, INCLUDING END OF RUNS.
5 . PIPING HEADER BRANCH CONNECTIONS SHALL BE MADE ON TOP OF PIPE AND BE VALVED.

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP.
G	07/11/11	ISSUED FOR PHA III									
F	04/20/11	ISSUED FOR ESTIMATE									
E	03/01/11	ISSUED FOR PHA II									
D	01/10/11	ISSUED FOR CLIENT REVIEW									
C	12/02/10	ISSUED FOR INTERNAL REVIEW									
B		ISSUED FOR PRELIMINARY REVIEW									

SHELL CANADA
QUEST CCS PROJECT

FLUOR®

PIPING AND INSTRUMENT DIAGRAM
QUEST CCS PROJECT
UNIT 440 - HYDROGEN MANUFACTURING UNIT
LP STEAM, COND., AND UTILITY WATER DISTRIBUTION

SCALE: NONE
SHELL DWG NO.: 440.0000.000.041.047
REV. G

440.047
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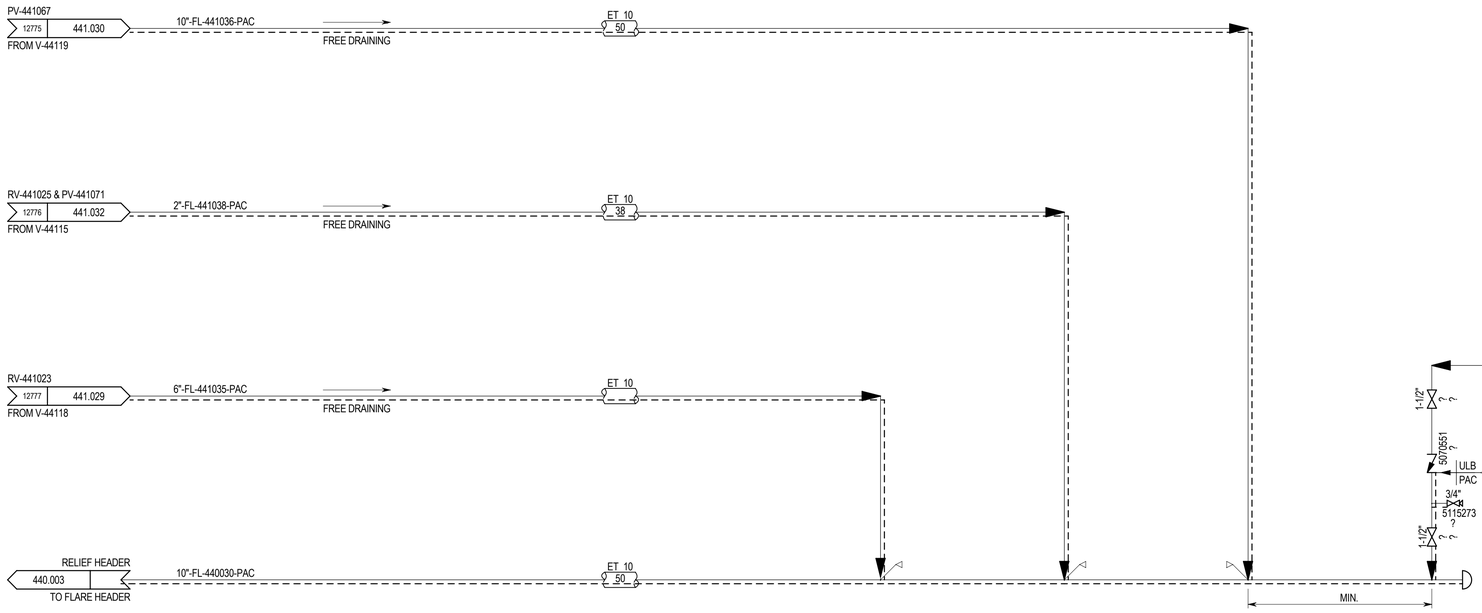
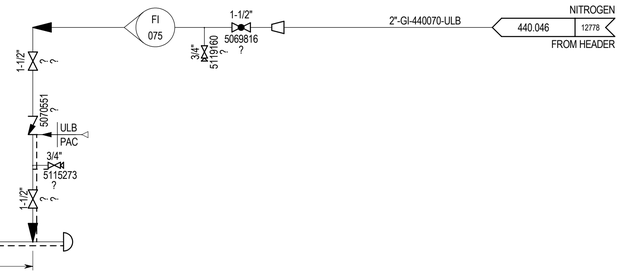




1 . SEE DRAWINGS 200.0000.000.041.007 THRU 016 FOR SYMBOL IDENTIFICATION GENERAL NOTES & CONNECTION DETAILS.

2 . ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY "440" UNLESS OTHERWISE STATED.

HOLDS:

- RELIEF DISCHARGE PIPING SIZES.

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
G	07/11/11	ISSUED FOR PHA III									
F	04/20/11	ISSUED FOR ESTIMATE									
E	03/01/11	ISSUED FOR PHA II									
D	01/10/11	ISSUED FOR CLIENT REVIEW									
C	12/02/10	ISSUED FOR INTERNAL REVIEW									
B		ISSUED FOR PRELIMINARY REVIEW									

SHELL CANADA

QUEST CCS PROJECT

FLUOR®

PIPING AND INSTRUMENT DIAGRAM
QUEST CCS PROJECT
UNIT 440 - HYDROGEN MANUFACTURING UNIT
ABSORBER AREA RELIEF COLLECTION

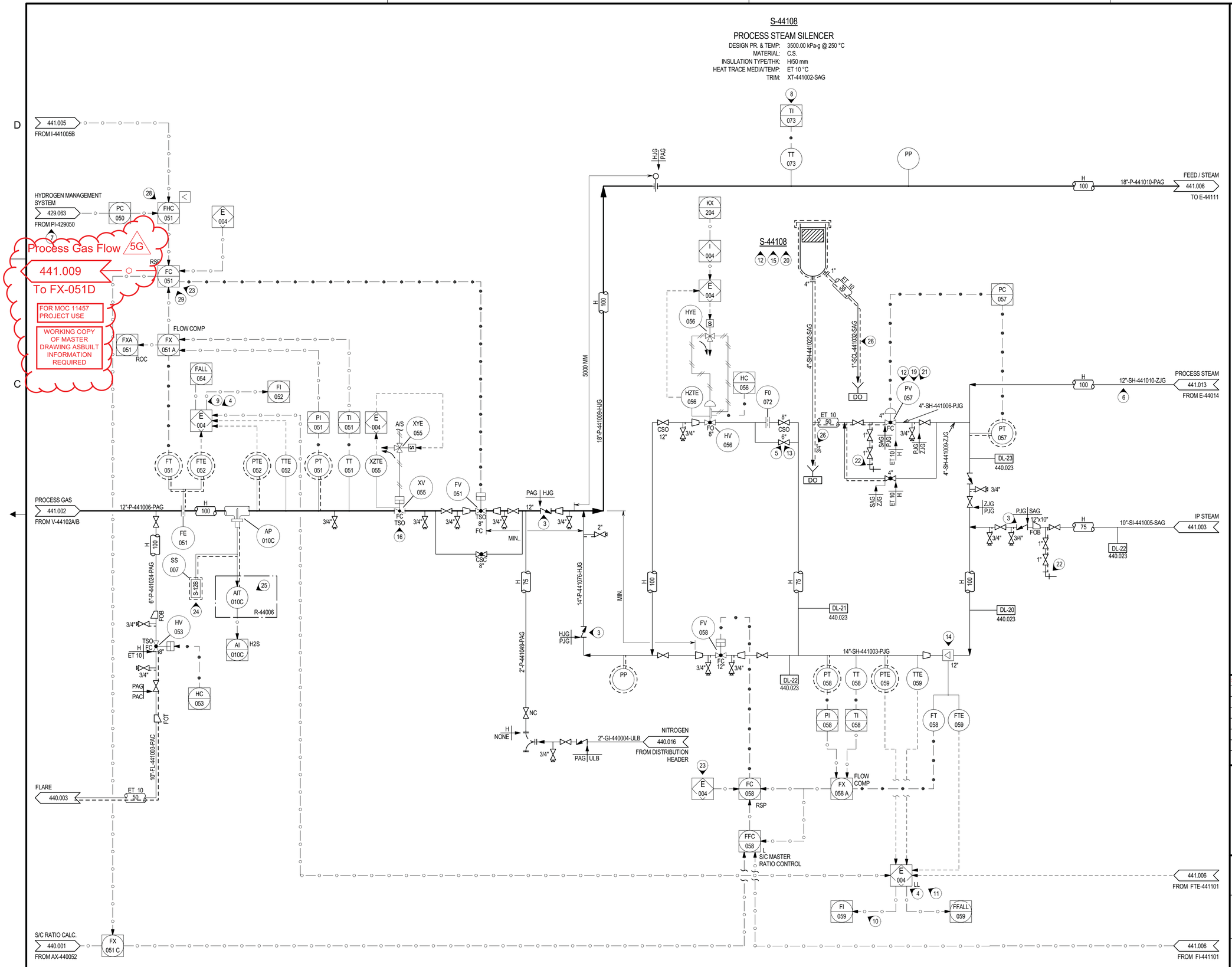
SCALE: NONE

SHELL DWG NO.: 440.0000.000.041.049

REV. G

440.049

FILE:\\F:\1025\DRAWINGS\HMU\440\440.049.pid MODEL DATE:7/6/2011 1:59:09 PM BY:ahm14887



1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "441" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. DUAL PLATE CHECK VALVE.
4. FEED GAS CARBON COMPOSITION ASSUMED CONSTANT FOR S/C RATIO SHUTDOWN.
5. BYPASS SIZED FOR MINIMUM STEAM FLOW. NORMALLY FULLY OPEN.
6. SATURATED STEAM. TRAP AT ALL LOW POINTS.
7. LOAD SIGNAL IS FROM OVERALL HYDROGEN CAPACITY MANAGEMENT MASTER LOAD CONTROLLER. LOAD SIGNAL IS VIA DATA HIGHWAY NETWORK.
8. LOCATE MINIMUM 10 DIAMETERS DOWNSTREAM OF FEED/STEAM MIX POINT.
9. FI-441052 SIS CALCULATION OF PRESS AND TEMP COMPENSATED FEED GAS FLOW. COMBINED LOW FLOW SHUT-DOWN FALL-441054 IS BASED ON SUM OF GAS (FI-441052), STEAM (FI-441059) AND BFW (FI-441101).
10. FI-441059 SIS CALC OF PRESS AND TEMP COMPENSATED STEAM FLOW.
11. FFX-441059 SIS CALCULATION OF STEAM / CARBON RATIO. LOW RATIO SHUT-DOWN FFALL-441059.
12. SILENCER S-44108 WILL BE SUPPLIED BY CONTROL VALVE PV-441057 VENDOR.
13. VALVE CLOSED ONLY DURING NITROGEN CIRCULATION.
14. VORTEX FLOW METER TO BE ACCESSIBLE.
15. STEAM SILENCER (S-44108) SHOULD BE LOCATED SUCH THAT STEAM EXHAUST TO ATMOSPHERE IS AT A SAFE LOCATION.
16. PROVIDE XV-441055 WITH PARTIAL STROKE TEST DEVICE.
17. DELETED.
18. DELETED.
19. LOCATE CONTROL VALVE CLOSE TO STEAM SILENCER INLET.
20. INSULATE AND TRACE UPTO SUPPORT BRACKET.
21. CONTROL VALVE PV-441057 TO BE OF MIN CLASS IV SHUTOFF.
22. MALE PLAINEND HILTAP WITH CAP C/W CHAIN.
23. ON REFORMER SHUTDOWN BY INTERLOCK E-441004, CONTROLLER WILL BE AUTOMATICALLY SET TO MANUAL, AND OUTPUT TO 0%.
24. FOR SAMPLE STATION DETAILS REFER TO 440.044.
25. ONE ANALYZER, MULTIPLE STREAMS.
26. DRAIN PIPE TO BE ELECTRICALLY TRACED AND INSULATED.
27. SEE P&ID 440.024 FOR ANALYZER SIGNALS.
28. FHC-441051 PROVIDES LOW SELECT OVERRIDE AND ALSO FLOW CLAMP FUNCTION.
29. FC-441051 PROVIDES FEED FORWARD BIAS TO TC-441120A/C.

ISSUED FOR ESTIMATE
11 Jul 2011

MASTER DRAWING
AS BUILT
INFORMATION REQUIRED

FOR SUPPLEMENTARY REVISION HISTORY OF THIS DOCUMENT, REFER TO REVISION LIST 441.0000.000.041.004R.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
5G	7/11/11	ISSUED FOR PHA III									
5	09/30/10	AS BUILT WITH NO CHANGE	LWJ	SL	-	-	-	-	-	-	
4	07/24/09	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS		RE	PH		
3	10/17/08	ISSUED FOR CONSTRUCTION	HG	CJC	CJC	YZ	DM	GH	NN	PB	
2	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
1	10/17/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	NN	HV	PB	
0	03/20/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

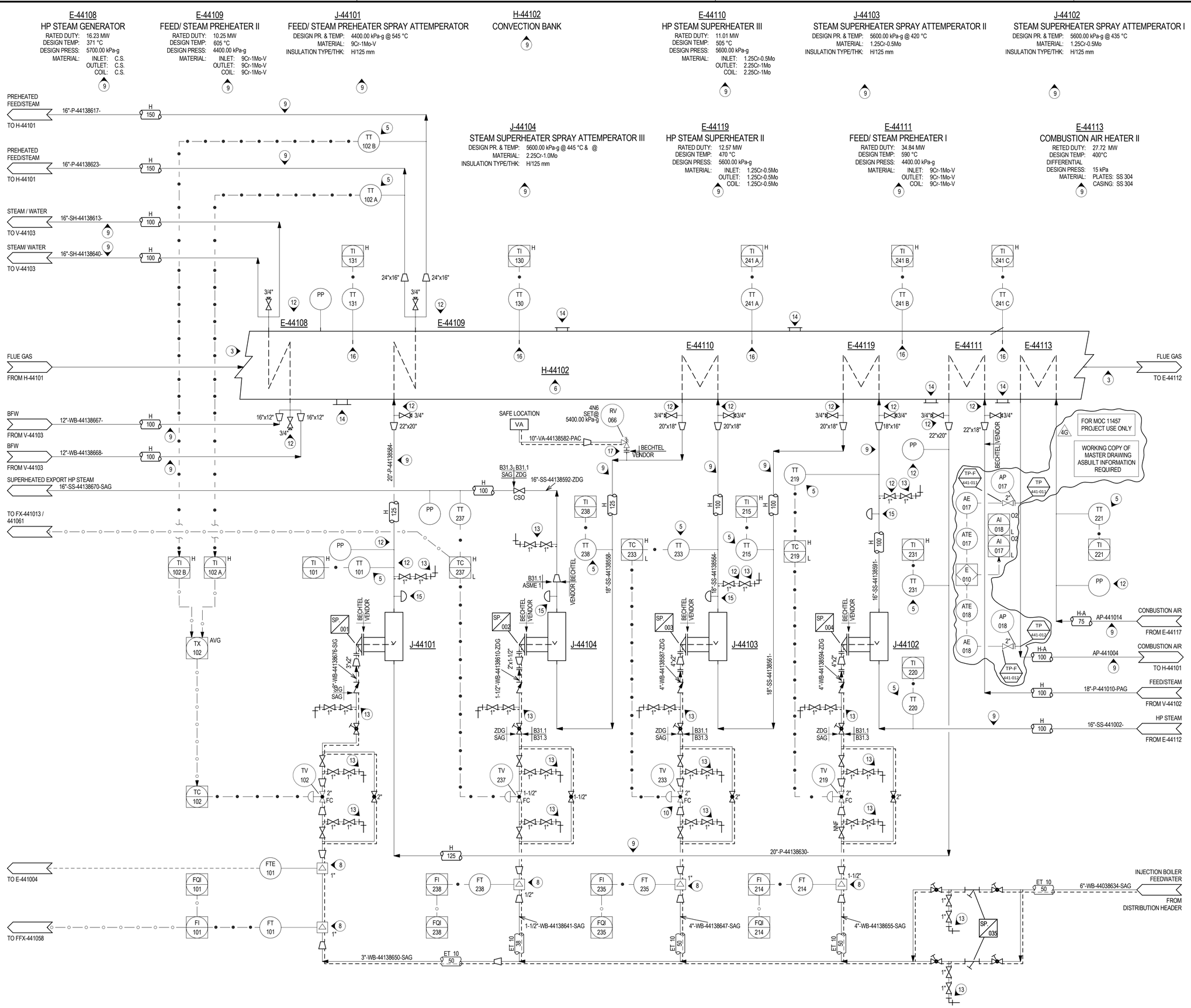
SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BECHTEL CANADA CO.
JOB NO. 25183

PIPING AND INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU-UNIT 441
FEED / STEAM MIXING

SCALE: NONE
SHELL DWG NO.: 441.0000.000.041.004 REV. 5G

441.004
FILE:\\F:\1025\DRAWINGS\HMU\441\441.004.pid MODEL DATE:30/09/2010 12:33:41 PM BY:wjliu



1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE APREFIX "441" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. CONTINUATION OF CONVECTION BANK.
4. DELETED.
5. THERMOWELL BY REFORMER PACKAGE VENDOR. TEMPERATURE ELEMENT & REMOTE MOUNTED TRANSMITTER BY BECHTEL.
6. REFRACTORY LINED.
7. DELETED.
8. VORTEX FLOW METER TO BE MADE ACCESSIBLE.
9. H-44102, E-44108, E-44109, E-44110, E-44111, E-44113, E-44119, J-44101, J-44102, J-44103 & J-44104, AND INLET / OUTLET LINES ARE UNDER REFORMER VENDOR'S SCOPE OF SUPPLY. ATTEMPERATOR SPRAY NOZZLES ARE BY BECHTEL.
10. VALVE IS DESIGNED FOR DESIGN CASE-I OPERATION. FOR DESIGN CASE-II (200 t/d HP STEAM EXPORT), VALVE WILL REQUIRE RESIZING.
11. DELETED.
12. NOZZLE WITH FLANGE BY REFORMER VENDOR, FIELD INSTRUMENTATION AND / OR VALVE BY BECHTEL.
13. MALE PLAIN END HIL TAP COUPLING WITH CAP (C / W CAP CHAIN.)
14. ACCESS DOOR.
15. INSPECTION NOZZLE WITH WELDED CAP.
16. CERAMIC THERMOWELL AND TEMPERATURE ELEMENT BY REFORMER PACKAGE VENDOR. REMOTE MOUNTED TRANSMITTER BY BECHTIL.
17. RELIEF VALVE INLET FLANGE PROVIDED BY EQUIPMENT VENDOR. RELIEF VALVE PROVIDED BY BECHTEL.
18. TIE-IN POINTS-SPG TIE-IN SHOWN AS TP 441-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-441-#.

MOC 11457

HOLDS:

- SIS INTERLOCK SEQUENCE NUMBER ADDED FOR QUEST.

ISSUED FOR ESTIMATE
11 Jul 2011

MASTER DRAWING
AS BUILT
INFORMATION REQUIRED

FOR SUPPLEMENTARY REVISION HISTORY OF THIS DOCUMENT, REFER TO REVISION LIST 441.0000.000.041.006R.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
4g	07/11/11	ISSUED FOR PHA III									
4f	04/20/11	ISSUED FOR ESTIMATE									
4	07/24/09	ISSUED FOR CONSTRUCTION	AB	JSJ	PRS	GTS			RE	PH	

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BECHTEL CANADA CO.
JOB NO. 25183

PIPING AND INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
UNIT 441 - HYDROGEN MANUFACTURING UNIT TRAIN 3
CONVECTION BANK PART-I

SCALE: NONE

SHELL DWG NO.: 441.0000.000.041.006 REV. 4g

441.006
FILE:\\F:\1025\DRAWINGS\HMU\441\441.006.pid MODEL DATE:7/10/2011 11:17:13 PM BY:mak22296

E-44112 NOTE 7
HP STEAM SUPERHEATER I
RATED DUTY: 22.35 MW
DESIGN TEMP: 515°C
DESIGN PRESS: 5600 kPag
MATERIAL:
INLET: 2.25Cr-1Mo
OUTLET: 2.25Cr-1Mo
COIL: 2.25Cr-1Mo

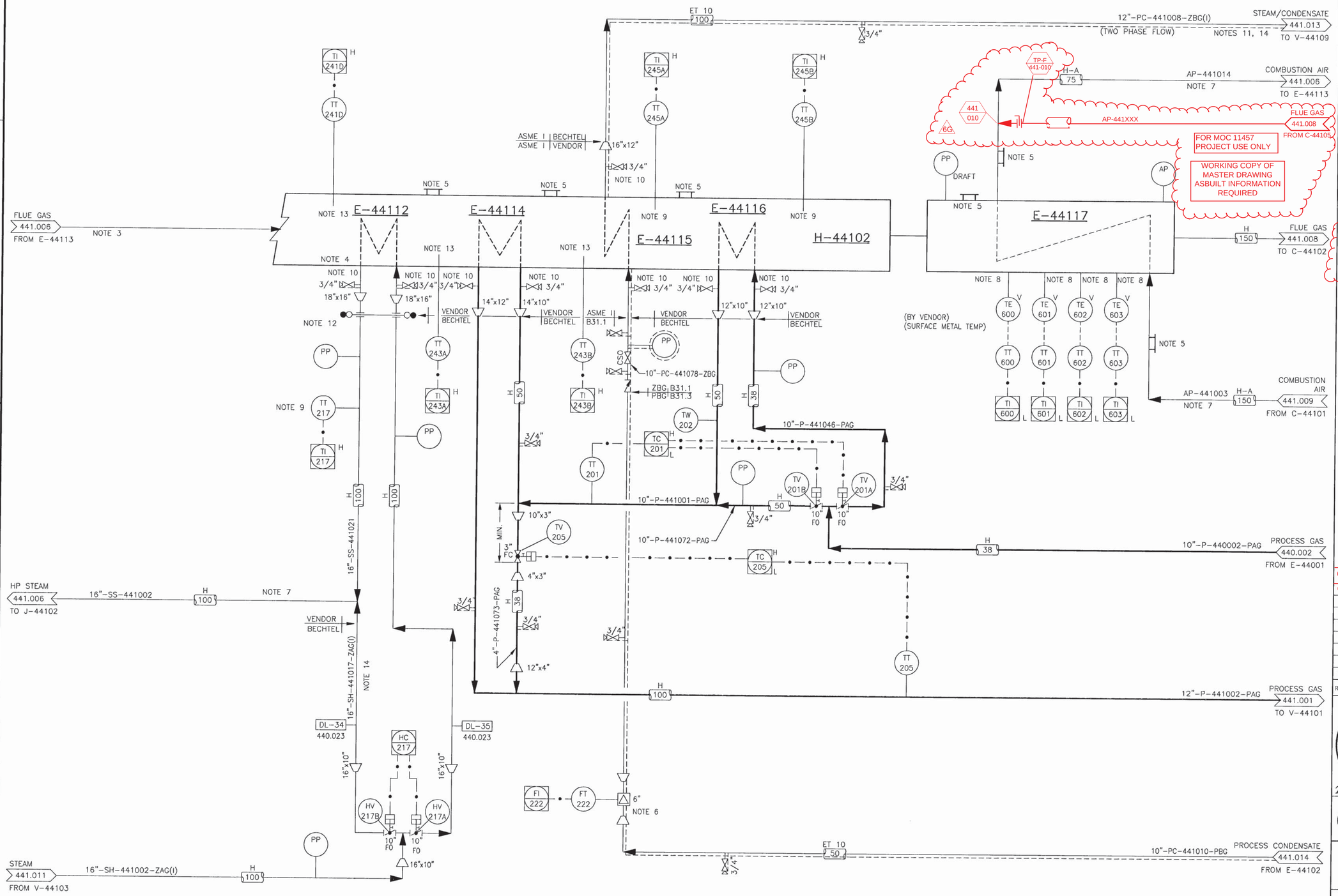
E-44114 NOTE 7
FEED PREHEATER II
RATED DUTY: 10.52 MW
DESIGN TEMP: 435°C
DESIGN PRESS: 4800 kPag
MATERIAL:
INLET: 1.25Cr-0.5Mo
OUTLET: 1.25Cr-0.5Mo
COIL: 1.25Cr-0.5Mo

E-44115 NOTE 7
PROCESS CONDENSATE PARTIAL EVAPORATOR
RATED DUTY: 30.29 MW
DESIGN TEMP: 371°C
DESIGN PRESS: 5050 kPag
MATERIAL:
INLET: SS-321
OUTLET: SS-321
COIL: SS-321

E-44116 NOTE 7
FEED PREHEATER I
RATED DUTY: 4.88 MW
DESIGN TEMP: 250°C
DESIGN PRESS: 4800 kPag
MATERIAL:
INLET: CS
OUTLET: CS
COIL: CS

H-44102 NOTE 7
CONVECTION BANK

E-44117 NOTE 7
COMBUSTION AIR HEATER I
RATED DUTY: 11.05 MW
DESIGN TEMP: 250°C
DIFFERENTIAL
DESIGN PRESS: 17 kPa
PLATES: COR-TEN A
CASING: CS



NOTES

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "441" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. CONTINUATION OF CONVECTION BANK.
4. REFRACTORY LINED.
5. ACCESS DOOR.
6. VORTEX FLOW METER TO BE MADE ACCESSIBLE.
7. H-44102, E-44112, E-44114, E-44115, E-44116, & E-44117 ARE UNDER REFORMER VENDOR'S SCOPE OF SUPPLY. INLET/OUTLET LINES FOR E-44117 AND OUTLET LINE FOR E-44112 UNDER REFORMER PACKAGE VENDOR'S SCOPE OF SUPPLY.
8. REFORMER SUPPLIER TO PROVIDE FOUR COLD END SITE PORTS.
9. THERMOWELL BY REFORMER PACKAGE VENDOR. TEMPERATURE ELEMENT & REMOTE MOUNTED TRANSMITTER BY BECHTEL.
10. NOZZLE WITH FLANGE BY REFORMER PACKAGE VENDOR. FIELD INSTRUMENTATION AND/OR VALVE BY BECHTEL.
11. PIPE SUPPORTS TO SUIT TWO PHASE FLOW IN LINE SUBJECT TO SLUGGING.
12. 3 FLANGES AND 2 SPECTICAL BLINDS BY REFORMER PACKAGE VENDOR.
13. CERAMIC THERMOWELL AND TEMPERATURE ELEMENT BY REFORMER PACKAGE VENDOR. REMOTE MOUNTED TRANSMITTER BY BECHTEL.
14. VENTS AND DRAINS ON ASME SECTION I LINES ARE BOILER EXTERNAL PIPING (BEP). REFER TO LDT 441.007 FOR TRIM DETAILS.
15. CONTROLLER TC-441201 OPERATES IN SPLIT RANGE CONFIGURATION TO CONTROL TEMPERATURE. IF VALVE TV-441201A OPENS, TV-441201B CLOSES THE SAME AMOUNT

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
6G	07/11/11	ISSUED FOR PHA III									
6F	04/20/11	ISSUED FOR ESTIMATE									
6	07/24/09	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS			RE	PH	
5	05/22/09	ISSUED FOR CONSTRUCTION	HG	CJC	CJC	YZ	DM	CD	NN	PB	
4	10/17/08	ISSUED FOR CONSTRUCTION	HG	CJC	CJC	YZ	DM	GH	NN	PB	
3	03/31/08	ISSUED FOR CONSTRUCTION	HG	CJC	CJC	LG	DM	GH	NN	PB	
2	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
1	10/17/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	GH	HV	PB	
0	04/12/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

PROFESSIONAL ENGINEER ALBERTA AJALAU S. JARIWALA
2009-07-30 Rev.6

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BANTREL
APEGGA PERMIT: P 3913

Job No. 1010

PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU – UNIT 441
CONVECTION BANK PART-II & APH

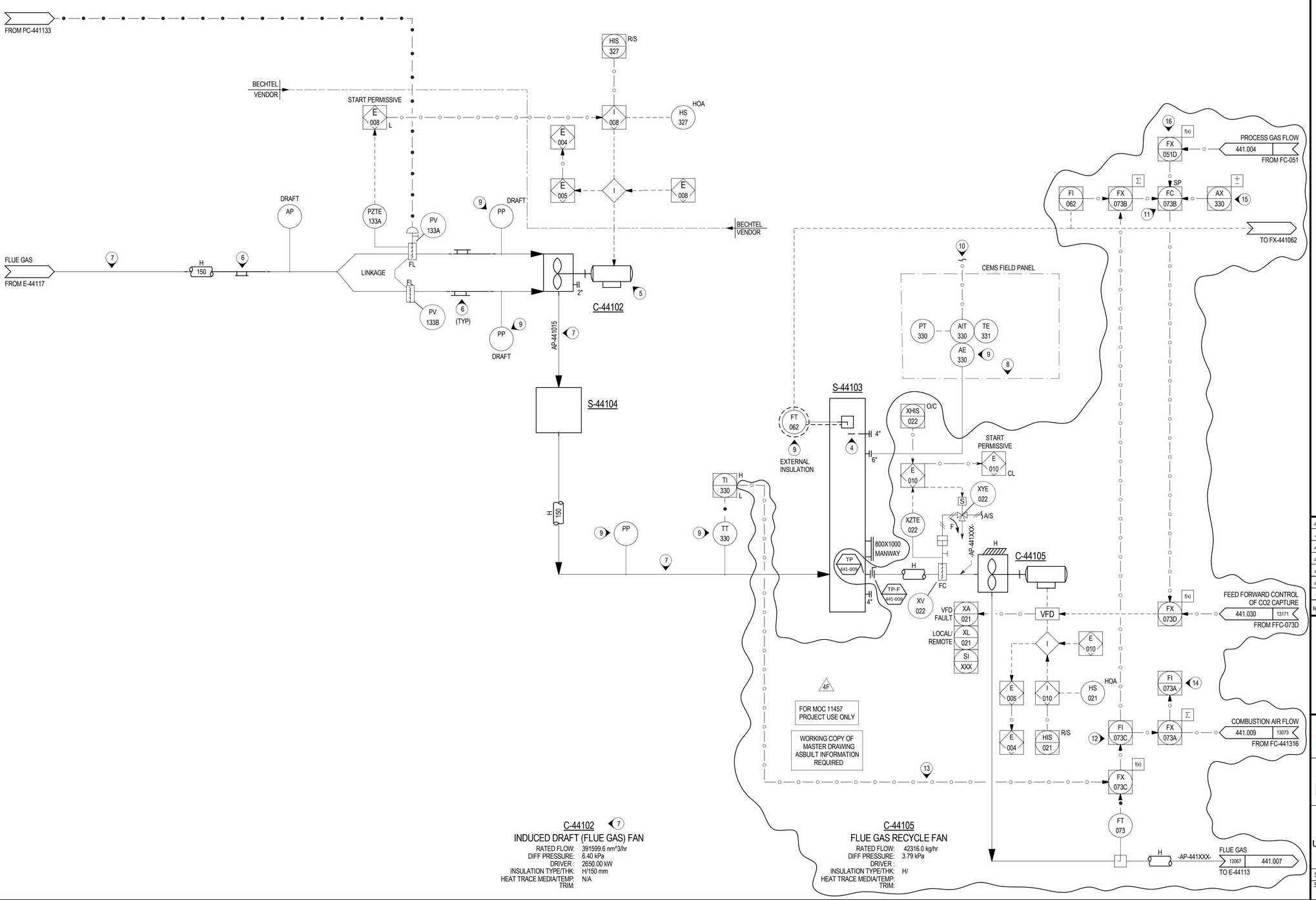
SCALE: NONE
SHELL DWG NO.: 441.0000.000.041.007
REV. 6G

441.0000.000.041.007.dwg

File: W:\1010\PIPING\HMU\UNIT-441\REV-6\441.0000.000.041.007 24/07/2009 1:29pm KAMINSKIM

S-44104 (7)
FLUE GAS SILENCER

S-44103 (7)
STACK
SIZE: 4500 mm ID x 55000 mm
DESIGN TEMP: 250°C
MATERIAL: C.S.
INSULATION TYPE/THK: H/100mm



C-44102 (7)
INDUCED DRAFT (FLUE GAS) FAN
RATED FLOW: 391599.6 nm³/hr
DIFF PRESSURE: 6.40 kPa
DRIVER : 2650.00 kW
INSULATION TYPE/THK: H/150 mm
HEAT TRACE MEDIA/TEMP: N/A
TRIM:

C-44105
FLUE GAS RECYCLE FAN
RATED FLOW: 42316.0 kg/hr
DIFF PRESSURE: 3.79 kPa
DRIVER :
INSULATION TYPE/THK: H/
HEAT TRACE MEDIA/TEMP:
TRIM:

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "441" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. DELETED.
4. THREE SETS OF NOZZLES:
   SET1 - MANUAL SAMPLE PORTS, 4", 150# FFWN C/W BLIND AND 4" NPT CAPPED NIPPLE. 4 @ 90°
   SET2 - CEMS SAMPLE PORTS, 6", 150# FFWN. 2 @ 180°
   SET3 - ANNUBAR PORT, 6", 150# FFWN. 2 @ 180°
   SAMPLE POINTS SHALL BE AS PER ALBERTA STACK SAMPLING CODE.
5. ONE LUBE OIL SYSTEM FOR BOTH FANS (C-44101 & C-44102) REFER TO P&ID NUMBER 441.024 & 441.026.
6. ACCESS DOOR.
7. C-44102, S-44103, S-44104 AND ASSOCIATED PIPING UNDER REFORMER VENDOR'S SCOPE OF SUPPLY.
8. CEMS ENCLOSURE.
9. NOZZLE WITH FLANGE BY REFORMER PACKAGE VENDOR. FIELD INSTRUMENTATION AND/OR VALVE BY BECHTEL.
10. SEE P&ID 440.024 FOR ANALYZER SIGNAL DETAILS.
11. TOTAL CONVECTION SECTION FLOW.
12. FLUE GAS RECYCLE FLOW.
13. TI-330 USED TO TEMPERATURE COMPENSATE FX-073C.
14. TOTAL FGR AND COMBUSTION AIR FLOW.
15. AX-330 IS FOR THE OPERATOR TO MANUALLY BIAS THE CONTROLLER OUTPUT TO OPTIMISE NOx EMISSIONS.
16. FX-051D DETERMINES THE SETPOINT FOR THE CONVECTION SECTION FLOW BASED ON THE HMU LOAD.
17. TIE-IN POINTS- SPG TIE-IN SHOWN AS TP-441-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-441-#.

MOC 11457

HOLDS:

- PCS AND SIS INTERLOCK SEQUENCE NUMBERS ADDED FOR QUEST.

ISSUED FOR ESTIMATE

MASTER DRAWING
AS BUILT
INFORMATION REQUIRED

FOR SUPPLEMENTARY REVISION HISTORY OF THIS DOCUMENT, REFER TO REVISION LIST 441.0000.000.041.008R.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP.
4g	07/11/11	ISSUED FOR PHA III									
4f	04/20/11	ISSUED FOR ESTIMATE									
4e	03/14/11	ISSUED FOR PHA II									
4d	01/10/11	ISSUED FOR CLIENT REVIEW									
4c	12/02/10	ISSUED FOR INTERNAL REVIEW									
4b		ISSUED FOR PRELIMINARY REVIEW									
4	09/30/10	AS BUILT WITH NO CHANGE	LWJ	SL							

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BECHTEL CANADA CO.
JOB NO. 25183

PIPING AND INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
UNIT 441 - HYDROGEN MANUFACTURING UNIT TRAIN 3
ID FAN AND FLUE GAS STACK

SCALE: NONE

SHELL DWG NO.: 441.0000.000.041.008 REV. 4G

441.008
FILE:\\F:\1025\DRAWINGS\HMU\441\441.008.pid MODEL DATE:7/8/2011 4:02:36 PM BY:athm14887

S-44101 (12)
COMBUSTION AIR SILENCER

E-44122A/B (12)
COMBUSTION AIR PREHEATER-II
RATED DUTY: 10.37 MW
DESIGN TEMP: TW SIDE: 145°C
AIRSIDE: 145°C
DESIGN PRESS: TW SIDE: 1600/FV kPa-g
AIR SIDE: 10 kPa-g
INSULATION TYPE/THK: H-A/150 mm

E-44121A/B (12)
COMBUSTION AIR PREHEATER-I
RATED DUTY: 6.62 MW
DESIGN TEMP: TW SIDE: 145°C
AIRSIDE: 145°C
DESIGN PRESS: TW SIDE: 1600/FV kPa-g
AIRSIDE: 1 kPa-g
INSULATION TYPE/THK: H-A/150 mm

BECHTEL VENDOR
E-44122A
E-44122B
E-44121A
E-44121B
(TYP.) 2"
DRAFT PP
1000MM ID
COMBUSTION AIR 441.007 TO E-44117
AP-441003
H-A 150
TT 317
TC AIR INTAKE 317
RS
CSO
TV 317
8"-WC-441001-PAB
H 50
3/4"
4" FO
AP-441020
441.005 FROM AC-441137
FX 316 B
FC 316
441.008 TO FX-441073A
FOR MOC 11457 PROJECT USE ONLY
WORKING COPY OF MASTER DRAWING AS BUILT INFORMATION REQUIRED
FE 316
FT 316
FTE 317
FTE 316
FTE 318
FQI 316
E 020
E 004
LL
AP-441001
TTE 302
TTE 299
TTE 300
TI 302 A
TT 302
A 150
6"-WR-441002-PAB
H 38
TC 149
TT 149
AP-441002
START PERMISSIVE
E 009
FZTE 316
FV 316
C-44101
VENDOR BECHTEL
E 004
HIS 315 R/S
E 005
I 009
HS 315 HOA
E 009
TEMPERED WATER 440.028 FROM E-44002
10"-WC-440018-PAB
FOB 10"x6"
FOB 8"x6"
8"-WR-441001-PAB
TEMPERED WATER 440.027 TO V-44005

C-44101 (12)
FORCED DRAFT (COMBUSTION AIR) FAN
RATED FLOW: 327504.0 s-m^3/hr
DIFF. PR.: 3.32 kPa
DRIVER: 1250.00 kW
INSULATION TYPE/THK: H/100 mm

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "441" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. DELETED.
4. VALVE OPENED ONLY TO DRAIN RAIN WATER.
5. PROVIDE SHALLOW CURBING FOR SPILL.
6. DELETED.
7. REFORMER START - UP PURGE FLOW TOTALIZER (FQI - 441316).
8. ONE LUBE OIL SYSTEM FOR BOTH FANS (C - 44101 & C - 44102). REFER TO P&ID NO.441.024 & 441.026.
9. BIRD SCREEN ELECTRICALLY TRACED. BIRD SCREEN IS SUPPLIED WITH S - 44101 (BY VENDOR).
10. ACCESS DOOR.
11. DELETED.
12. S - 44101, C - 44101, E - 44121A/B, E - 44122A / B AND COMBUSTION AIR LINES ARE UNDER REFORMER'S VENDOR SCOPE OF SUPPLY.
13. LOCATION SUITABLE FOR C - 44101 PERFORMANCE MEASUREMENT.
14. THERMOWELL BY REFORMER PACKAGE VENDOR. TEMPERATURE ELEMENT AND TRANSMITTER BY BECHTEL.
15. VENTURI FE - 441316 WITH NOZZLES BY REFORMER PACKAGE VENDOR, FLOW TRANSMITTER BY BECHTEL.
16. FOUNDATION FIELD BUS POSITIONER AND POSITION TRANSMITTER BY REFORMER PACKAGE VENDOR.
17. NOZZLE WITH FLANGE BY REFORMER PACKAGE VENDOR. FIELD INSTRUMENTATION AND / OR VALVE BY BECHTEL.
18. FOR START UP OPTION # 1.
19. FOR DETAILED MACHINE MONITORING, REFER TO P&ID 441.024.

ISSUED FOR ESTIMATE
11 Jul 2011

MASTER DRAWING
AS BUILT
INFORMATION REQUIRED

FOR SUPPLEMENTARY REVISION HISTORY OF THIS DOCUMENT, REFER TO REVISION LIST 441.0000.000.041.009R.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
4G	07/11/11	ISSUED FOR PHA III									
4F	04/20/11	ISSUED FOR ESTIMATE									
4	09/30/10	AS BUILT PER PROJECT NO 25183	LWJ	SL	-	-	-	-	-	-	
3	07/24/09	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS			RE	PH	
2	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
1	10/17/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	GH	HV	PB	
0	04/12/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BECHTEL CANADA CO.
JOB NO. 25183

PIPING AND INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
HMU-UNIT 441
COMBUSTION AIR HEATING AND FD FAN

SCALE: NONE
SHELL DWG NO.: 441.0000.000.041.009
REV. 4G

441.009
FILE:\\F:\1029\DRAWINGS\HMU\441\441.009.pid MODEL DATE:30/09/2010 10:03:29 AM BY:wjliu

E-44120
PROCESS STEAM CONDENSATE COOLER

	SHELL	TUBE
RATED DUTY:	0.108MW	
SURFACE AREA:	4.0 M^2	
TEMA TYPE:	HAIR PIN TYPE	
DESIGN PRESS., kPaG:	300/FV	800
DESIGN TEMP., °C:	200/150	58
MATERIAL:	CW /304L CLAD	2205 (DUPLEX)
INSULATION TYPE/THK.:	PP25	PP25
TRIM:	ET-441003-PJB	ET-441004-UAB

V-44111
PROCESS STEAM CONDENSATE RECEIVER

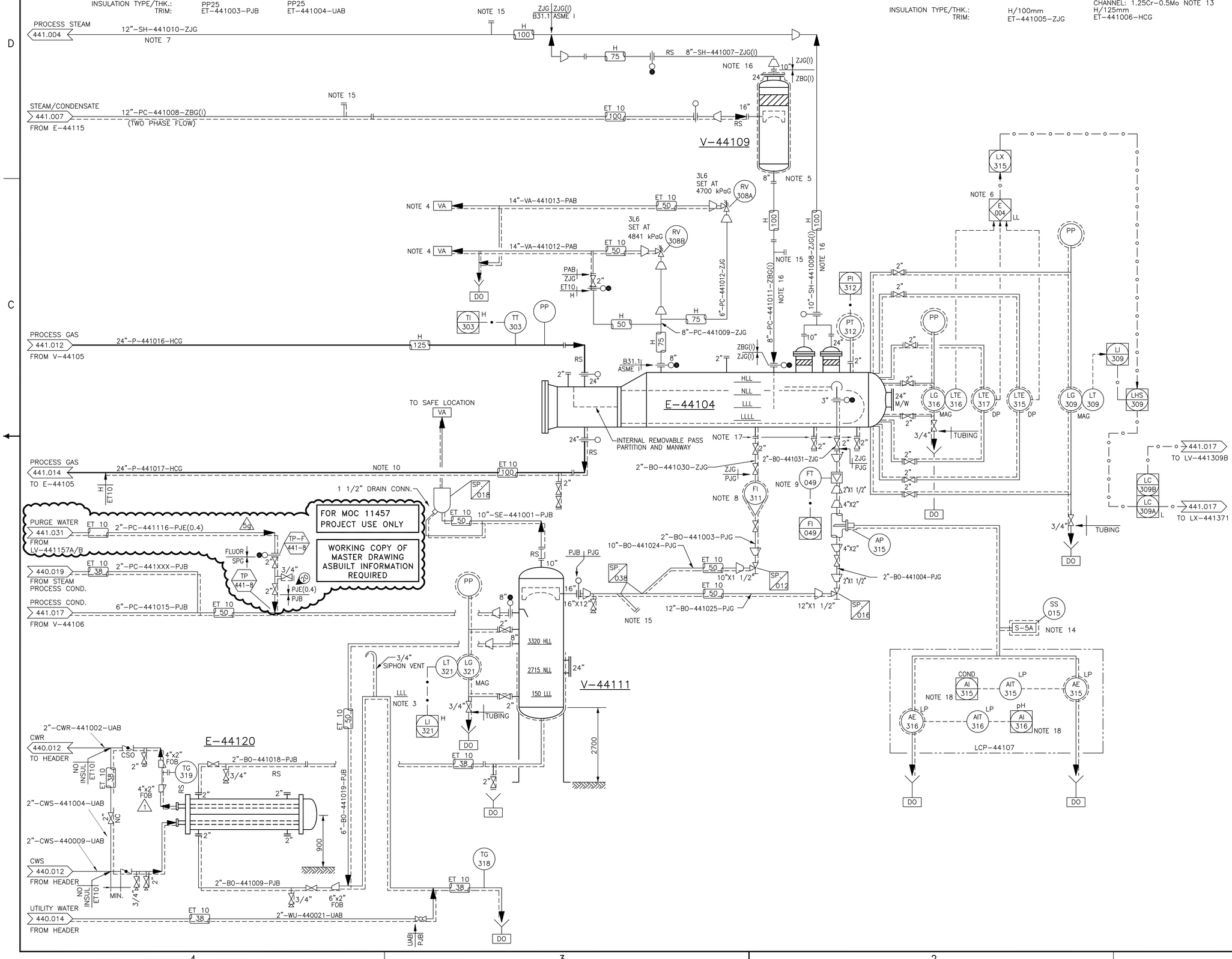
SIZE: 1370mm ID x 4975mm T/T
DESIGN PR. & TEMP.: 300kPaG @ 130°C & 65kPaA @ 150°C
MATERIAL: CS W/SS304L CLAD
INSULATION TYPE/THK.: ET 10 TO HLL / 50mm
TRIM: VT-441006-PJB

V-44109
PROCESS STEAM SEPARATOR

SIZE: 1250mm ID x 2100mm T/T
DESIGN PR. & TEMP.: 4850kPaG @ 275°C & F.V. @ 150°C
MATERIAL: CS W/SS304L CLAD (INTERNALS :SS304L)
INSULATION TYPE/THK.: ET 10/100mm
TRIM: VT-441007-ZBG

E-44104
PROCESS CONDENSATE EVAPORATOR

	SHELL	TUBE
RATED DUTY:	19.40MW	
SURFACE AREA:	430M^2	
TEMA TYPE:	NKU	
DESIGN PRESS., kPaG:	4850 & F.V.	3785
DESIGN TEMP., °C:	280/150	450
MATERIAL:	CS W/SS304L CLAD	ALLOY800/825 CHANNEL: 1.25Cr-0.5Mo NOTE 13
INSULATION TYPE/THK.:	H/100mm	H/125mm
TRIM:	ET-441005-ZJG	ET-441006-HCG



NOTES

1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "441" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. LOCATE TOP OF TRAP AT SAME ELEVATION AS LLL IN THE V-44111.
4. PROVIDE WEEP HOLE AT LOW POINT ROUTE TO SEWER. DRAIN PIPE TO BE ELECTRICALLY TRACED AND INSULATED.
5. FREE DRAIN TO E-44104.
6. PROCESS CONDENSATE EVAPORATOR LOW LEVEL SHUTDOWN REQUIRES A 2 OUT OF 3 TRIP. VOTING TO BE DONE IN THE SIS. A VOTED VALUE LT-441315 WILL BE HARDWIRED TO THIS DCS (LX-441315 AS AI).
7. SATURATED STEAM, TRAP AT ALL LOW POINTS AND ON HEADERS.
8. LOCATE LOCAL INDICATOR WITHIN SIGHT OF THE BLOWDOWN VALVE.
9. CLOSE COUPLE TO VESSEL. VORTEX FLOW METER MUST BE ACCESSIBLE.
10. TRACE POCKETED SECTION OF LINE 24"-P-441017.
11. DELETED.
12. DELETED
13. TUBE SHEET MATERIAL FOR E-44104 IS SS304L OR 1.25Cr-0.5Mo (BASE MATERIAL) WITH SS304L OVERLAY SHELL SIDE.
14. FOR SAMPLE STATION DETAIL REFER 440.043
15. FUTURE CONNECTION POINT FOR ENHANCED FORCED CIRCULATION.
16. VENTS AND DRAINS ON ASME SECTION I LINES ARE BOILER EXTERNAL PIPING (BEP). REFER TO LDT 441.013 FOR TRIM DETAILS.
17. BREAK BETWEEN ASME SECTION I (E-44104 SHELL SIDE NOZZLES) AND BOILER EXTERNAL PIPING.
18. SEE P&ID 440.024 FOR ANALYZER DETAILS.
19. DELETED.
20. SPG TO PROVIDE INSULATION AND EHT FOR THEIR TIE-IN SCOPE.
21. TIE-IN POINTS - SPG TIE-IN SHOWN AS TP 441-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-441-#.

MOC 11457

ISSUED FOR ESTIMATE
11 Jul 2011

REV	ISSUED DATE	DESCRIPTION	BY	CHD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
5g	07/11/11	ISSUED FOR PHA III									
5f	04/20/11	ISSUED FOR ESTIMATE									
5e	03/01/11	ISSUED FOR PHA II									
5d	01/10/11	ISSUED FOR CLIENT REVIEW									
5c	12/03/10	ISSUED FOR INTERNAL REVIEW									
5b	08/06/10	ISSUED FOR PRELIMINARY REVIEW									
5	2009-07-28	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS		RE	RH		
4	10/17/08	ISSUED FOR CONSTRUCTION	HG	CJC	CJC	YZ	DM	GH	NN	PB	
3	03/31/08	ISSUED FOR CONSTRUCTION	HG	CJC	CJC	LG	DM	GH	NN	PB	
2	01/31/08	ISSUED FOR CONSTRUCTION	PP	CJC	HG	LG	DM	GH	NN	PB	
1	10/17/07	ISSUED FOR CONSTRUCTION	PD	CJC	HG	LG	DM	NN	HV	PB	
0	09/20/07	ISSUED FOR CONSTRUCTION	PD	HG	RCD	LG	DM	NN	PG	PB	

"THE SIGNED APEGGA STAMP RESIDES ON THE ORIGINAL IFC DOCUMENT HELD IN DOCUMENT CONTROL. NO DESIGN CHANGES WILL BE MADE TO THIS DRAWING WITHOUT THE APPROVAL OF A REGISTERED ENGINEER."

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BANTREL Job No. 1010
APEGGA PERMIT: P 3913

PIPING & INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION
HMU - UNIT 441
PROCESS CONDENSATE EVAPORATOR

SCALE: NONE
SHELL DWG NO.: 441.0000.000.041.013 REV. 5g

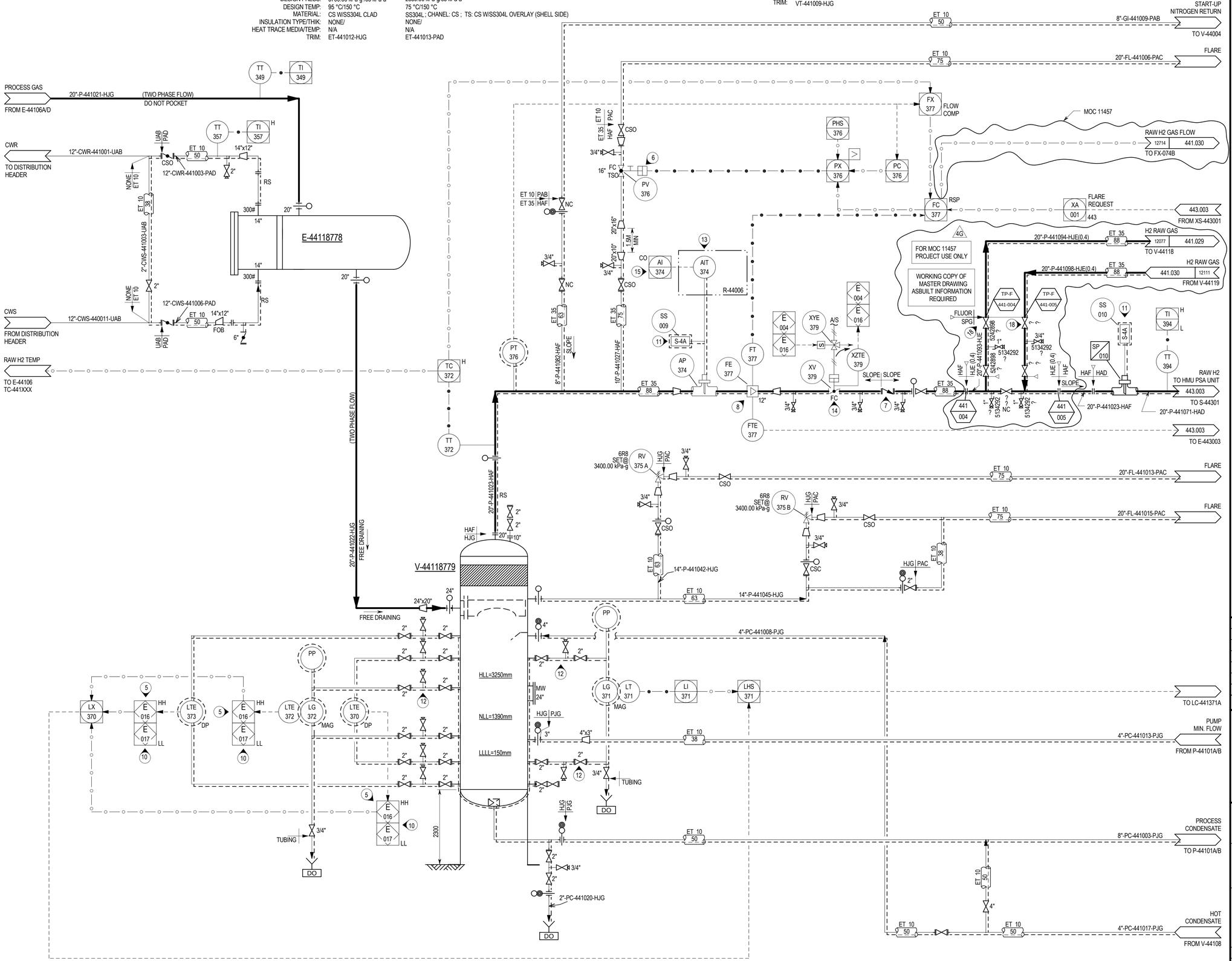
441.0000.000.041.013_REV5.dwg

E-44118778
FINAL COOLER

RATED DUTY:	5.72 MW	
SURFACE AREA:	493.0 m^2	
TEMA TYPE:	AEU	
	SHELL	TUBE
DESIGN PRESS:	3700.00 kPa-g /65 kPa-a	2850.00 kPa-g/65 kPa-a
DESIGN TEMP:	95 °C/150 °C	75 °C/150 °C
MATERIAL:	CS W/SS304L CLAD	SS304L ; CHANEL: CS ; TS: CS W/SS304L OVERLAY (SHELL SIDE)
INSULATION TYPE/THIK:	NONE/	NONE/
HEAT TRACE MEDIA/TEMP:	N/A	N/A
TRIM:	ET-441012-HJG	ET-441013-PAD

V-44118779
PROCESS CONDENSATE SEPARATOR

SIZE:	2400 mm ID x 5800 mm T/T
DESIGN PR. & TEMP:	3450.00 kPa-g @ 185 °C & 65 kPa-a @ 150 °C
MATERIAL:	CS W/SS304L CLAD
INSULATION TYPE/THK:	H/50 mm
HEAT TRACE MEDIA/TEMP:	ET 10 °C,TO HHLL
TRIM:	VT-441009-HJG



1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "441" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. DELETED.
4. DELETED.
5. PROCESS CONDENSATE SEPARATOR HI HI LEVEL SHUTDOWN REQUIRES A 2 OUT OF 3 TRIP. VOTING DONE IN THE SIS.
6. ACTUATOR SPEED SAME AS XV-441379.
7. DUAL PLATE CHECK VALVE.
8. VORTEX FLOW METER TO BE MADE ACCESSIBLE.
9. DELETED. — MOC 11457
10. PROCESS CONIDENSATE SEPARATOR LOW LOW LEVEL SHUTDOWN REQUIRES A 2 OUT OF 3 TRIP. VOTING DONE IN THE SIS.
11. FOR SAMPLE STATION DETAIL REFER TO 440.042.
12. FOR VALVE SIZE AND TYPE REFER TO PIPING STANDARD DRAWING # 400.0311.000.053.012.
13. DUAL STREAMS TO ONE ANALYZER (DUAL BRANCH). SEE P&ID 440.024 FOR ANALYZER DETAILS.
14. XV-441379 IS PROVIDED WITH PARTIAL STROKE TEST DEVICE.
15. SEE P&ID 440.024 FOR ANALYZER DETAILS.
16. DELETED.
17. TIE-IN POINTS- SPG TIE-IN SHOWN AS TP-441-# AND FLUOR QUEST TIE-IN SHOWN AS TP-F-441.
18. CHAIN OPERATOR REQUIRED ON VALVE. — MOC 11457

ISSUED FOR ESTIMATE
11 Jul 2011

MASTER DRAWING
AS BUILT
INFORMATION REQUIRED

FOR SUPPLEMENTARY REVISION HISTORY OF THIS DOCUMENT, REFER TO REVISION LIST 441.0000.000.041.016R.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP.
4g	07/11/11	ISSUED FOR PHA III									
4f	04/20/11	ISSUED FOR ESTIMATE									
4e	03/01/11	ISSUED FOR PHA II									
4d	01/11/11	ISSUED FOR CLIENT REVIEW									
4c	12/02/10	ISSUED FOR INTERNAL REVIEW									
4b	11/04/10	ISSUED FOR INFORMATION									
4	09/30/10	AS BUILT PER PROJECT NO 25183	LWJ	SL							

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BECHTEL CANADA CO.
JOB NO. 25183

PIPING AND INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
UNIT 441 - HYDROGEN MANUFACTURING UNIT TRAIN 3
FINAL COOLER & PROC. COND. SEPARATOR

SCALE: NONE

SHELL DWG NO.: 441.0000.000.041.016 REV. 4g

441.016
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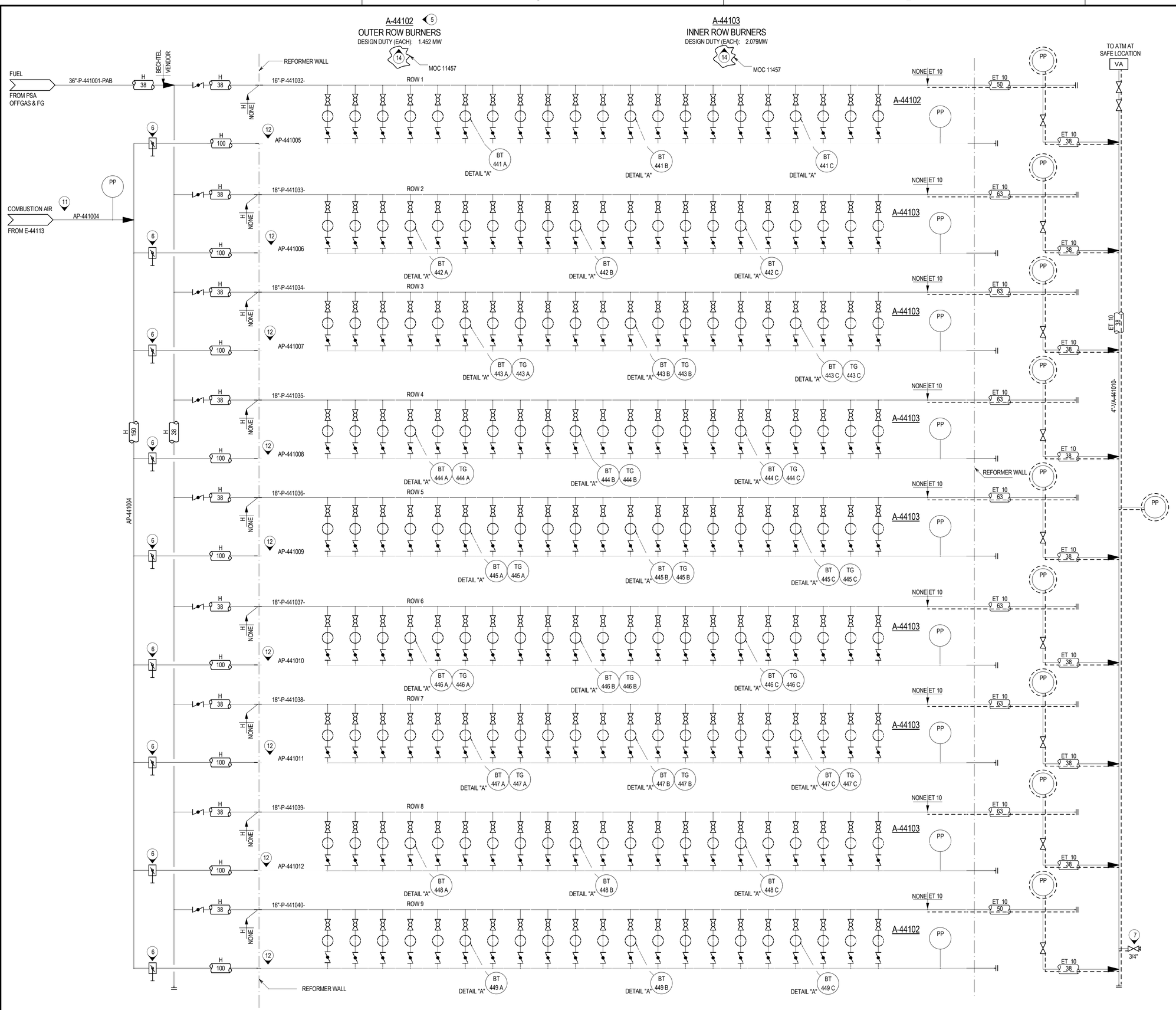
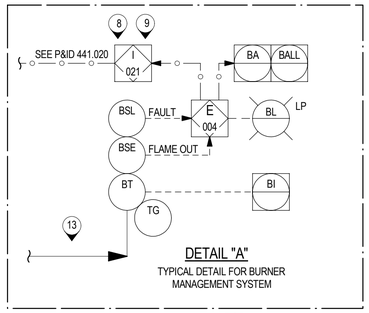


1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005 AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "441" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. DELETED.
4. DELETED.
5. OUTER ROW DUTY 70% OF INNER ROWS.
6. SPECIAL LOCKABLE SINGLE BLADE DAMPER FOR COMBUSTION AIR SUPPLIED BY BURNER VENDOR (TYPICAL).
7. LOW POINT BLEED.
8. REFORMER SHUT-DOWN LOGIC REQUIRES 13 OUT OF 27 FLAME SCANNERS TO ACKNOWLEDGE LOSS OF FLAME BEFORE INITIATING A REFORMER TRIP.
9. REFORMER START-UP PERMISSIVE REQUIRES 23 OUT OF 27 FLAME SCANNERS TO ACKNOWLEDGE A FLAME TO RESET THE REFORMER I-441021 INTERLOCK.
10. DELETED.
11. PIPING UNDER REFORMER VENDOR SCOPE.
12. COMBUSTION AIR SUB-HEADER SIZE REDUCES GRADUALLY FROM 1820 MM TO 300 MM AT THE END OF SUB-HEADER.
13. PLANT AIR SUPPLIED VIA 2"-AU-440025-ULB (SEE P&ID 440.015) TO MANIFOLD NO. M-AU440.015-1 FOR H-44101 FLAME SCANNERS.



14. EXISTING BURNER LANCES TO BE REPLACED WITH LANEMARK LOW NOx BURNERS.

FOR MOC 11457 PROJECT USE ONLY 1G

WORKING COPY OF MASTER DRAWING ASBUILT INFORMATION REQUIRED

ISSUED FOR ESTIMATE
11 Jul 2011

MASTER DRAWING
AS BUILT
INFORMATION REQUIRED

FOR SUPPLEMENTARY REVISION HISTORY OF THIS DOCUMENT, REFER TO REVISION LIST 441.0000.000.041.021R.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
1g	07/11/11	ISSUED FOR PHA III									
1f	04/20/11	ISSUED FOR ESTIMATE									
1e	03/01/11	ISSUED FOR PHA II									
1d	01/11/11	ISSUED FOR CLIENT REVIEW									
1c	12/02/10	ISSUED FOR INTERNAL REVIEW									
1b	11/04/10	ISSUED FOR INFORMATION									
1	07/24/09	ISSUED FOR CONSTRUCTION	AB	JSJ	DM	GTS		RE	PH		

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BECHTEL CANADA CO.
JOB NO. 25183

PIPING AND INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
UNIT 441 - HYDROGEN MANUFACTURING UNIT TRAIN 3
PREFORMER BURNER LAYOUT

SCALE: NONE

SHELL DWG NO.: 441.0000.000.041.021 REV. 1g

441.021

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S- 18780
HMU PSA SILENCER - I

DESIGN PR. & TEMP: 700.00 kPa-g @ 200 °C & @
MATERIAL: C.S.
INSULATION TYPE/THK: H/75 mm
HEAT TRACE MEDIA/TEMP: ET 27 °C
TRIM: XT- 002-HAB

S- 18781
HMU PSA SILENCER - II

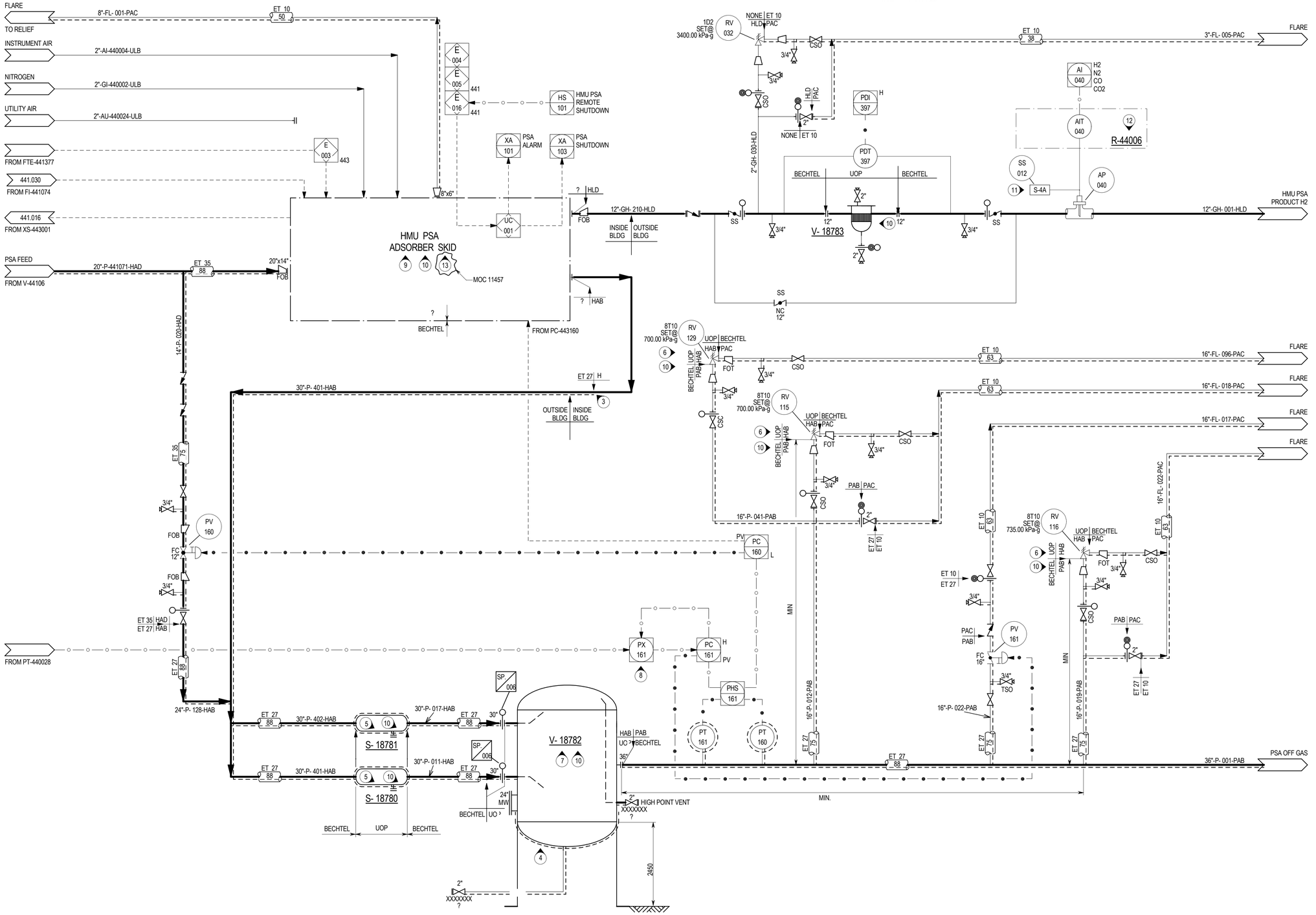
DESIGN PR. & TEMP: 700.00 kPa-g @ 200 °C & @
MATERIAL: C.S.
INSULATION TYPE/THK: H/75 mm
HEAT TRACE MEDIA/TEMP: ET 27 °C
TRIM: XT- 003-HAB

V- 18782
HMU-PSA OFF GAS DRUM

SIZE: 3810 mm ID x 30000 mm T/T
DESIGN PR. & TEMP: 700.00 kPa-g @ 200 °C & @
MATERIAL: C.S.
INSULATION TYPE/THK: H/75 mm
HEAT TRACE MEDIA/TEMP: ET 27 °C,BTM HEAD (4)
TRIM: VT- 015-HAB

V- 18783
HMU PSA HYDROGEN PRODUCT FILTER

SIZE: 508 mm ID x 1753 mmT/T
RATED FLOW: 166261.0 nm^3/hr
DESIGN PR. &TEMP: 3400.00 kPa-g @ 150 °C & @
PRESSURE DROP (CLEAN/DIRTY): 7.00 kPa/
PARTICLE RETENTION: 5 MICRONS
MATERIAL: C.S.
INSULATION TYPE/THK: NONE/
HEAT TRACE MEDIA/TEMP: N/A
TRIM: VT- 016-HLD



1. FOR GENERAL NOTES AND LEGEND SEE DWGS 400.0000.000.041.001, 002, 003, 004, 005, AND 006.
2. ALL INSTRUMENT LOOP AND INTERLOCK NUMBERS SHOWN ON P&ID SHALL HAVE A PREFIX "443" UNLESS OTHERWISE IDENTIFIED ON P&ID.
3. ELECTRIC TRACE & INSULATE UP TO 2 METERS INSIDE BUILDING (CUSTOMER SCOPE OF SUPPLY).
4. OFF GAS DRUM SHOULD HAVE BOTTOM HEAD ELECTRICALLY HEAT TRACED AND SHALL BE INSULATED TO 1.8m ABOVE TANGENT.
5. OFF SKID INSULATION AND ELECTRIC HEAT TRACING TO BE SUPPLIED AND INSTALLED BY BECHTEL.
6. INLET RV NOZZLE SHALL HAVE 300# FLANGE RATING.
7. OFF GAS DRUM INLET AND OUTLET NOZZLES SHALL BE 300# FLANGE RATING.
8. WHEN THE FLARE HEADER PRESSURE MEASURED BY PT-440028 IS HIGHER THAN HMU OFF GAS INLET PRESSURE, CONTROLLER PC-443161 WILL BE SET TO MANUAL AND OUTPUT 0% TO CLOSE PV-443161.
9. FOR HMU PSA ADSORBER SKID DETAILS, REFER TO UOP P&ID DRAWING NUMBER 943543-D-102.
10. EQUIPMETN DESIGNED AND SUPPLIED BY UOP.
11. FOR SAMPLE STATION DETAIL REFER TO 440.042.
12. SEE P&ID 440.024 FOR ANALYZER DETAILS.
13. LOGIC CHANGES REQUIRED FOR SWITCHING BETWEEN LEAN AND RICH CO2 CASES.

FOR MOC 11457 PROJECT USE ONLY (3G)

WORKING COPY OF MASTER DRAWING ASBUILT INFORMATION REQUIRED

HOLDS:

- NUMBER OF RVs AND SIZING TO BE CONFIRMED DURING DETAILED ENGINEERING.
- INSTRUMENT SIZING TO BE CONFIRMED DURING DETAILED ENGINEERING.

ISSUED FOR ESTIMATE
11 Jul 2011

MASTER DRAWING
AS BUILT
INFORMATION REQUIRED

FOR SUPPLEMENTARY REVISION HISTORY OF THIS DOCUMENT, REFER TO REVISION LIST 443.0000.000.041.003R.

REV	ISSUED DATE	DESCRIPTION	BY	CKD	PRS	CS	PDP	MC	APE	PEM	CLIENT APP
3g	07/11/11	ISSUED FOR PHA III									
3f	04/20/11	ISSUED FOR ESTIMATE									
3e	03/01/11	ISSUED DOR PHA II									
3d	01/11/11	ISSUED FOR CLIENT REVIEW									
3c	10/02/10	ISSUED FOR INTERNAL REVIEW									
3b	10/04/10	ISSUED FOR INFORMATION									
3	07/24/09	ISSUED FOR CONSTRUCTION									

SHELL CANADA ENERGY
SCOTFORD UPGRADER EXPANSION 1

BECHTEL CANADA CO.
JOB NO. 25183

PIPING AND INSTRUMENT DIAGRAM
SCOTFORD UPGRADER EXPANSION 1
UNIT 443 - HMU PSA OFFGAS & H2 FEED/PRODUCT
HMU PSA OFFGAS & H2 FEED/PRODUCT

SCALE: NONE
SHELL DWG NO.: 443.0000.000.041.003
REV. 3g

443.003
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