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# Heavy Oil

## Controlled Document

Quest CCS Project

### Execute Phase Tie In List

<b>Project</b>	Quest CCS Project
<b>Document Title</b>	Execute Phase Tie In List
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<b>Document Status</b>	Approved
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<i>Revision History shown on next page</i>	

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### Revision History

REVISION STATUS			APPROVAL		
Rev.	Date	Description	Originator	Reviewer	Approver
00	2014/10/01	Draft for Approval	Richard Haack/ Nitesh Neelanshu	Robert Simms Leonid Dykhno Allen Miller Chris Charbonneau Brett Kirk Arpit Desai	Irina Ward
01	2014/05/07	Issued for approval	Richard Haack/ Nitesh Neelanshu		Irina Ward
02	2014/05/28	Approved	Richard Haack/ Nitesh Neelanshu		Irina Ward
03	2014/10/01	Issued for Approval	Richard Haack/ Nitesh Neelanshu		Hironmoy Mukherjee
04	2014/10/03	Approved	Richard Haack/ Nitesh Neelanshu		Hironmoy Mukherjee

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### Signatures for this revision

Date	Role	Name	Signature or electronic reference (email)
2014/10/03	Originator	Richard Haack/ Nitesh Neelanshu	
	Reviewer	Add name	
	Approver	Hironmoy Mukherjee	<a href="https://knowledge.shell.ca/livelink/livelink.exe?func=ll&amp;objId=94585392&amp;objAction=browse&amp;sort=name">https://knowledge.shell.ca/livelink/livelink.exe?func=ll&amp;objId=94585392&amp;objAction=browse&amp;sort=name</a>

### Summary

Execute Phase Tie In List		Revision 1
Heavy Oil		

Date 07-May-14  
AA version

UNIT  
240

F	7-May-14	Issued For Approval	NN	RH	HM		
E	20-Mar-14	Issued For Review	NN	RH	HM		
D	15-Aug-11	Issued for PHA III and Approved for Design	MRAB				
C	20-Apr-11	Issued for Estimate Basis	MRAB				
B	7-Dec-10	Issued for IDS-003	MRAB				
REV	DATE	DESCRIPTION	BY	CHK	APP	APP	CLNT APP

SHELL CANADA ENERGY	
ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS QUEST CAPTURE INTERFACE UNIT 240	
240.0311.000.029.001	
Revision:	F

Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping

Tie-in Point	MOC#	WBI	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Mech Completion Duration	IDS Basis	Existing Line No.	Stream Data - Operating from Tie-In to Quest		Line Design Data		Insulated Y / N	EHT Y / N
															Temp °C	Pressure kPag	Temp °C	Pressure kPag		
240 - 2	13822 - 2 CWP 32	2190ABTP	Low	75	CWR - Cooling Water Return	240	6	240.003	From Water Wash Circulating Coolers E-24129 & E-24229 = 187 m³/h CWR inside new Absorber modules.	NO	NO		IDS - 3 Apr 11, 11	14"-CWR-240001-UAB	Temp °C	32	58	800	Y	ET 10
															Pressure kPag	240				
															Flow m³/h	83.5				
240 - 8	U/G	2191AITP	Med - High	NNF	FW - Fire Water	240	6	240.011	Flue gas recirculation tie-in downstream of the E-24117	NO	YES		U/G	12"-WF-240001-UHX	Temp °C	5	27	1100	No U/G HDPE <> Yes A/G & U/G CS	No U/G HDPE <> ET 10 A/G & U/G CS
															Pressure kPag	900				
															Flow m³/h	NNF				
240 - 13	U/G	NA	Low Med	NNF	WW - Waste Water	240	NA	240.032	PDN-026 Apr 20, 2011 - Run down from Quest Catchment area for curbed area under HMU 1&2 CO2 Absorbers and to receive stormwater collected in Unit 246	NO	NO		NA	NA	Temp °C		NA	NA	NA	NA
															Pressure kPag	NNF				
															Flow m³/h					

- Note:
1. All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.
  2. Use existing tie-in procedure and specs.
  4. Tie-ins will be arranged at the east end of 240 Piperack, and will be either to/from 241 or 242 lines
  5. Absorber Utility Tie-Ins will be within HMU 1&2 complex and will avoid connecting supply to the Unit 246 side. JA answered Sept 29/10

UNIT  
241

H	7-May-14	Issued For Approval	NN	RH	HM		
G	19-Mar-14	Issued For Review	NN	RH	HM		
F	5-Feb-13	Issued for IA Tie-in IDS Package	KB				
E	15-Dec-11	Issued for Design	BS				
0	20-Mar-14	Issued for PHA III and Approved for Design	MRAB	FSM	KH	PHJ	
B	20-Apr-11	Issued for Estimate Basis	MRAB				
REV	DATE	DESCRIPTION	BY	CHK	APP	APP	CLNT APP

SHELL CANADA ENERGY	
ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS QUEST CAPTURE INTERFACE UNIT 241	
241.0311.000.029.001	
Revision:	F

Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping

Tie-in Point	MOC#	WBI	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Mech Completion Duration	Next Step Basis	Existing Line No.	Stream Data for Quest Pipe Line - Operating		Line Design Data		Insulated Y / N	EHT Y / N
															Temp °C	Pressure kPag	Temp °C	Pressure kPag		
240 - 1	13822 - 1 CWP 31	2190AATP	Low	75	CWS - Cooling Water Supply	240	6	240.003	To Water Wash Circulating Coolers E-24129 & E-24229 = 187 m³/h total to be split equally between coolers inside the new Absorber modules.	NO	NO		IDS - 3 Apr 11, 11	NA	Temp °C 25 Pressure kPag 420 Flow m³/h 83.5	58	800	Y	ET 10	
240 - 4	13822 - 4 CWP 31	2190ACTP	Low Med	36	AI - Instrument Air	240	2	240.004	Common IA supply to Absorber / Wash Water area, Former MOC 6899 (TP#20) to be revised NOTE 5	NO	NO		IDS - 3 Apr 11, 11	NA	Temp °C 35 - 43 Pressure kPag 700 Flow m³/h 45	70	1200	N	NA	
241 - 2	14041 - 2 CWP 31	2191AATP	High	6125	Raw H2 Syngas Supply	241	14"	241.009	Supply Raw H2 (35°C) to Absorber V-24118 & Wash Column V-24119 Former MOC 6897 (TP# 8A/8B) to be revised	NO	NO		IDS - 9 Rev 2	14"-P-241023-HJE	Temp °C 35 Pressure kPag 3036 Flow m³/h 6125	95	3500	Y	ET 38	
241 - 3	14041 - 3 CWP 31	2191ABTP	High	5437 / 6125	Raw H2 Syngas Return	241	14"	241.009	Return Lean Raw H2 Syngas (35°C) from Wash Column V-24119, upstream of PSA supply s/d valve Former MOC 6897 (TP# 8A/8B) to be revised	NO	NO		IDS - 9 Rev 2	14"-P-241023-HJE	Temp °C 35 Pressure kPag 2967 Flow m³/h 5437	95	3500	Y	ET 38	
241-6	NA	NA	NA	NA	Reformer Flue Gas	241	Duct	241.005	Flue gas recirculation supply tie-in downstream of the reformer ID fan (C-24102).	NO	YES		NA	NA	Temp °C NA Pressure kPag NA Flow m³/h NA	NA	NA	NA	NA	
241-7	NA	NA	NA	NA	Reformer Flue Gas	241	Duct	241.005	Flue gas recirculation tie-in downstream of the E-24117.	NO	YES		NA	NA	Temp °C NA Pressure kPag NA Flow m³/h NA	NA	NA	NA	NA	
241-10	NA	NA	NA	NA	Combustion Air / Flue Gas Recirculation O2 Analyzer.	241	Duct	241.012	Ducting tie-in for new O2 analyser on combined combustion air / flue gas recirculation.	NO	YES		NA	NA	Temp °C NA Pressure kPag NA Flow m³/h NA	NA	NA	NA	NA	
241-11	NA	NA	NA	NA	Combustion Air / Flue Gas Recirculation O2 Analyzer.	241	Duct	241.012	Ducting tie-in for new O2 analyser on combined combustion air / flue gas recirculation.	NO	YES		NA	NA	Temp °C NA Pressure kPag NA Flow m³/h NA	NA	NA	NA	NA	
241-12	NA	NA	NA	6.6 / 58	AI - Instrument Air	241	1"	240.004	AI supply to FGR Louvre actuator and oxygen analyzer	NO	NO		NA	3/4" supply off 2"-AI-244001-ULB	Temp °C 35 Pressure kPag 700 Design Flow Sm³/h 58	70	1200	N	NA	

- Note:
- All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.
  - Use existing tie-in procedure and specs.
  - Absorber Utility Tie-Ins will be within HMU 1&2 complex and will avoid connecting supply to the Unit 246 side. JA answered Sept 29/10

Date 07-May-14  
AA version

UNIT Date 07-May-14  
242 AC Version

G	7-May-14	Issued For Approval	NN	RH	HM		
F	19-Mar-14	Issued For Review	NN	RH	HM		
E		Issued for Design	BS				
C	20-Mar-14	Issued for PHA III and Approved for Design	MRAB				
B	20-Apr-11	Issued for Estimate Basis					
REV	DATE	DESCRIPTION	BY	CHK	APP	APP	CLNT APP

<b>SHELL CANADA ENERGY</b>	
ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS QUEST CAPTURE INTERFACE UNIT 242	
<b>242.0311.000.029.001</b>	
Revision:	<b>E</b>

**Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping**

Tie-in Point	MOC#	WBI	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Mech Completion Duration	Next Step Basis	Existing Line No.	Stream Data for Quest Pipe Line - Operating		Line Design Data		Insulated Y / N	EHT Y / N
															Temp °C	Pressure kPag	Temp °C	Pressure kPag		
240 - 3	13822 - 3 CWP 31	2190AGTP	Low	11	WU - Utility Water	240	2	240.003	Common UW supply to Absorber / Wash Water area for Utility stations New MOC <b>NOTE 5</b>	NO	NO		IDS - 3 Apr 11, 11	2"-WU-242001-UAB	Temp °C 5	525	33	1034	Y	ET 10
240 - 5	13822 - 5 CWP 31	2190ADTP	Low Med	0 / 204	AU - Utility Air	240	2	240.004	Common UA supply to Absorber / Wash Water area for Utility stations Former MOC 6951 (TP#37) to be revised NOTE 5	NO	NO		IDS - 3 Apr 11, 11	2"-AU-242001-ULB	Temp °C 35 - 43	700	70	1200	N	NA
240 - 6	13822 - 6 CWP 31	2190AETP	Low Med	0 / 211	GI - Nitrogen	240	2	240.004	Common N2 supply to Absorber / Wash Water Area for vessel purge (start-up, shut down) Former MOC 6922 (TP#29) to be revised NOTE 5	NO	NO		IDS - 3 Apr 11, 11	3"-GI-242005-ULB	Temp °C 5 - 45	1100	70	1500	N	NA
240 - 7	13822 - 7 CWP 32	2190AHTP	Med	2 t/h	SL - 350 kPa (LP) Steam	240	4	240.006	Absorber Steam out & Utility Stations Former MOC 6903 (TP#24) to be revised NOTE 5 Line size revised to 4NPS Jan 1, 2011	NO	NO		IDS - 3 Apr 11, 11	10"-SL-242002-SAB	Temp °C 160	335	250	500	Y	ET 10 for Tie In
240 - 12	13822 - 12 CWP 32	2190AxTP	Med	< 1 t/h	SC - LP Recovered Clean Condensate	240	2	240.006	Absorber Trapped Condensate return NOTE 5	NO	NO		IDS - 3 Apr 11, 11	6"-SC-242004-SAB	Temp °C 135	250	250	500	Y	ET 10 for Tie In
242 - 2	14043 - 2 CWP 31	2191AATP	High	6125	Raw H2 Syngas Supply	242	14	242.009	Supply Raw H2 (35°C) to Absorber V-24218 & Wash Column V-24219 Former MOC 6897 (TP# 9A/9B) to be revised.	NO	YES		IDS - 10 Rev 2	14"-P-242023-HJE	Temp °C 35	3036	95	3500	Y	ET 38
242 - 3	14043 - 3 CWP 31	2191ABTP	High	5437 / 6125	Raw H2 Syngas Return	242	14	242.009	Return Lean Raw H2 Syngas (35°C) from Wash Column V-24219, upstream of PSA supply s/d valve Former MOC 6897 (TP# 9A/9B) to be revised.	NO	YES		IDS - 10 Rev 2	14"-P-242023-HJE	Temp °C 35	2967	95	3500	Y	ET 38
242-6	NA	NA	NA	NA	Reformer Flue Gas	242	Duct	242.005	Flue gas recirculation supply tie-in downstream of the reformer ID fan (C-24202).	NO	YES		NA	NA	Temp °C NA	NA	NA	NA	NA	NA
242-7	NA	NA	NA	NA	Reformer Flue Gas	242	Duct	242.005	Flue gas recirculation tie-in downstream of the E-24217.	NO	YES		NA	NA	Temp °C NA	NA	NA	NA	NA	NA
242-10	NA	NA	NA	NA	Combustion Air / Flue Gas Recirculation O2 Analyzer.	242	Duct	242.005 242.012	Ducting tie-in for new O2 analyser on combined combustion air / flue gas recirculation.	NO	YES		NA	NA	Temp °C NA	NA	NA	NA	NA	NA
242-11	NA	NA	NA	NA	Combustion Air / Flue Gas Recirculation O2 Analyzer.	242	Duct	242.005 242.012	Ducting tie-in for new O2 analyser on combined combustion air / flue gas recirculation.	NO	YES		NA	NA	Temp °C NA	NA	NA	NA	NA	NA
242-12	NA	NA	NA	NA	AI - Instrument Air	242	1"	240.004	AI supply to FGR Louvre actuator and Lube Oil Skid - 1" supply from existing 1" supply to Combustion Air Louvre actuator supply FV-242316-FF	By SPG	By SPG		NA	1" supply off 2"-AI-242002-ULB ??	Temp °C 45	700	70	1200	N	N
242-13	NA	NA	NA	NA	AI - Instrument Air	242	1"	240.004	AI supply to O2 analysers. Tie-in to existing 1" valve run piping up to reformer penthouse and leave 2 x 3/4" tie-ins for the O2 analysers.	By SPG	By SPG		NA	1" supply off 2"-AI-244001-ULB ??	Temp °C 45	700	70	1200	N	N
242-14	NA	NA	NA	NA	Combustible Gas Analyser in Reformer Flue Gas	242	Duct	242.005	Ducting tie-in for new combustible gas analyser on reformer flue gas. (Source)	NO	YES		NA	NA	Temp °C NA	NA	NA	NA	NA	NA
242-15	NA	NA	NA	NA	Combustible Gas Analyser in Reformer Flue Gas	242	Duct	242.005	Ducting tie-in for new combustible gas analyser on reformer flue gas. (Detector)	NO	YES		NA	NA	Temp °C NA	NA	NA	NA	NA	NA

Note:  
1. All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.  
2. Use existing tie-in procedure and specs.  
5. Absorber Utility Tie-Ins will be within HMU 1&2 complex and will avoid connecting supply to the Unit 246 side. JA answered Sept 29/10



Date 07-May-14

UNIT  
250

0	25-Sep-12	Issued for Design			KB	KH		
REV	DATE	DESCRIPTION			BY	CHK	APP	CLNT APP

SHELL CANADA ENERGY	
ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS QUEST CAPTURE INTERFACE UNIT 250	
250.0311.000.029.001	
Revision:	0

**Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping**

Tie-in Point	MOC#	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Next Step Basis	Existing Line No.	Stream Data - Operating from Tie-In to Quest		Line Design Data		Insulated Y / N	EHT Y / N
													Temp °C	Pressure kPag	Temp °C	Pressure kPag		
250-1A/B	11457	High	1084 / 1300	CWS - Cooling Water Supply	250	14"	250.009	Supply 25°C CWS water to Cogen aux. for process and equipment cooling (bypass Quest).	No	No	IDS-046 Sept 28/12	14"-CWS-250007-UAB	Temp °C	25	58	800	N	N
													Pressure kPag	500				
													Nor Flow m³/h	1084				

Notes:

1. All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.
2. Use existing tie-in procedure and specs.

Date 07-May-14  
AA version

UNIT  
251

E							
D	20-Mar-14	Issued For Review	NN				
C	20-Apr-11	Issued for Estimate Basis	MRAB				
B	12-Jan-11	Issued for IDS - 004	MRAB				
A	25-Oct-10	Issued for IDS-003	MRAB	0	0.0		
REV	DATE	DESCRIPTION	BY	CHK	APP	APP	CLNT APP

SHELL CANADA ENERGY	
ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS	
QUEST CAPTURE INTERFACE UNIT 251	
251.0311.000.029.001	
Revision:	E

Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping

Tie-in Point	MOC#	WBI	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Mech Completion Duration	Next Step Basis	Existing Line No.	Coordinates		Stream Data for Quest Pipe Line - Operating		Line Design Data		Insulated Y / N	EHT Y / N
															Temp °C	Pressure kPag	Temp °C	Pressure kPag	Y / N	Y / N		
251 - 1	13284 - 1 Fluor	5191AA1PT	Low - Med	185	WI - Demin Water Return	251	14	251.103	From Capture Unit 246 - was used for utility cooling in Quest CO2 Capture, line is UJB, target is to return Demin Water at approx 90°C - need to revise UJB design temperature limits for this return stream. TieIn is downstream of FV-251001 on existing 14 NPS gate valve installed by SPG for prior project (Valve is not shown on P&ID provided to Fluor)	NO	NO		IDS - 13 Apr 28, 11	18" - WI - 251001 - UJB downstream of FV-251001 on 14NPS valve pre-installed	Northing m	Temp °C	84	125	1450	Y	ET 10	
															Easting m	Pressure kPag	420					
															Elevation m	Flow m³/h	185					
251 - 2	13284 - 2 CWP 31	NA	NA	158	RCC Recovered Clean Condensate	251	6	251.116	From Capture Unit 246 - Condensate return from Quest unit. Tiein to RCC Tank at NOZZLE N13 Former MOC 6948 to be revised Flow rate increased from 90 t/h to 158 t/h - line on piperack to be 6 inch, connecting to 6 inch valve / nozzle on Tk-25101 (south side where condensate polisher project ties in to tank)	NO	NO		IDS - 13 Apr 28, 11	Nozzle N18 Tk-25101	Northing m	Temp °C	74	130	1400	Y	ET 10	
															Easting m	Pressure kPag	350					
															Elevation m	Flow m³/h	154					
251 - 4	13284 - 4 CWP 31	5191AA1PT	Med	80	WI - Demin Water	251	6	251.103	Modification of existing Demin Water control system - Required for split range flow control at FV-251001	NO	NO		IDS - 13 Apr 28, 11	from 14" - WI - 251001 - UJB upstream of FV-251001 and 14" Bypass valve	Northing m	Temp °C	22	125	1700	Y	ET 10	
															Easting m	Pressure kPag	900					
															Elevation m	Flow m³/h	80 - 300					
251 - 6	14040 - 6 CWP 31	NA	Med	5750 / 6132	CWR - Cooling Water Return	251	30	251.101	Return 43°C CWR water from Quest back the CWS supply for CoGen / Utility Plant.	NO	NO		IDS - 4 Apr 11, 11	42"-CWS-251001-UAB	Northing m	Temp °C	42	58	800	Y for Tie In	ET 10 for Tie In	
															Easting m	Pressure kPag	500					
															Elevation m	Nor Flow m³/h	5750					
251 - 8	NA	NA	Med	2470 / 8780	CWS - Cooling Water Supply	251	42	251.101	CWS supply from Unit 252 requires butterfly valve to be modified so that the control room can change the degree of valve opening with the addition of an actuator and positioners to the valve. The actuation and valve position to be incorporated into DCS. 2	NO	NO		NA	42"-CWS-251001-UAB	Northing m	Temp °C	25	58	800	NO	NO	
															Easting m	Pressure kPag	NA					
															Elevation m	Nor Flow m³/h	2470					

Note: 1. All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.  
2. Use existing tie-in procedure and specs.

Date 07-May-14  
AA version

UNIT  
252

D	20-Mar-14	Issued For Review			NN		
C	20-Apr-11	Issued for Estimate Basis			MRAB		
B	12-Jan-11	Issued for IDS - 004			MRAB		
A	25-Oct-10	Issued for IDS-003			MRAB	0	0.0
REV	DATE	DESCRIPTION			BY	CHK	APP APP CLNT APP

<b>SHELL CANADA ENERGY</b>	
ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS QUEST CAPTURE INTERFACE UNIT 252	
<b>252.0311.000.029.001</b>	
Revision:	<b>E</b>

**Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping**

Tie-in Point	MOC#	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Mech Completion Duration	Next Step Basis	Existing Line No.	Stream Data - Operating from Tie-In to Quest		Line Design Data		Insulated Y / N	EHT Y / N
														Temp °C	Pressure kPag	Temp °C	Pressure kPag		
252 - 1	14040 - 1 CWP 31	Med	5750 / 6132	CWS - Cooling Water Supply	252	30	252.005	Supply 25°C CWS water to Quest for process and equipment cooling.	YES	NO		IDS-004 Apr 11, 11	42"-CWS-252010-UAB	Temp °C	25	58	800	Y for Tie In	ET 10 for Tie In
													Pressure kPag	500					
													Nor Flow m³/h	5750					

- Note:
1. All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.
  2. Use existing tie-in procedure and specs.

Date 07-May-14  
AA version

UNIT  
282  
258

D	7-May-14	Issued For Approval	NN	RH	HM	
C	20-Mar-14	Issued For Review	NN	RH	HM	
B	20-Apr-11	Issued for Estimate Basis	MRAB			
A	7-Dec-10	Issued for IDS-003	MRAB	0	0.0	
REV	DATE	DESCRIPTION	BY	CHK	APP	CLNT APP

SHELL CANADA ENERGY	
ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS QUEST CAPTURE INTERFACE UNIT 258 & UNIT 282	
258.0311.000.029.001	
Revision:	E

Quest CO2 Capture Project Tie-in Scope

Tie-in Point	MOC#	WBI	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Mech Completion Duration	Existing Line No.	Coordinates			Stream Data for Quest Pipe Line - Operating		Line Design Data		Insulated Y / N	EHT Y / N
														Temp °C	Pressure kPag	Temp °C	Pressure kPag	Temp °C	Pressure kPag			
258 - 1	NA	519201TP	Med	NA	Firewater	258	12	258.004	Capture Unit Area 246 - Firewater loop for hydrants / FW circuit around Quest CO2 Capture Unit Loop or individual 6NPS Hydrant is subject to discussion (former TP# 41)	NO	NO		12" PIV @ PIV 250-1 8th Ave & G Street	Northing m		Temp °C	5	NA	NA	No U/G HDPE <> Yes A/G & U/G CC	No U/G HDPE <> ET 10 A/G	
														Easting m		Pressure kPag						
														Elevation m		Flow m³/h						
283-1	NA	NA	NA	128.9	GN - Natural Gas	282	2"	246.036	NA	NA	NO	NA	Northing m		Temp °C	15	70	1350	NA	NA		
													Easting m		Pressure kPag	950						
													Elevation m		Flow m³/h	128.9						

Note: 1. All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.  
2. Use existing tie-in procedure and specs.

Date 07-May-14  
AA version

UNIT  
285

D	20-Mar-14	Issued For Review	NN	RH	HM		
C	20-Apr-11	Issued for Estimate Basis	MRAB				
B	12-Nov-10	Issued for IDS-002 Package	MRAB				
A	7-Dec-10	Issued for IDS-003	MRAB	0	0.0		
REV	DATE	DESCRIPTION	BY	CHK	APP	APP	CLNT APP

SHELL CANADA ENERGY	
ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS QUEST CAPTURE INTERFACE UNIT 285	
285.0311.000.029.001	
Revision:	E

Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping

Tie-in Point	MOC#	WBI	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	System Shutdown Required	Mech Completion Duration	Next Step Basis	Existing Line No.	Coordinates		Stream Data for Quest Pipe Line - Operating			Line Design Data		Insulated Y / N	EHT Y / N
															Temp °C	Pressure kPag	Flow m³/h	Temp °C	Pressure kPag	Flow m³/h			
285 - 1	13821 - 1 CWP 32	5195AATP	Low	185	WI - DEMIN Water - Supply	285	6	285.212	Utility Supply to Capture Unit 246 - Required for utility cooling in Quest CO2 Capture , line is UJB TieIn on Piperack header to minimise length (could have had TieIn point upstream of FV-251001	NO	NO		IDS - 2 Nov 22, 10, Feb 7, 11	18" - WI - 285001 - UJB	Northing m	Temp °C	22	70	1700	Y	ET 10		
285 - 2	13821 - 2 CWP 32	5195ALTP	Low	12 / 163	WP - Waste Water	285	8	285.212	Utility removal for Capture Unit 246 - Potentially oily condensate, Purge water, Excess Reflux water, Blowdown from Amine Sump waters to WWTP for treatment - USE POC line to WWTP , Former MOC 6966 (TP # 35) to be revised - Pipe spec from Unit 246 likely to be "PJB", tie-in assembly will match current line spec.	NO	NO		IDS - 2 Nov 22, 10, Feb 7, 11	8" - SCO - 285001 - SAB	Northing m	Temp °C	35	122	1650	Y	ET 10		
285 - 2 A / B	NA	519202TP	Med	NA	Firewater	258	12	258.004	Capture Unit 246 Area - Firewater loop for hydrants / FW circuit around Quest CO2 Capture Unit Loop or individual 6NPS Hydrant is subject to discussion (former TP # 42)	NO	NO		12" PIV @ PIV 240-3 8th Ave & G Street	Temp °C	5	NA	NA	No U/G HDPE <> Yes A/G & U/G CS	No U/G HDPE <> ET 10 A/G & U/G CS				
285 - 3	13821 - 3 CWP 31	5195AHTP	Low	0 / 11	WU - Utility Water	285	2	285.212	Utility Supply to Capture Unit 246 - Utility water for Utility stations Former MOC 6953 (TP # 39) to be revised	NO	NO		IDS - 2 Nov 22, 10, Feb 7, 11	6" - WU - 285008 - UAB	Northing m	Temp °C	5	33	1034	Y	ET 10		
285 - 9	13821 - 9 CWP 31	5195AxTP	Low	0 / 2	RCC - Low Pressure Recovered Clean Condensate	285	2	285.212	Utility return from Battery Limits of Capture Unit 246 of Trapped Condensate from Steam Supply lines	NO	NO		IDS - 2 Nov 22, 10, Feb 7, 11	3" - SC - 285045 - SAB	Northing m	Temp °C	135	250	500	Y	ET 10		
285 - 5	13821 - 5 CWP 31	5195ADTP	Low Med	0 / 204	AU - Utility Air	285	2	285.212	Utility Supply to Capture Unit 246 - Utility Air supply to Quest CO2 Capture Unit Utility Stations	NO	NO		IDS - 2 Nov 22, 10, Feb 7, 11	4" - AU - 285007 - ULB	Northing m	Temp °C	35 - 43	70	1200	N	N		
285 - 6	13821 - 6 CWP 31	5195AETP	Low Med	33 / 314	GI - Nitrogen	285	2	285.212	Utility Supply to Capture Unit 246 - Nitrogen supply to Quest CO2 Capture Unit Utility Stations and vessel purging, tank blanketing, TEG stripping Former MOC 6965 (TP # 31) to be revised	NO	NO		IDS - 2 Nov 22, 10, Feb 7, 11	6" - GI - 285005 - ULB	Northing m	Temp °C	5 - 45	70	1500	N	N		
285 - 7A/B	13821 - 7 CWP 33	5195AITP	Low Med	166 t/h	SL - LP Steam (350 kPag)	285	36	285.211	Utility Supply to Capture Unit 246 - LP Steam supply to Quest CO2 Capture Amine Regeneration Former MOC 6907 (TP # 26) to be revised	NO	NO		IDS - 2 Nov 22, 10, Feb 7, 11	42" - SL - 285013 - SAB	Northing m	Temp °C	160	250	500	Y	ET 10 for Tie-IN		
285 - 8	13821 - 8 CWP 32	5195AKTP	Low Med	0.7 t/h	Low Temp (Sat) HP Steam	285	2	285.212	Utility Supply to Capture Unit 246 - LT HP Steam for TEG unit operation in Quest CO2 Capture	NO	NO		IDS - 2 Nov 22, 10, Feb 7, 11	16" - SS - 285009 - SAG	Northing m	Temp °C	275	415	5170	Y	ET 10 for Tie-IN		

- Note:
- All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.
  - Use existing tie-in procedure and specs.
  - Jan 25, 11 - Revised WU, CWS/R, SL, SC, AI, AU & GI design & operating conditions to Basic Engineering Design Data
  - Feb 22, 11 - All "HOT TAP" as services to be available to Unit 246 Quest in Q2 2014, prior to Base Upgrader T/A in 2015

Date 07-May-14  
AA version

UNIT  
440

E	7-May-14	Issued For Approval	NN	RH	HM		
D	20-Mar-14	Issued For Review	NN	RH	HM		
C	20-Apr-11	Issued for Estimate Basis	MRAB				
B	23-Feb-11	Issued for IDS-007	MRAB				
A	7-Dec-10	Issued for IDS-003	MRAB	0	0.0		
REV	DATE	DESCRIPTION	BY	CHK	APP	APP	CLNT APP

<b>SHELL CANADA ENERGY</b>	
ATHABASCA OIL SANDS	DOWNSTREAM
PROJECT	
<b>FLUOR</b>	
TIE INS	
QUEST CAPTURE INTERFACE	
UNIT 440	
<b>440.0311.000.029.001</b>	
Revision:	<b>E</b>

**Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping**

Tie-in Point	MOC#	WBI	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Mech Completion Duration	Next Step Basis	Existing Line No.	Stream Data for Quest Pipe Line - Operating			Line Design Data		Insulated Y / N	EHT Y / N				
															Temp °C	Pressure kPag	Flow m³/h	Temp °C	Pressure kPag						
440 - 1	14044 - 1 CWP 3X	2390AATP	Low	110 m3/h	CWS - Cooling Water Supply	440	8"	440.012	To Water Wash Circulating Cooler E-44129 = 53 m3/h & E-44014 = 32 m³/h, consider tap on 16"-CWS-440001-UAB (original flow from SPG was 65 m³/h) (former TP # 100)	NO	YES - unit shutdown		IDS - 7 May 30, 11	14"-CWS-440001-UAB	Temp °C	25	Pressure kPag	420	Flow m³/h	113	58	800	Y	ET 10	
440 - 2	14044 - 2 CWP 3X	2390ABTP	Low	110 m3/h	CWR - Cooling Water Return	440	8"	440.012	CWR from Water Wash Circulating Cooler E-44119 & E-44014 == 85 m3/h, consider tap on 16"-CWR-440004-UAB (former TP#101)	NO	YES - unit shutdown		IDS - 7 May 30, 11	14"-CWR-440004-UAB	Temp °C	32	Pressure kPag	390	Flow m³/h	113	58	800	Y	ET 10	
440 - 14	14044 - 14 CWP 3X	2390AxTP	Low	<1 t/h	SCL - LP Steam Condensate	440	2"	440.019	Condensate recovery from LP Steam traps and Drip legs	NO	YES - unit shutdown		IDS - 7 May 30, 11	3"-SCL-440020-SAB	Temp °C	135	Pressure kPag	250	Flow m³/h	<1 t/h	250	500	Y	ET 10	
440 - 5	14044 - 5 CWP 3X	2390AGTP	Low	11	WU - Utility Water	440	2"	440.014	For utility stations. Consider temporary connection and using spare connection on header take offs.	NO	YES - unit shutdown		IDS - 7 May 30, 11	2"-WU-440022-UAB	Temp °C	5	Pressure kPag	525	Flow m³/h	11	33	1034	Y	ET 10	
440 - 6	14044 - 6 CWP 3X	2390ACTP	Low Med	19 / 24	AI - Instrument Air	440	2"	440.016	For new control valves in Absorber Area. Use manifold take offs - Aug 2010 - Need a separate 2" takeoff that can support itself	NO	YES - unit shutdown		IDS - 7 May 30, 11	2"-AI-440009-ULB	Temp °C	35 - 43	Pressure kPag	700	Design Flow Sm³/h	24	70	1200	NA	NA	
440 - 7	14044 - 7 CWP 3X	2390ADTP	Low Med	0 / 204	AU - Utility Air	440	2"	440.015	For Utility Stations in Absorber area. Aug 2010 - Need a separate 2" takeoff that can support itself.	NO	YES - unit shutdown		IDS - 7 May 30, 11	2"-AU-440013-ULB	Temp °C	35 - 43	Pressure kPag	700	Design Flow Sm³/h	204	70	1200	NA	NA	
440 - 8	14044 - 8 CWP 3X	2390AETP	Low Med	0 / 211	GI - Nitrogen	440	2"	440.016	For purging and pressure out liquid from the CO2 absorber. And Utility Stations Consider temporary connection and using spare connection on header take offs.	NO	YES - unit shutdown		IDS - 7 May 30, 11	3"-GI-440001-ULB	Temp °C	5 - 45	Pressure kPag	1100	Design Flow Sm³/h	211	70	1500	NA	NA	
440 - 10	14044 - 10 CWP 3X	2390AHTP	Med	2 t/h	SL - LP Steam	440	4"	440.018	For absorber steam out and Utility Stations. Consider temporary connection and using spare connection on header take offs. Unit 240 Tie-Ins indicated that 4" connection is more appropriate than 3" line to deliver 2 t/h == line velocity = 31 m/s with 4NPS	NO	YES - unit shutdown		IDS - 7 May 30, 11	4"-SL-440027-SAB	Temp °C	160	Pressure kPag	335	Design Flow t/h	2	250	500	Y	ET 10 for Tie-In	
440 - 11	14044 - 11 CWP 3X	2390AFTP	Med - High	???	FL - Flare	440	10"	440.003	An absorber, treat gas cooler and KO drum are being installed in HMU3. These equipment items will likely be fitted with relief valves that will have to be tied into the flare header. It is not anticipated that any new relief valves will add significant load to the existing flare systems as they will likely be sized for fire case only. At this point it is deemed that the existing block flow PSVs in the HMU will be adequate to cover the block flow case Note 3 <b>NEED to verify line size</b>	NO	YES - unit shutdown		IDS - 7 May 30, 11	20"-FL-440011-PAC	Temp °C		Pressure kPag	NA	Flow m³/h		NA	NA	NA	Y	ET 10
440 - 12	NA	2390AITP	Med High	NNF	FW - Fire Water	440	8"	440.025	Confirm tie-in can be done outside T/A window No pooling hydrocarbons or other additional fire sources. Will use existing monitors and firefighting facilities. Need to check constructability requirements - FW hydrant locations to be checked	NA	NA		HOLD	NA	Temp °C		Pressure kPag	NA	Flow m³/h		NA	NA	NA	No U/G HDPE <-> Yes A/G & U/G CS	No U/G HDPE <-> ET 10 A/G & U/G CS
440 - 15	14044 - 15 CWP 3X	2390AKTP	Low Med	6.5 m³/h	BFW - Boiler Feedwater	440	2"	440.021	To Wash Water Makeup Cooler E-44014	NO	YES - unit shutdown		IDS - 7 May 30, 11	6"-WB-440001-SAG	Temp °C	121	Pressure kPag	7000	Flow m³/h	7	150	9129	Y	ET 10	

- Note:
- All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.
  - Use existing tie-in procedure and specs.
  - Flare connection to accommodate PSV discharge equal to PSV 375 A/B on Process Condensate Separator V-44106 - need to check
  - Jan 25, 11 - Revised WU, CWS/R, SL, SC, AI, AU & GI design & operating conditions to Basic Engineering Design Data

Date 07-May-14  
AA version

UNIT  
441

E							
D	7-May-14	Issued For Approval	NN	RH	HM		
C	20-Mar-14	Issued For Review	NN				
B	20-Apr-11	Issued for Estimate Basis					
A	7-Dec-10	Issued for IDS-003	MRAB	0	0.0		
REV	DATE	DESCRIPTION	BY	CHK	APP	APP	CLNT APP

SHELL CANADA ENERGY	
ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS	
QUEST CAPTURE INTERFACE	
UNIT 441	
441.0311.000.029.001	
Revision:	E

Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping

Tie-in Point	MOC#	WBI	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Mech Completion Duration	Next Step Basis	Existing Line No.	Stream Data for Quest Pipe Line - Operating			Line Design Data		Insulated Y / N	EHT Y / N
															Temp °C	Pressure kPag	Flow m³/h	Temp °C	Pressure kPag		
441 - 8	14046 - 8 CWP 31	219311TP	Low	6.6	WP - Waste Water	441	2"	441.013	From Purge Water Flash Drum as purge of Excess Wash Water to oily water sewer. Direct to V-44111 and cool in E-44120 and then dump to DO underground system. Will be directed to WWTP through V-44008 and P-44001 A/B	NO	YES		IDS - 11 Jun 14, 11	4"-PC-441015-PJB	Temp °C	38	60	3500	Y	ET 10	
															Pressure kPag	83					
															Flow m³/h	7					
441 - 1	NA	2391BBTP	Med	NA	PSA Tail gas - LP Offgas	442	NA	441.019	Modify PSA Gas Fuel Control to Reformer for Lean and Rich CO2 gas feed. CHECK PV-426 A/B control logic and sizing basis to determine if paired valves can meet the Lean CO2 / Rich CO2 operating modes - further work for in-line devices to be determined	NO	NA		NA	NA	Temp °C	NA	NA	NA	NA	NA	
															Pressure kPag	NA	NA	NA	NA	NA	
															Flow m³/h	NA	NA	NA	NA	NA	
441 - 4	14046 - 4 CWP 31	2391AATP	High	8858	Raw H2 Syngas Supply	441	20	441.016	Raw Syngas feed to Amine Absorber (V-44118) (Former TP 102A)	NO	YES		IDS - 11 Jun 14, 11	20"-P-441023-HAF	Temp °C	65	95	3500	Y	ET 35	
															Pressure kPag	3003					
															Flow m³/h	8858					
441 - 5	14046 - 5 CWP 31	2391ABTP	High	7444 / 8858	Raw H2 Syngas Return	441	20	441.016	Return of lean Raw Syngas from the Wash Water Vessel (V-44119) for PSA feed (former TP#102B)	NO	YES		IDS - 11 Jun 14, 11	20"-P-441023-HAF	Temp °C	35	95	3500	Y	ET 35	
															Pressure kPag	2933					
															Flow m³/h	7444					
441-9	NA	NA	NA	NA	Reformer Flue Gas	441	Duct	441.008	Flue gas recirculation supply tie-in downstream of the reformer ID fan (C-44102).	NO	YES		NA	NA	Temp °C	NA	NA	NA	NA	NA	
															Pressure kPag	NA	NA	NA	NA	NA	
															Flow m³/h	NA	NA	NA	NA	NA	
441-10	NA	NA	NA	NA	Reformer Flue Gas	441	Duct	441.007	Flue gas recirculation tie-in downstream of the combustion air fan (E-44117).	NO	YES		NA	NA	Temp °C	NA	NA	NA	NA	NA	
															Pressure kPag	NA	NA	NA	NA	NA	
															Flow m³/h	NA	NA	NA	NA	NA	
441-11	NA	NA	NA	NA	Combustion Air / Flue Gas Recirculation O2 Analyzer.	441	Duct	441.006	Ducting tie-in for new O2 analyser on combined combustion air / flue gas recirculation. Downstream of E-44113.	NO	YES		NA	NA	Temp °C	NA	NA	NA	NA	NA	
															Pressure kPag	NA	NA	NA	NA	NA	
															Flow m³/h	NA	NA	NA	NA	NA	
441-12	NA	NA	NA	NA	Combustion Air / Flue Gas Recirculation O2 Analyzer.	441	Duct	441.006	Ducting tie-in for new O2 analyser on combined combustion air / flue gas recirculation. Downstream of E-44113.	NO	YES		NA	NA	Temp °C	NA	NA	NA	NA	NA	
															Pressure kPag	NA	NA	NA	NA	NA	
															Flow m³/h	NA	NA	NA	NA	NA	
441-13	NA	NA	NA	TBD	AI - Instrument Air	441	1"	440.016	For new FGR Louver actuator and Lube Oil Skid.	NO	YES - unit shutdown		NA	2"-AI-440008-ULB	Temp °C	35 - 43	70	1200	NA	NA	
															Pressure kPag	700					
															Design Flow Sm³/h	2					
441-14	NA	NA	NA	NA	Combustible Gas Analyser in Reformer Flue Gas	441	Duct	441.008	Ducting tie-in for new combustible gas analyser on reformer flue gas. (Source)	NO	YES		NA	NA	Temp °C	NA	NA	NA	NA	NA	
															Pressure kPag	NA	NA	NA	NA	NA	
															Design Flow Sm³/h	NA	NA	NA	NA	NA	
441-15	NA	NA	NA	NA	Combustible Gas Analyser in Reformer Flue Gas	441	Duct	441.008	Ducting tie-in for new combustible gas analyser on reformer flue gas. (Detector)	NO	YES		NA	NA	Temp °C	NA	NA	NA	NA	NA	
															Pressure kPag	NA	NA	NA	NA	NA	
															Design Flow Sm³/h	NA	NA	NA	NA	NA	

- Note:
- All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.
  - Use existing tie-in procedure and specs.
  - Flare connection to accommodate PSV discharge equal to PSV 375 A/B on Process Condensate Separator V-44106 - need to check

Date 07-May-14  
AA version

UNIT  
485

C	7-May-14	Issued For Approval	NN	RH	HM		
B	41717	Issued For Review	NN	RH	HM		
A	7-Dec-10	Issued for IDS-003	MRAB	0	0.0		
REV	DATE	DESCRIPTION	BY	CHK	APP	APP	CLNT APP

ATHABASCA OIL SANDS DOWNSTREAM PROJECT	
<b>FLUOR</b>	
TIE INS QUEST CAPTURE INTERFACE	
UNIT 485	
485.0000.000.0xx.001	
Revision:	E

Quest CO2 Capture Project Tie-in Scope - Mechanical / Piping

Tie-in Point	MOC#	WBI	Tie In Complexity Factor	Flow m³/h Normal/Max	Service	Unit	Tie-in Size NPS Estimate	P&ID	Comments	Hot Tap Required ?	Shutdown Required	Mech Completion Duration	Next Step Basis	Existing Line No.	Stream Design		Line Design Data		Insulated Y / N	EHT Y / N
															Temp °C	Pressure kPag	Temp °C	Pressure kPag		
285 - 16	14044 - 16 CWP 3X	5195ACTP	Low	107	AI - Instrument Air	285	3	285.312	Utility Supply to Capture Unit 246 - Instrument Air supply to Quest CO2 Capture Unit for control systems Use 6"AI-485001-ULB as it can be blocked in at Unit 251 B/L and at Unit 285/Unit 485 interface (north of Unit 272 Flare) during Expansion 1 Shutdown. Tie-in ID changed to TP-285-16 (from TP-285-10) to match MOC process by Expansion	NO	YES		IDS-13 Apr 21, 11	6" - AI - 485001 - ULB	Temp °C	35 - 43	27	1100	N	N
															Pressure kPag	800				
															Design Flow Sm³/h	134				

Note: 1. All tie-ins to be "Double Block and Bleed" type, SPG to lock out all block valves. Quest Project to run piping to tie-in location.  
2. Use existing tie-in procedure and specs.