







SHELL AND TUBE HEAT EXCHANGER							Data Sheet No.:		DS-CL03A-E-100-E102				REV
Produced Gas Properties - Maximum Duty and UA Case													
				Vapour Properties					Liquid Properties				
	Temperature	Pressure	Heat	Mass Fraction	Density	Specific Heat	Viscosity	Thermal Conductivity	Density	Specific Heat	Viscosity	Thermal Conductivity	
	°C	kPa(g)	MW		kg/m³	kJ/kg. °C	cP	W/m. °C	kg/m³	kJ/kg. °C	cP	W/m. °C	
	50.0	865.0	0.000	0.2422	5.972	2.297	0.01225	0.03758	984.6	4.267	0.57869	0.62044	
	67.6	865.0	3.044	0.2484	5.690	2.326	0.01277	0.03984	971.3	4.290	0.43784	0.63875	
	83.2	865.0	6.088	0.2588	5.493	2.345	0.01318	0.04158	959.5	4.321	0.35386	0.65320	
	96.5	865.0	9.132	0.2732	5.352	2.354	0.01349	0.04274	949.3	4.356	0.30084	0.66410	
	107.6	865.0	12.176	0.2908	5.243	2.356	0.01369	0.04339	940.4	4.389	0.26624	0.67122	
	116.9	865.0	15.219	0.3114	5.156	2.351	0.01379	0.04363	932.8	4.419	0.24279	0.67554	
	124.4	865.0	18.263	0.3350	5.092	2.342	0.01381	0.04357	926.4	4.447	0.22614	0.67835	
	130.7	865.0	21.307	0.3612	5.047	2.329	0.01378	0.04331	921.0	4.472	0.21379	0.68042	
	135.8	865.0	24.351	0.3895	5.014	2.314	0.01371	0.04293	916.6	4.495	0.20431	0.68213	
	140.1	865.0	27.395	0.4195	4.989	2.299	0.01362	0.04249	912.8	4.516	0.19686	0.68357	
	143.7	865.0	30.439	0.4507	4.969	2.285	0.01352	0.04204	909.7	4.534	0.19098	0.68459	
	146.7	865.0	33.483	0.4828	4.952	2.272	0.01342	0.04158	907.0	4.549	0.18636	0.68509	
	149.3	865.0	36.527	0.5157	4.936	2.259	0.01331	0.04114	904.6	4.562	0.18267	0.68523	
	151.5	865.0	39.570	0.5493	4.924	2.247	0.01321	0.04072	902.5	4.573	0.17964	0.68521	
	153.5	865.0	42.614	0.5835	4.913	2.236	0.01312	0.04032	900.7	4.583	0.17709	0.68513	
	155.2	865.0	45.658	0.6182	4.905	2.226	0.01303	0.03995	899.1	4.592	0.17468	0.68560	
				Vapour Properties					Liquid Properties				
	Temperature	Pressure	Heat	Mass Fraction	Density	Specific Heat	Viscosity	Thermal Conductivity	Density	Specific Heat	Viscosity	Thermal Conductivity	
	°C	kPa(g)	MW		kg/m³	kJ/kg. °C	cP	W/m. °C	kg/m³	kJ/kg. °C	cP	W/m. °C	
	50.0	852.5	0.000	0.2423	5.893	2.297	0.01225	0.03756	984.6	4.267	0.57867	0.62046	
	67.9	852.5	3.105	0.2487	5.611	2.326	0.01277	0.03986	971.0	4.290	0.43587	0.63908	
	83.7	852.5	6.210	0.2595	5.416	2.345	0.01319	0.04160	959.1	4.322	0.35153	0.65372	
	97.1	852.5	9.316	0.2745	5.277	2.354	0.01350	0.04275	948.8	4.358	0.29870	0.66462	
	108.3	852.5	12.421	0.2927	5.169	2.355	0.01369	0.04337	939.9	4.391	0.26447	0.67161	
	117.5	852.5	15.526	0.3141	5.085	2.349	0.01378	0.04357	932.3	4.421	0.24136	0.67584	
	125.0	852.5	18.631	0.3386	5.023	2.339	0.01380	0.04348	925.9	4.449	0.22499	0.67859	
	131.2	852.5	21.736	0.3656	4.979	2.325	0.01376	0.04319	920.6	4.474	0.21286	0.68065	
	136.2	852.5	24.842	0.3948	4.948	2.310	0.01368	0.04278	916.2	4.497	0.20355	0.68236	
	140.4	852.5	27.947	0.4257	4.924	2.295	0.01359	0.04233	912.6	4.518	0.19626	0.68378	
	143.9	852.5	31.052	0.4578	4.905	2.281	0.01348	0.04186	909.5	4.535	0.19054	0.68473	
	146.9	852.5	34.157	0.4907	4.888	2.267	0.01337	0.04140	906.8	4.550	0.18605	0.68517	
	149.5	852.5	37.262	0.5245	4.873	2.254	0.01327	0.04095	904.5	4.563	0.18246	0.68528	
	151.6	852.5	40.368	0.5589	4.861	2.243	0.01317	0.04053	902.4	4.574	0.17950	0.68525	
	153.5	852.5	43.473	0.5939	4.851	2.232	0.01307	0.04014	900.7	4.584	0.17702	0.68517	
	155.2	852.5	46.578	0.6295	4.843	2.222	0.01299	0.03977	899.1	4.593	0.17468	0.68560	
				Vapour Properties					Liquid Properties				
	Temperature	Pressure	Heat	Mass Fraction	Density	Specific Heat	Viscosity	Thermal Conductivity	Density	Specific Heat	Viscosity	Thermal Conductivity	
	°C	kPa(g)	MW		kg/m³	kJ/kg. °C	cP	W/m. °C	kg/m³	kJ/kg. °C	cP	W/m. °C	
	50.0	840.0	0.000	0.2423	5.814	2.296	0.01225	0.03755	984.6	4.267	0.57865	0.62048	
	68.3	840.0	3.170	0.2490	5.532	2.325	0.01278	0.03989	970.8	4.291	0.43380	0.63944	
	84.2	840.0	6.341	0.2603	5.339	2.344	0.01320	0.04163	958.7	4.324	0.34909	0.65425	
	97.7	840.0	9.511	0.2758	5.202	2.353	0.01350	0.04275	948.3	4.360	0.29649	0.66515	
	108.9	840.0	12.682	0.2948	5.095	2.353	0.01369	0.04334	939.4	4.393	0.26265	0.67201	
	118.1	840.0	15.852	0.3170	5.013	2.347	0.01377	0.04351	931.7	4.424	0.23990	0.67614	
	125.6	840.0	19.023	0.3424	4.954	2.335	0.01378	0.04337	925.4	4.451	0.22380	0.67884	
	131.6	840.0	22.193	0.3704	4.912	2.321	0.01373	0.04305	920.2	4.477	0.21190	0.68088	
	136.6	840.0	25.364	0.4005	4.882	2.306	0.01365	0.04263	915.9	4.499	0.20278	0.68260	
	140.8	840.0	28.534	0.4324	4.859	2.290	0.01355	0.04216	912.3	4.520	0.19565	0.68399	
	144.2	840.0	31.705	0.4653	4.840	2.276	0.01344	0.04168	909.2	4.537	0.19009	0.68487	
	147.1	840.0	34.875	0.4992	4.824	2.262	0.01333	0.04121	906.6	4.551	0.18574	0.68525	
	149.6	840.0	38.046	0.5338	4.810	2.250	0.01322	0.04076	904.3	4.564	0.18225	0.68533	
	151.7	840.0	41.216	0.5691	4.798	2.238	0.01312	0.04034	902.4	4.575	0.17937	0.68529	
	153.6	840.0	44.387	0.6050	4.789	2.227	0.01303	0.03994	900.6	4.584	0.17662	0.68594	
	155.2	840.0	47.557	0.6414	4.781	2.217	0.01294	0.03958	899.1	4.593	0.17468	0.68560	
REVISIONS							 						
REV NO	DATE	BY	CHK	APP	DESCRIPTION								
C	4-Mar-13	SS	AG	CS	Issued for Squad Check		PROJECT	CLRP PHASE 3A CENTRAL PLANT FACILITY: EPC					
D	7-Mar-13	SS	AG	CS	Issued for Quote								
0	14-May-13	SS	SY / CS	CS	Issued for Purchase		JOB NO.	511036		TAG NC	3A-E-102		
0A1	4-Feb-14	SS	SY	CS	Re-Issued for Purchase					PAGE	2 of 6		



SHELL AND TUBE HEAT EXCHANGER								Data Sheet No.:		DS-CL03A-E-100-E102				REV
Produced Gas Properties - Minimum Case														
			Vapour Properties						Liquid Properties					
Temperature	Pressure	Heat	Mass Fraction	Density	Specific Heat	Viscosity	Thermal Conductivity	Density	Specific Heat	Viscosity	Thermal Conductivity			
°C	kPa(g)	MW		kg/m³	kJ/kg. °C	cP	W/m. °C	kg/m³	kJ/kg. °C	cP	W/m. °C			
50.0	865.0	0.000	0.1102	7.658	1.831	0.01288	0.03359	977.6	4.187	0.63060	0.58645			
54.6	865.0	0.168	0.1108	7.555	1.838	0.01303	0.03414	974.0	4.192	0.58440	0.59083			
59.0	865.0	0.333	0.1114	7.459	1.845	0.01317	0.03465	970.6	4.198	0.54469	0.59485			
63.3	865.0	0.496	0.1122	7.368	1.852	0.01330	0.03515	967.2	4.204	0.50985	0.59859			
67.6	865.0	0.658	0.1130	7.283	1.859	0.01343	0.03563	963.9	4.210	0.47909	0.60209			
71.8	865.0	0.820	0.1140	7.202	1.866	0.01355	0.03609	960.7	4.217	0.45178	0.60536			
75.8	865.0	0.980	0.1151	7.128	1.873	0.01367	0.03651	957.5	4.225	0.42745	0.60842			
79.9	865.0	1.140	0.1164	7.058	1.880	0.01378	0.03692	954.3	4.233	0.40567	0.61129			
83.8	865.0	1.299	0.1178	6.993	1.887	0.01388	0.03729	951.2	4.241	0.38610	0.61399			
87.6	865.0	1.458	0.1194	6.934	1.894	0.01398	0.03763	948.2	4.250	0.36847	0.61654			
91.3	865.0	1.615	0.1212	6.879	1.901	0.01407	0.03794	945.3	4.259	0.35252	0.61896			
94.9	865.0	1.772	0.1232	6.830	1.907	0.01415	0.03822	942.5	4.269	0.33806	0.62128			
98.4	865.0	1.929	0.1254	6.785	1.914	0.01422	0.03846	939.7	4.279	0.32490	0.62350			
101.8	865.0	2.084	0.1279	6.745	1.920	0.01428	0.03867	937.1	4.289	0.31290	0.62566			
105.1	865.0	2.239	0.1305	6.709	1.926	0.01434	0.03884	934.5	4.300	0.30193	0.62776			
108.3	865.0	2.399	0.1336	6.677	1.932	0.01439	0.03899	932.0	4.311	0.29151	0.62991			
			Vapour Properties					Liquid Properties						
Temperature	Pressure	Heat	Mass Fraction	Density	Specific Heat	Viscosity	Thermal Conductivity	Density	Specific Heat	Viscosity	Thermal Conductivity			
°C	kPa(g)	MW		kg/m³	kJ/kg. °C	cP	W/m. °C	kg/m³	kJ/kg. °C	cP	W/m. °C			
50.0	852.5	0.000	0.1102	7.557	1.831	0.01287	0.03358	977.6	4.187	0.63058	0.58647			
54.6	852.5	0.169	0.1108	7.455	1.837	0.01302	0.03412	974.0	4.192	0.58428	0.59086			
59.0	852.5	0.334	0.1115	7.360	1.844	0.01316	0.03464	970.6	4.198	0.54452	0.59489			
63.3	852.5	0.497	0.1123	7.271	1.851	0.01330	0.03514	967.2	4.204	0.50964	0.59864			
67.6	852.5	0.660	0.1131	7.186	1.859	0.01343	0.03562	963.9	4.210	0.47886	0.60214			
71.8	852.5	0.822	0.1141	7.107	1.866	0.01355	0.03607	960.6	4.217	0.45155	0.60541			
75.9	852.5	0.983	0.1152	7.034	1.873	0.01367	0.03650	957.4	4.225	0.42722	0.60848			
79.9	852.5	1.143	0.1165	6.965	1.880	0.01378	0.03690	954.3	4.233	0.40544	0.61135			
83.8	852.5	1.302	0.1179	6.901	1.887	0.01388	0.03727	951.2	4.241	0.38589	0.61406			
87.6	852.5	1.461	0.1196	6.843	1.894	0.01397	0.03761	948.2	4.250	0.36827	0.61662			
91.3	852.5	1.619	0.1214	6.789	1.900	0.01406	0.03792	945.3	4.260	0.35234	0.61904			
94.9	852.5	1.776	0.1234	6.741	1.907	0.01414	0.03819	942.5	4.269	0.33790	0.62136			
98.4	852.5	1.933	0.1257	6.697	1.913	0.01421	0.03843	939.7	4.279	0.32476	0.62360			
101.8	852.5	2.088	0.1281	6.658	1.919	0.01427	0.03863	937.1	4.290	0.31278	0.62576			
105.1	852.5	2.243	0.1309	6.623	1.925	0.01433	0.03880	934.5	4.300	0.30184	0.62788			
108.3	852.5	2.404	0.1339	6.591	1.931	0.01437	0.03894	932.0	4.311	0.29143	0.63004			
			Vapour Properties					Liquid Properties						
Temperature	Pressure	Heat	Mass Fraction	Density	Specific Heat	Viscosity	Thermal Conductivity	Density	Specific Heat	Viscosity	Thermal Conductivity			
°C	kPa(g)	MW		kg/m³	kJ/kg. °C	cP	W/m. °C	kg/m³	kJ/kg. °C	cP	W/m. °C			
50.0	840.0	0.000	0.1103	7.456	1.830	0.01287	0.03357	977.6	4.187	0.63057	0.58649			
54.6	840.0	0.169	0.1109	7.355	1.837	0.01302	0.03411	974.0	4.192	0.58416	0.59089			
59.0	840.0	0.334	0.1115	7.262	1.844	0.01316	0.03463	970.6	4.198	0.54434	0.59493			
63.4	840.0	0.498	0.1123	7.173	1.851	0.01330	0.03513	967.2	4.204	0.50943	0.59868			
67.6	840.0	0.662	0.1132	7.090	1.858	0.01343	0.03560	963.9	4.210	0.47863	0.60219			
71.8	840.0	0.824	0.1142	7.012	1.865	0.01355	0.03606	960.6	4.218	0.45131	0.60547			
75.9	840.0	0.985	0.1153	6.940	1.872	0.01366	0.03648	957.4	4.225	0.42698	0.60854			
79.9	840.0	1.145	0.1166	6.872	1.879	0.01377	0.03688	954.3	4.233	0.40521	0.61142			
83.8	840.0	1.305	0.1181	6.809	1.886	0.01387	0.03725	951.2	4.242	0.38567	0.61413			
87.7	840.0	1.464	0.1197	6.752	1.893	0.01397	0.03759	948.2	4.251	0.36807	0.61669			
91.4	840.0	1.622	0.1216	6.699	1.900	0.01406	0.03789	945.3	4.260	0.35216	0.61913			
95.0	840.0	1.780	0.1236	6.652	1.906	0.01413	0.03816	942.4	4.269	0.33773	0.62145			
98.4	840.0	1.937	0.1259	6.609	1.913	0.01420	0.03840	939.7	4.279	0.32462	0.62369			
101.8	840.0	2.093	0.1284	6.570	1.919	0.01427	0.03860	937.1	4.290	0.31266	0.62587			
105.1	840.0	2.248	0.1312	6.536	1.925	0.01432	0.03876	934.5	4.300	0.30174	0.62799			
108.3	840.0	2.409	0.1343	6.505	1.931	0.01436	0.03890	932.0	4.312	0.29135	0.63017			
REVISIONS								 <b>MEG Energy Corp.</b>  <b>SNC-LAVALIN</b>						
REV NO	DATE	BY	CHK	APP	DESCRIPTION			PROJECT	CLRP PHASE 3A CENTRAL PLANT FACILITY: EPC					
C	4-Mar-13	SS	AG	CS	Issued for Squad Check									
D	7-Mar-13	SS	AG	CS	Issued for Quote									
0	14-May-13	SS	SY / CS	CS	Issued for Purchase			JOB NO.	511036		TAG NO	3A-E-102		
0A1	4-Feb-14	SS	SY	CS	Re-Issued for Purchase						PAGE	4 of 6		

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SHELL AND TUBE HEAT EXCHANGER					Data Sheet No.:		DS-CL03A-E-100-E102		REV
Inlet Produced Gas Vapour Composition (Maximum Duty and UA Case)									
		Overall Phase		Vapour Phase					
	Component	Mole Fraction		Mole Fraction					
	CO2 (Note*)	0.0020		0.0033					
	H2S (Note*)	0.0001		0.0001					
	Nitrogen	0.0018		0.0029					
	Methane	0.2553		0.4107					
	Ethane	0.0001		0.0002					
	Propane	0.0000		0.0001					
	i-Butane	0.0000		0.0000					
	n-Butane	0.0000		0.0000					
	i-Pentane	0.0000		0.0000					
	n-Pentane	0.0000		0.0000					
	n-Hexane	0.0000		0.0000					
	n-Heptane	0.0000		0.0000					
	n-Octane	0.0000		0.0000					
	n-Nonane	0.0000		0.0000					
	n-Decane	0.0000		0.0000					
	H2O	0.7387		0.5796					
	Bitumen	0.0019		0.0030					
	Total	1.0000		1.0000					
Note*: Maximum expected concentration in heat exchanger outlet vapour phase is 36.26 mol% CO2 and 1.85 mol% H2S.									
Maximum in the liquid phase is 23380 ppmw CO2 and 2707 ppmw H2S.									
Inlet Produced Gas Vapour Composition (Minimum Case)									
		Overall Phase		Vapour Phase					
	Component	Mole Fraction		Mole Fraction					
	CO2 (Note*)	0.0164		0.1373					
	H2S (Note*)	0.0011		0.0086					
	Nitrogen	0.0007		0.0063					
	Methane	0.0808		0.6866					
	Ethane	0.0002		0.0021					
	Propane	0.0001		0.0011					
	i-Butane	0.0000		0.0003					
	n-Butane	0.0001		0.0007					
	i-Pentane	0.0000		0.0002					
	n-Pentane	0.0000		0.0003					
	n-Hexane	0.0001		0.0004					
	n-Heptane	0.0002		0.0012					
	n-Octane	0.0000		0.0000					
	n-Nonane	0.0000		0.0000					
	n-Decane	0.0000		0.0000					
	H2O	0.8944		0.1463					
	Bitumen	0.0059		0.0087					
	Total	1.0000		1.0000					
Note*: Maximum expected concentration in heat exchanger outlet vapour phase is 36.26 mol% CO2 and 1.85 mol% H2S.									
Maximum in the liquid phase is 23380 ppmw CO2 and 2707 ppmw H2S.									