ConocoPhillips

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March 12, 2019

Certified Mail
Return Receipt Requested
7016 1370 0000 0848 9886

Attn: Compliance Technician
Air Quality Management Division
Alaska Department of Environmental Conservation
610 University Avenue
Fairbanks, Alaska 99709

Subject: Supplements to previously provided 2018 Operating Reports
Kuparuk Central Production Facility No.1
Permit No. AQ0267TVP01 Rev. 2, 8 August 2007

During routine quality assurance reviews, two (2) Permit Deviations were identified that impact previously submitted ConocoPhillips Alaska, Inc. (COPA) Operating Reports (ORs) for the Kuparuk Central Production Facility #1 (CPF-1). Permit Deviation Reports for these events have been submitted to the Department under separate cover.

The attached materials are supplements to previously submitted ORs as described in the Permit Deviation Reports.

1) Replacement Attachment 7 for the Third Quarter OR. The original OR included only summary information of flowbacks during the reporting period. The attached material also includes the omitted supporting documentation for the well flowback calculations;

2) Corrected Page 8 for the Fourth Quarter OR. The original OR indicated that there were no Permit Deviations during the reporting period. The attached is a replacement page to correct the Department's records.

3) Corrected Permit Deviation submitted in the Fourth Quarter OR. The Permit Deviation submitted in the original OR did not include the required date of deviation as required when Permit Deviations not previously provided to the Department are included in the OR. The attached is a replacement to correct the Department's records.

If you have any questions or need additional information regarding this report, please contact us at n1037@conocophillips.com or by phone at (907) 659-7242.

Sincerely,

Brad Broker/Catie Coursen
Environmental Coordinator

Attachments

cc: Compliance Technician, Fairbanks *dec.aq.airreports@alaska.gov*

Air Quality Control Operating Permit No. AQ0267TVP01, Rev. 2
(issued August 8, 2007)

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete.

Dennis Melton	Dennis E. Melton	3/12/2019
Printed Name:	Signature:	Date:

ED_004016I_00012170-00002

Air Quality Control Operating Permit No. AQ0267TVP01, Rev. 2
(issued August 8, 2007)

Third Quarter 2018 Operating Report

ED_004016I_00012170-00003

Attachment 7

1E/1J VOC Emissions from EU ID 56 with Inputs and Outputs (To replace previously submitted Attachment 7)

ED_004016I_00012170-00004

Operator's Gas Venting Logsheet
CPF1 ORL 267CP02
DS 1E / 1J
Jul-18

Date/Time Start	Date/Time Finish	Well/Area	Fluid ID	Total Vol Crude (BBL)	Est Gas Vol Vented MCF	Est VOC Tons	Comments/Description
07/04/2018 06:45	07/04/2018 12:15	1J-159	West Sak A, B, & D	260.0	147.9	1.40	Flowback to tanks, venting all gas. Crude vol estimated from water cut and flowback volumes.
07/06/2018 06:00	07/06/2018 10:00	1J-159	West Sak A, B, & D	233.0	83.4	0.80	Flowback to tanks, venting all gas. Crude vol estimated from water cut and flowback volumes.
07/11/2018 07:30	07/11/2018 15:45	1J-159	West Sak A, B, & D	400.0	194.1	1.80	Flowback to tanks, venting all gas. Crude vol estimated from water cut and flowback volumes.
07/06/2018 18:00	07/06/2018 22:30	1J-166	West Sak A, B, & D	236.0	55.9	0.50	Flowback to tanks, venting all gas. Crude vol estimated from water cut and flowback volumes.
07/12/2018 06:45	07/12/2018 16:30	1J-166	West Sak A, B, & D	405.0	186.5	1.80	Flowback to tanks, venting all gas. Crude vol estimated from water cut and flowback volumes.
N/A	N/A	1E	N/A	0.0	0.0	0.00	No gas venting from 1E West Sak wells during this month

Monthly Total VOC's **6.300**

Prior 11 months rolling Cumulative Volume = **0.000**

Rolling 12 month VOC Limit: 34 Tons

Rolling 12 month cumulative Total = **6.300**

Production Engineer:

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete.

PREVIOUS VOC'S FROM INITIAL OBM FLOWBACKS HAVE BEEN REMOVED PER ADEC

DSO Responsibility: Notify CPF1 Production Engineer of event description, duration and liquid volumes within 24 hours
Forward to CPF1 Production Engineer at the end of each month for final MCF and VOC calculation

1J-159 Well Maintenance Flowback Emissions Summary

Well	1J-159
Date	7/4/2018
Reservoir	West Sak A, B and D Sand
Flow Duration	Flow Duration is Unknown

ProMax Inputs (1)

Wellhead Stream Composition (2)	Wellhead fluid composition taken from 1H-105 Well West Sak A2 Sand Sampled 12/14/2006 analyzed by Schlumberger
Tubing Pressure(3)	375.0 psig
Tubing Temperature(3)	100.0 °F
Atmospheric Pressure(4)	14.7 psia
Liquid to Tanks(5)	260.0 bbl/flowback

ProMax Output Summary(6)

Phase	Volumetric Flow (MSCFD)	Cumulative Gas Volume (MSCF)	Total Fluid Volume (STB)
Vapor	0	147.9	260.0

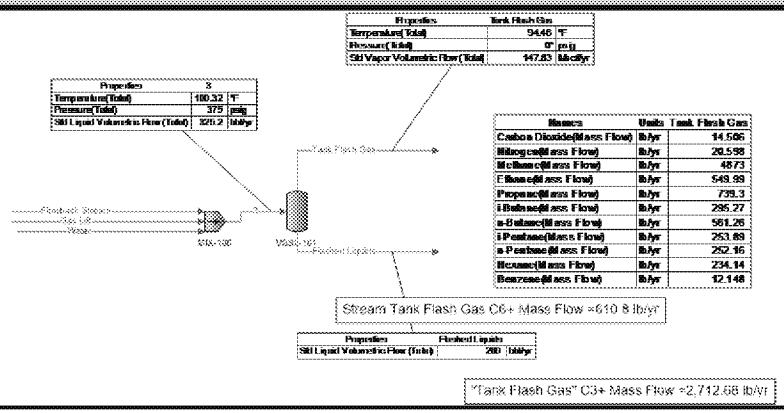
Compostion	Mass Flow (lb/hr)	Total Mass(7) (lb)	Mass (tonne)	Mass (ton)
Carbon Dioxide	0.0	14.5	0.007	0.007
Nitrogen	0.0	20.6	0.009	0.010
Methane	0.0	4,873.0	2.2	2.4
Ethane	0.0	550.0	0.25	0.27
Propane	0.0	739.3	0.34	0.37
i-Butane	0.0	295.3	0.13	0.15
n-Butane	0.0	561.3	0.25	0.28
i-Pentane	0.0	253.9	0.12	0.13
n-Pentane	0.0	252.2	0.11	0.13
n-Hexane	0.0	234.1	0.11	0.12
Hexane+(8)	0.0	364.5	0.17	0.18
Benzene	0.0	12.1	0.006	0.006
C3 Plus VOC	**0.0**	**2,712.7**	**1.2**	**1.4**

ProMax® (the successor to PROSIM®) was used to estimate emissions from the open top tanks during a well flowback. In the model, wellhead fluid is routed directly to a flowback tank. Thus, emissions from the flowback are only those that occur when the oil flashes due to the change in pressure from the wellhead to the tank.

Notes:
(1) All inputs to the model are denoted by a * symbol in the ProMax® generated report.
(2) The composition of the sample is entered in ProMax® as the "wellhead feed" stream composition.
(3) Tubing pressure and temperature are estimates provided by Conoco Phillips.
(4) The atmospheric pressure is assumed to be equal to sea level pressure.
(5) The amount of Liquid produced during the flowback is entered in ProMax® as "Flashed Liquids". bbl/year is equivalent to bbl/flowback for purposes of this model.
(6) A detailed ProMax® generated report is attached.
(7) Mass emission rates equal "Tank Flash Gas" emission rates in the ProMax® generated report.
(8) Hexane+ does not include n-Hexane or Benzene.

Flowsheet1
Plant Schematic

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-4-2018	
Flowsheet:	Flowsheet1	



Names	Units	Tank Flash Gas
Carbon Dioxide(Mass Flow)	lb/yr	14.586
Nitrogen(Mass Flow)	lb/yr	20.598
Methane(Mass Flow)	lb/yr	48.73
Ethane(Mass Flow)	lb/yr	549.99
Propane(Mass Flow)	lb/yr	739.3
i-Butane(Mass Flow)	lb/yr	295.27
n-Butane(Mass Flow)	lb/yr	561.26
i-Pentane(Mass Flow)	lb/yr	253.89
n-Pentane(Mass Flow)	lb/yr	252.16
Hexane(Mass Flow)	lb/yr	234.14
Benzene(Mass Flow)	lb/yr	12.148

* User Specified Values
? Extrapolated or Approximate Values

ProMax 4.0.16071.0
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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-4-2018	
Flowsheet:	Flowsheet1	

Connections

	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
From Block	VSSL-101	--	--	VSSL-101	--
To Block	--	MIX-100	MIX-100	--	MIX-100

Stream Composition

Mole Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	3.4865E-05	0.04 *	0.090018 *	0.0846113	0 *
Nitrogen	2.31192E-06	0.08 *	0.20004 *	0.188754	0 *
Methane	0.00204986	31.77 *	82.6865 *	77.9745	0 *
Ethane	0.000258191	1.91 *	4.981 *	4.69533	0 *
Propane	0.000466441	2.04 *	4.56091 *	4.30386	0 *
i-Butane	0.000300433	0.76 *	1.38028 *	1.3041	0 *
n-Butane	0.000813387	1.68 *	2.62052 *	2.47887	0 *
i-Pentane	0.000727356	1 *	0.95019 *	0.903318	0 *
n-Pentane	0.000937526	1.23 *	0.940188 *	0.897186	0 *
Hexane	0.00239818	2.18 *	0.720144 *	0.697474	0 *
Methylcyclopentane	0.000652079	0.84 *	0.180036 *	0.181242	0 *
Benzene	0.000239661	0.22 *	0.040008 *	0.0399224	0 *
Cyclohexane	0.000622675	0.96 *	0.120024 *	0.128663	0 *
Heptane	0.00252723	2.23 *	0.230046 *	0.239601	0 *
Methylcyclohexane	0.00145539	1.6 *	0.120024 *	0.134428	0 *
Toluene	0.000720585	0.85 *	0.040008 *	0.0499091	0 *
Octane	0.00388899	2.93 *	0.10002 *	0.118787	0 *
Ethylbenzene	0.000251192	0.37 *	0 *	0.00626298	0 *
m-Xylene	0.000912102	0.9 *	0.010002 *	0.0207394	0 *
o-Xylene	0.000252127	0.32 *	0 *	0.00497273	0 *
Nonane	0.00381539	2.3 *	0.030006 *	0.0382585	0 *
Decane	0.0050655	3.19 *	0 *	0.017093	0 *
Undecane	0.00485897	2.63 *	0 *	0.00540394	0 *
C12	0.00506829	2.6 *	0 *	0.00197303	0 *
C13	0.00500949	2.52 *	0 *	0.000675996	0 *
C14	0.00476314	2.38 *	0 *	0.000231799	0 *
C15	0.00459428	2.29 *	0 *	7.96947E-05	0 *
C16	0.00409618	2.04 *	0 *	2.69888E-05	0 *
C17	0.0037359	1.86 *	0 *	1.00611E-05	0 *
C18	0.00311364	1.55 *	0 *	3.4216E-06	0 *
C19	0.00313389	1.56 *	0 *	1.28116E-06	0 *
C20	0.00277236	1.38 *	0 *	3.09274E-07	0 *
C21	0.00253129	1.26 *	0 *	1.27E-07	0 *
C22	0.00227013	1.13 *	0 *	4.96966E-08	0 *
C23	0.00204915	1.02 *	0 *	1.32246E-08	0 *
C24	0.00198888	0.99 *	0 *	4.53088E-09	0 *
C25	0.00162727	0.81 *	0 *	1.46397E-09	0 *
C26	0.00166745	0.83 *	0 *	4.9667E-10	0 *
C27	0.0013661	0.68 *	0 *	1.07797E-10	0 *
C28	0.00146655	0.73 *	0 *	5.86515E-11	0 *
C29	0.00170763	0.85 *	0 *	3.12325E-11	0 *
Water	99.8907	0 *	0 *	5.48371	100 *
c30+	0.023083	11.49 *	0 *	1.32184E-06	0 *

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
Carbon Dioxide	1.97314E-07	4.54781E-07 *	3.7369E-05 *	3.76264E-05	0 *
Nitrogen	1.3084E-08	9.09561E-07 *	8.30421E-05 *	8.39386E-05	0 *
Methane	1.16009E-05	0.000361209 *	0.0343255 *	0.0346751	0 *
Ethane	1.4612E-06	2.17158E-05 *	0.00206775 *	0.002088	0 *
Propane	2.63976E-06	2.31938E-05 *	0.00189336 *	0.00191391	0 *

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-4-2018	
Flowsheet:	Flowsheet1	

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
i-Butane	1.70026E-06	8.64083E-06 *	0.000572991 *	0.000579931	0 *
n-Butane	4.60326E-06	1.91008E-05 *	0.00108785 *	0.00110235	0 *
i-Pentane	4.11638E-06	1.13695E-05 *	0.00039445 *	0.000401703	0 *
n-Pentane	5.30581E-06	1.39845E-05 *	0.000390298 *	0.000398977	0 *
Hexane	1.35722E-05	2.47855E-05 *	0.000298952 *	0.000310165	0 *
Methylcyclopentane	3.69036E-06	9.55039E-06 *	7.47379E-05 *	8.05979E-05	0 *
Benzene	1.35633E-06	2.50129E-06 *	1.66084E-05 *	1.77534E-05	0 *
Cyclohexane	3.52395E-06	1.09147E-05 *	4.98253E-05 *	5.72161E-05	0 *
Heptane	1.43025E-05	2.5354E-05 *	9.54984E-05 *	0.00010655	0 *
Methylcyclohexane	8.23659E-06	1.81912E-05 *	4.98253E-05 *	5.97799E-05	0 *
Toluene	4.07806E-06	9.66409E-06 *	1.66084E-05 *	2.21945E-05	0 *
Octane	2.20093E-05	3.33127E-05 *	4.15211E-05 *	5.28245E-05	0 *
Ethylbenzene	1.42159E-06	4.20672E-06 *	0 *	2.78513E-06	0 *
m-Xylene	5.16192E-06	1.02326E-05 *	4.15211E-06 *	9.22275E-06	0 *
o-Xylene	1.42688E-06	3.63824E-06 *	0 *	2.21136E-06	0 *
Nonane	2.15927E-05	2.61499E-05 *	1.24563E-05 *	1.70135E-05	0 *
Decane	2.86675E-05	3.62688E-05 *	0 *	7.60122E-06	0 *
Undecane	2.74987E-05	2.99018E-05 *	0 *	2.40312E-06	0 *
C12	2.86833E-05	2.95607E-05 *	0 *	8.77401E-07	0 *
C13	2.83506E-05	2.86512E-05 *	0 *	3.00614E-07	0 *
C14	2.69564E-05	2.70594E-05 *	0 *	1.03081E-07	0 *
C15	2.60007E-05	2.60362E-05 *	0 *	3.544E-08	0 *
C16	2.31818E-05	2.31938E-05 *	0 *	1.20018E-08	0 *
C17	2.11428E-05	2.11473E-05 *	0 *	4.47413E-09	0 *
C18	1.76212E-05	1.76227E-05 *	0 *	1.52158E-09	0 *
C19	1.77359E-05	1.77364E-05 *	0 *	5.6973E-10	0 *
C20	1.56898E-05	1.56899E-05 *	0 *	1.37534E-10	0 *
C21	1.43255E-05	1.43256E-05 *	0 *	5.64764E-11	0 *
C22	1.28475E-05	1.28476E-05 *	0 *	2.21E-11	0 *
C23	1.15969E-05	1.15969E-05 *	0 *	5.88096E-12	0 *
C24	1.12558E-05	1.12558E-05 *	0 *	2.01487E-12	0 *
C25	9.20931E-06	9.20931E-06 *	0 *	6.51025E-13	0 *
C26	9.4367E-06	9.4367E-06 *	0 *	2.20868E-13	0 *
C27	7.73127E-06	7.73127E-06 *	0 *	4.79371E-14	0 *
C28	8.29975E-06	8.29975E-06 *	0 *	2.60822E-14	0 *
C29	9.66409E-06	9.66409E-06 *	0 *	1.3889E-14	0 *
Water	0.565319	0 *	0 *	0.00243859	0.567757 *
c30+	0.000130635	0.000130636 *	0 *	5.87818E-10	0 *

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	8.37405E-05	0.00979463 *	0.179979 *	0.169549	0 *
Nitrogen	3.53458E-06	0.0124692 *	0.254583 *	0.240759	0 *
Methane	0.00179472	2.83576 *	60.2632 *	56.9565	0 *
Ethane	0.000423702	0.319547 *	6.80428 *	6.42844	0 *
Propane	0.00112251	0.500504 *	9.13679 *	8.64118	0 *
i-Butane	0.000952993	0.245775 *	3.64464 *	3.45123	0 *
n-Butane	0.00258012	0.543292 *	6.91953 *	6.56019	0 *
i-Pentane	0.00286402	0.401431 *	3.11448 *	2.96749	0 *
n-Pentane	0.00369158	0.49376 *	3.0817 *	2.94735	0 *
Hexane	0.0112789	1.04525 *	2.81935 *	2.73672	0 *
Methylcyclopentane	0.00299504	0.393336 *	0.68835 *	0.694516	0 *
Benzene	0.00102168	0.0956139 *	0.141975 *	0.141989	0 *
Cyclohexane	0.00285999	0.449527 *	0.4589 *	0.493033	0 *
Heptane	0.0138204	1.24326 *	1.04722 *	1.09316	0 *
Methylcyclohexane	0.00779882	0.874081 *	0.535383 *	0.60098	0 *
Toluene	0.00362348	0.435754 *	0.167469 *	0.209382	0 *
Octane	0.0242444	1.86219 *	0.519049 *	0.617824	0 *
Ethylbenzene	0.00145541	0.218557 *	0 *	0.0302749	0 *

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-4-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
m-Xylene	0.00528475	0.531625 *	0.0482408 *	0.100253	0 *
o-Xylene	0.00146084	0.189022 *	0 *	0.0240379	0 *
Nonane	0.0267063	1.64129 *	0.174835 *	0.22342	0 *
Decane	0.0393343	2.52535 *	0 *	0.110736	0 *
Undecane	0.0414501	2.28728 *	0 *	0.0384602	0 *
C12	0.0471156	2.4641 *	0 *	0.0153023	0 *
C13	0.0504038	2.58495 *	0 *	0.00567459	0 *
C14	0.0515713	2.62708 *	0 *	0.00209386	0 *
C15	0.0532601	2.70646 *	0 *	0.000770786	0 *
C16	0.0506214	2.5702 *	0 *	0.000278265	0 *
C17	0.0490288	2.48858 *	0 *	0.000110159	0 *
C18	0.043246	2.19478 *	0 *	3.96485E-05	0 *
C19	0.0459264	2.33069 *	0 *	1.5664E-05	0 *
C20	0.0427504	2.16946 *	0 *	3.97883E-06	0 *
C21	0.0409709	2.07915 *	0 *	1.71497E-06	0 *
C22	0.0384816	1.95282 *	0 *	7.02828E-07	0 *
C23	0.0363043	1.84233 *	0 *	1.95474E-07	0 *
C24	0.0367591	1.8654 *	0 *	6.98648E-08	0 *
C25	0.0313213	1.58945 *	0 *	2.3509E-08	0 *
C26	0.0333711	1.69348 *	0 *	8.29291E-09	0 *
C27	0.028386	1.44049 *	0 *	1.86874E-09	0 *
C28	0.0315958	1.60338 *	0 *	1.05422E-09	0 *
C29	0.0380969	1.93329 *	0 *	5.81331E-10	0 *
Water	98.2123	0 *	0 *	4.49817	100 *
c30+	0.841615	42.7094 *	0 *	4.02087E-05	0 *

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
Carbon Dioxide	8.68368E-06	2.00147E-05 *	0.00164459 *	0.00165592	0 *
Nitrogen	3.66527E-07	2.54799E-05 *	0.00232629 *	0.00235141	0 *
Methane	0.000186107	0.00579469 *	0.550665 *	0.556273	0 *
Ethane	4.39369E-05	0.000652972 *	0.0621752 *	0.0627843	0 *
Propane	0.000116402	0.00102275 *	0.0834889 *	0.0843952	0 *
i-Butane	9.8823E-05	0.000502224 *	0.0333035 *	0.0337069	0 *
n-Butane	0.000267552	0.00111018 *	0.0632283 *	0.064071	0 *
i-Pentane	0.000296992	0.000820297 *	0.0284591 *	0.0289824	0 *
n-Pentane	0.000382807	0.00100896 *	0.0281595 *	0.0287857	0 *
Hexane	0.00116959	0.0021359 *	0.0257623 *	0.0267286	0 *
Methylcyclopentane	0.000310579	0.000803756 *	0.0062899 *	0.00678308	0 *
Benzene	0.000105945	0.000195381 *	0.00129731 *	0.00138675	0 *
Cyclohexane	0.000296574	0.000918578 *	0.00419327 *	0.00481527	0 *
Heptane	0.00143314	0.00254052 *	0.00956913 *	0.0106765	0 *
Methylcyclohexane	0.000808718	0.00178612 *	0.00489215 *	0.00586955	0 *
Toluene	0.000375746	0.000890434 *	0.00153027 *	0.00204496	0 *
Octane	0.00251408	0.00380526 *	0.00474289 *	0.00603406	0 *
Ethylbenzene	0.000150923	0.000446606 *	0 *	0.000295684	0 *
m-Xylene	0.000548015	0.00108634 *	0.000440808 *	0.000979133	0 *
o-Xylene	0.000151485	0.000386254 *	0 *	0.000234769	0 *
Nonane	0.00276938	0.00335386 *	0.00159759 *	0.00218207	0 *
Decane	0.00407886	0.00516038 *	0 *	0.00108151	0 *
Undecane	0.00429827	0.0046739 *	0 *	0.000375627	0 *
C12	0.00488577	0.00503522 *	0 *	0.000149452	0 *
C13	0.00522675	0.00528217 *	0 *	5.54216E-05	0 *
C14	0.00534782	0.00536827 *	0 *	2.045E-05	0 *
C15	0.00552294	0.00553047 *	0 *	7.52798E-06	0 *
C16	0.00524932	0.00525203 *	0 *	2.71771E-06	0 *
C17	0.00508417	0.00508524 *	0 *	1.07588E-06	0 *
C18	0.0044845	0.00448489 *	0 *	3.87233E-07	0 *
C19	0.00476245	0.00476261 *	0 *	1.52984E-07	0 *

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-4-2018	
Flowsheet:	Flowsheet1	

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
C20	0.00443311	0.00443315 *	0 *	3.88598E-08	0 *
C21	0.00424858	0.0042486 *	0 *	1.67494E-08	0 *
C22	0.00399045	0.00399046 *	0 *	6.86426E-09	0 *
C23	0.00376467	0.00376467 *	0 *	1.90912E-09	0 *
C24	0.00381183	0.00381183 *	0 *	6.82344E-10	0 *
C25	0.00324794	0.00324794 *	0 *	2.29604E-10	0 *
C26	0.0034605	0.0034605 *	0 *	8.09938E-11	0 *
C27	0.00294355	0.00294355 *	0 *	1.82513E-11	0 *
C28	0.00327641	0.00327641 *	0 *	1.02962E-11	0 *
C29	0.00395055	0.00395055 *	0 *	5.67764E-12	0 *
Water	10.1844	0 *	0 *	0.043932	10.2283 *
c30+	0.0872734	0.0872738 *	0 *	3.92704E-07	0 *

Stream Properties

Property	Units	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
Temperature	°F	94.4601	100 *	100 *	94.4601	100 *
Pressure	psia	14.6959	389.696 *	389.696 *	14.6959 *	389.696 *
Mole Fraction Vapor	%	0	25.9185	98.0301	100	0
Mole Fraction Light Liquid	%	0.107084	74.0815	1.96993	0	100
Mole Fraction Heavy Liquid	%	99.8929	0	0	0	0
Molecular Weight	lb/lbmol	18.3231	179.729	22.0117	21.9624	18.0153
Mass Density	lb/ft^3	61.901	25.8182	1.58448	0.0544744	61.9724
Molar Flow	lbmol/h	0.565937	0.00113695	0.0415128	0.0444698	0.567757
Mass Flow	lb/h	10.3698	0.204343	0.913766	0.976663	10.2283
Vapor Volumetric Flow	ft^3/h	0.167521	0.0079147	0.576698	17.9289	0.165046
Liquid Volumetric Flow	gpm	0.0208858	0.000986767	0.0719	2.23529	0.0205772
Std Vapor Volumetric Flow	MMSCFD	0.00515434	1.03549E-05	0.000378082 *	0.000405013	0.00517091
Std Liquid Volumetric Flow	sgpm	0.0207765	0.000494889 *	0.00504439	0.00520988	0.0204471 *
Compressibility		0.000731518	0.451672	0.901358	0.996347	0.0188614
Specific Gravity		0.992496			0.758303	0.993642
API Gravity		10.2418				9.95343
Enthalpy	Btu/h	-69432.4	-158.827	-1464.28	-1718.96	-69528.3
Mass Enthalpy	Btu/lb	-6695.67	-777.255	-1602.47	-1760.03	-6797.63
Mass Cp	Btu/(lb*°F)	0.970794	0.422532	0.544214	0.483481	0.980205
Ideal Gas CpCv Ratio		1.31934	1.0326	1.2274	1.23102	1.32441
Dynamic Viscosity	cP	0.792338			0.0108951	0.704198
Kinematic Viscosity	cSt	0.799083			12.4858	0.709374
Thermal Conductivity	Btu/(h*ft*°F)	0.352299 ?			0.0178615	0.360083
Surface Tension	lbf/ft	0.0048014 ?				0.00480959
Net Ideal Gas Heating Value	Btu/ft^3	15.5721	8622.07	1201.74	1144.1	0
Net Liquid Heating Value	Btu/lb	-720.616	18077.1	20655.8	19660.4	-1059.76
Gross Ideal Gas Heating Value	Btu/ft^3	66.8373	9200.76	1322.93	1261.92	50.3101
Gross Liquid Heating Value	Btu/lb	341.119	19298.9	22745.1	21696.3	0

Remarks

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-4-2018	
Flowsheet:	Flowsheet1	

Connections

	3				
From Block	MIX-100				
To Block	VSSL-101				

Stream Composition

Mole Fraction	3 %				
Carbon Dioxide	0.00619648				
Nitrogen	0.0137534				
Methane	5.68255				
Ethane	0.342307				
Propane	0.31398				
i-Butane	0.0952858				
n-Butane	0.181347				
i-Pentane	0.0664834				
n-Pentane	0.0662316				
Hexane	0.0530363				
Methylcyclopentane	0.0138085				
Benzene	0.00313065				
Cyclohexane	0.00995074				
Heptane	0.0197987				
Methylcyclohexane	0.0111428				
Toluene	0.0043041				
Octane	0.0122596				
Ethylbenzene	0.000689167				
m-Xylene	0.00235657				
o-Xylene	0.000596036				
Nonane	0.00632467				
Decane	0.00594173				
Undecane	0.00489867				
C12	0.00484279				
C13	0.00469378				
C14	0.00443302				
C15	0.00426538				
C16	0.00379973				
C17	0.00346446				
C18	0.00288705				
C19	0.00290568				
C20	0.0025704				
C21	0.00234689				
C22	0.00210475				
C23	0.00189986				
C24	0.00184399				
C25	0.00150872				
C26	0.00154597				
C27	0.00126658				
C28	0.00135971				
C29	0.00158322				
Water	93.0129				
c30+	0.0214014				

Molar Flow	3 lbmol/h				
Carbon Dioxide	3.78237E-05				
Nitrogen	8.39517E-05				
Methane	0.0346867				
Ethane	0.00208946				
Propane	0.00191655				
i-Butane	0.000581631				
n-Butane	0.00110695				
i-Pentane	0.00040582				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-4-2018	
Flowsheet:	Flowsheet1	

Molar Flow	3 lbmol/h				
n-Pentane	0.000404282				
Hexane	0.000323737				
Methylcyclopentane	8.42883E-05				
Benzene	1.91097E-05				
Cyclohexane	6.074E-05				
Heptane	0.000120852				
Methylcyclohexane	6.80165E-05				
Toluene	2.62725E-05				
Octane	7.48337E-05				
Ethylbenzene	4.20672E-06				
m-Xylene	1.43847E-05				
o-Xylene	3.63824E-06				
Nonane	3.86062E-05				
Decane	3.62688E-05				
Undecane	2.99018E-05				
C12	2.95607E-05				
C13	2.86512E-05				
C14	2.70594E-05				
C15	2.60362E-05				
C16	2.31938E-05				
C17	2.11473E-05				
C18	1.76227E-05				
C19	1.77364E-05				
C20	1.56899E-05				
C21	1.43256E-05				
C22	1.28476E-05				
C23	1.15969E-05				
C24	1.12558E-05				
C25	9.20931E-06				
C26	9.4367E-06				
C27	7.73127E-06				
C28	8.29975E-06				
C29	9.66409E-06				
Water	0.567757				
c30+	0.000130636				

Mass Fraction	3 %				
Carbon Dioxide	0.0146707				
Nitrogen	0.020727				
Methane	4.90428				
Ethane	0.553727				
Propane	0.744831				
i-Butane	0.297942				
n-Butane	0.567038				
i-Pentane	0.25805				
n-Pentane	0.257072				
Hexane	0.245876				
Methylcyclopentane	0.0625189				
Benzene	0.0131557				
Cyclohexane	0.0450525				
Heptane	0.106727				
Methylcyclohexane	0.058858				
Toluene	0.0213346				
Octane	0.0753379				
Ethylbenzene	0.0039361				
m-Xylene	0.0134593				
o-Xylene	0.0034042				
Nonane	0.0436388				
Decane	0.0454803				
Undecane	0.0411928				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-4-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	3 %				
C12	0.0443772				
C13	0.0465537				
C14	0.0473125				
C15	0.048742				
C16	0.046288				
C17	0.0448181				
C18	0.0395269				
C19	0.0419745				
C20	0.0390709				
C21	0.0374444				
C22	0.0351693				
C23	0.0331794				
C24	0.033595				
C25	0.0286253				
C26	0.0304986				
C27	0.0259426				
C28	0.0288762				
C29	0.0348176				
Water	90.1457				
c30+	0.769175				

Mass Flow	3 lb/h				
Carbon Dioxide	0.0016646				
Nitrogen	0.00235177				
Methane	0.55646				
Ethane	0.0628282				
Propane	0.0845116				
i-Butane	0.0338057				
n-Butane	0.0643385				
i-Pentane	0.0292794				
n-Pentane	0.0291685				
Hexane	0.0278982				
Methylcyclopentane	0.00709366				
Benzene	0.0014927				
Cyclohexane	0.00511185				
Heptane	0.0121097				
Methylcyclohexane	0.00667827				
Toluene	0.00242071				
Octane	0.00854815				
Ethylbenzene	0.000446606				
m-Xylene	0.00152715				
o-Xylene	0.000386254				
Nonane	0.00495144				
Decane	0.00516038				
Undecane	0.0046739				
C12	0.00503522				
C13	0.00528217				
C14	0.00536827				
C15	0.00553047				
C16	0.00525203				
C17	0.00508524				
C18	0.00448489				
C19	0.00476261				
C20	0.00443315				
C21	0.0042486				
C22	0.00399046				
C23	0.00376467				
C24	0.00381183				
C25	0.00324794				
C26	0.0034605				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-4-2018	
Flowsheet:	Flowsheet1	

Mass Flow	3 lb/h				
C27	0.00294355				
C28	0.00327641				
C29	0.00395055				
Water	10.2283				
c30+	0.0872738				

Stream Properties

Property	Units	3				
Temperature	°F	100.317				
Pressure	psia	389.696				
Mole Fraction Vapor	%	6.59337				
Mole Fraction Light Liquid	%	0.363913				
Mole Fraction Heavy Liquid	%	93.0427				
Molecular Weight	lb/lbmol	18.5883				
Mass Density	lb/ft^3	15.2608				
Molar Flow	lbmol/h	0.610407				
Mass Flow	lb/h	11.3464				
Vapor Volumetric Flow	ft^3/h	0.743499				
Liquid Volumetric Flow	gpm	0.092696				
Std Vapor Volumetric Flow	MMSCFD	0.00555935				
Std Liquid Volumetric Flow	sgpm	0.0259864				
Compressibility		0.0789852				
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	-71151.4				
Mass Enthalpy	Btu/lb	-6270.82				
Mass Cp	Btu/(lb*°F)	0.935767				
Ideal Gas CpCv Ratio		1.31021				
Dynamic Viscosity	cP					
Kinematic Viscosity	cSt					
Thermal Conductivity	Btu/(h*ft*°F)					
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	97.7881				
Net Liquid Heating Value	Btu/lb	1033.72				
Gross Ideal Gas Heating Value	Btu/ft^3	153.903				
Gross Liquid Heating Value	Btu/lb	2179.31				

Remarks

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1J-159_Well Maintenance Flowback Emissions Summary

Well	1J-159
Date	7/6/2018
Reservoir	West Sak A, B and D Sand
Flow Duration	Flow Duration is Unknown

ProMax Inputs (1)

Wellhead Stream Composition (2)	Wellhead fluid composition taken from 1H-105 Well West Sak A2 Sand Sampled 12/14/2006 analyzed by Schlumberger
Tubing Pressure(3)	375.0 psig
Tubing Temperature(3)	100.0 °F
Atmospheric Pressure(4)	14.7 psia
Liquid to Tanks(5)	233.0 bbl/flowback

ProMax Output Summary(6)

Phase	Volumetric Flow (MSCFD)	Cumulative Gas Volume (MSCF)	Total Fluid Volume (STB)
Vapor	0	83.4	233.0

Compostion	Mass Flow (lb/hr)	Total Mass(7) (lb)	Mass (tonne)	Mass (ton)
Carbon Dioxide	0.0	8.1	0.004	0.004
Nitrogen	0.0	11.6	0.005	0.006
Methane	0.0	2,735.8	1.2	1.4
Ethane	0.0	308.7	0.14	0.15
Propane	0.0	415.2	0.19	0.21
i-Butane	0.0	166.0	0.08	0.08
n-Butane	0.0	315.7	0.14	0.16
i-Pentane	0.0	143.3	0.06	0.07
n-Pentane	0.0	142.7	0.06	0.07
n-Hexane	0.0	133.8	0.06	0.07
Hexane+(8)	0.0	221.3	0.10	0.11
Benzene	0.0	7.1	0.003	0.004
C3 Plus VOC	**0.0**	**1,545.0**	**0.7**	**0.8**

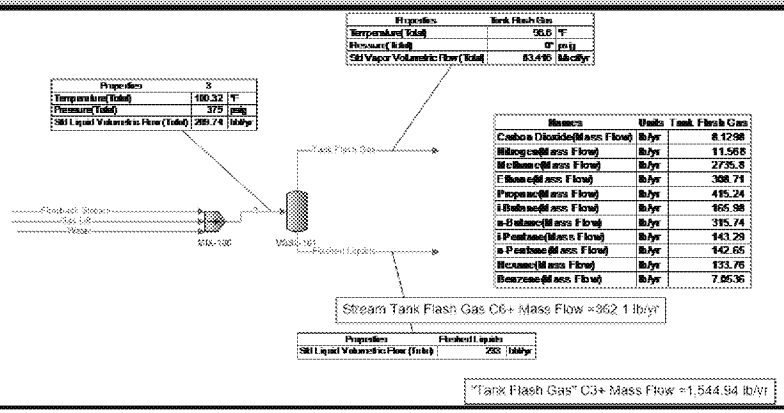
ProMax® (the successor to PROSIM®) was used to estimate emissions from the open top tanks during a well flowback. In the model, wellhead fluid is routed directly to a flowback tank. Thus, emissions from the flowback are only those that occur when the oil flashes due to the change in pressure from the wellhead to the tank.

Notes:
(1) All inputs to the model are denoted by a * symbol in the ProMax® generated report.
(2) The composition of the sample is entered in ProMax® as the "wellhead feed" stream composition.
(3) Tubing pressure and temperature are estimates provided by Conoco Phillips.
(4) The atmospheric pressure is assumed to be equal to sea level pressure.
(5) The amount of Liquid produced during the flowback is entered in ProMax® as "Flashed Liquids". bbl/year is equivalent to bbl/flowback for purposes of this model.
(6) A detailed ProMax® generated report is attached.
(7) Mass emission rates equal "Tank Flash Gas" emission rates in the ProMax® generated report.
(8) Hexane+ does not include n-Hexane or Benzene.

ED_004016I_00012170-00016

Flowsheet1
Plant Schematic

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	



Names	Units	Tank Flash Gas
Carbon Dioxide(Mass Flow)	lb/yr	8.1298
Nitrogen(Mass Flow)	lb/yr	11.565
Methane(Mass Flow)	lb/yr	2735.8
Ethane(Mass Flow)	lb/yr	368.71
Propane(Mass Flow)	lb/yr	415.24
i-Butane(Mass Flow)	lb/yr	165.98
n-Butane(Mass Flow)	lb/yr	315.74
i-Pentane(Mass Flow)	lb/yr	143.29
n-Pentane(Mass Flow)	lb/yr	142.65
Hexane(Mass Flow)	lb/yr	133.76
Benzene(Mass Flow)	lb/yr	7.0536

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? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Connections

	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
From Block	VSSL-101	--	--	VSSL-101	--
To Block	--	MIX-100	MIX-100	--	MIX-100

Stream Composition

Mole Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	3.39378E-05	0.04 *	0.090018 *	0.0840381	0 *
Nitrogen	2.28309E-06	0.08 *	0.20004 *	0.187867	0 *
Methane	0.00202299	31.77 *	82.6865 *	77.5802	0 *
Ethane	0.000253821	1.91 *	4.981 *	4.67057	0 *
Propane	0.00045874	2.04 *	4.56091 *	4.28395	0 *
i-Butane	0.000294313	0.76 *	1.38028 *	1.29913	0 *
n-Butane	0.000796431	1.68 *	2.62052 *	2.47132	0 *
i-Pentane	0.000710589	1 *	0.95019 *	0.903486	0 *
n-Pentane	0.000916202	1.23 *	0.940188 *	0.899467	0 *
Hexane	0.00234801	2.18 *	0.720144 *	0.706114	0 *
Methylcyclopentane	0.000652477	0.84 *	0.180036 *	0.187223	0 *
Benzene	0.000238145	0.22 *	0.040008 *	0.0410806	0 *
Cyclohexane	0.000641031	0.96 *	0.120024 *	0.136946	0 *
Heptane	0.0025488	2.23 *	0.230046 *	0.25169	0 *
Methylcyclohexane	0.00151327	1.6 *	0.120024 *	0.145392	0 *
Toluene	0.00077564	0.85 *	0.040008 *	0.0558832	0 *
Octane	0.00405223	2.93 *	0.10002 *	0.129799	0 *
Ethylbenzene	0.000325406	0.37 *	0 *	0.00849687	0 *
m-Xylene	0.00104248	0.9 *	0.010002 *	0.0248295	0 *
o-Xylene	0.000318872	0.32 *	0 *	0.00659205	0 *
Nonane	0.00394116	2.3 *	0.030006 *	0.0417497	0 *
Decane	0.00546091	3.19 *	0 *	0.0195962	0 *
Undecane	0.00500642	2.63 *	0 *	0.00596792	0 *
C12	0.00513454	2.6 *	0 *	0.00215662	0 *
C13	0.00504339	2.52 *	0 *	0.000739608	0 *
C14	0.00478516	2.38 *	0 *	0.000254789	0 *
C15	0.00461199	2.29 *	0 *	8.79619E-05	0 *
C16	0.00411089	2.04 *	0 *	2.99676E-05	0 *
C17	0.00374896	1.86 *	0 *	1.12321E-05	0 *
C18	0.00312441	1.55 *	0 *	3.8436E-06	0 *
C19	0.00314469	1.56 *	0 *	1.44875E-06	0 *
C20	0.00278188	1.38 *	0 *	3.53228E-07	0 *
C21	0.00253999	1.26 *	0 *	1.45692E-07	0 *
C22	0.00227793	1.13 *	0 *	5.73201E-08	0 *
C23	0.00205619	1.02 *	0 *	1.53861E-08	0 *
C24	0.00199571	0.99 *	0 *	5.30946E-09	0 *
C25	0.00163285	0.81 *	0 *	1.72625E-09	0 *
C26	0.00167317	0.83 *	0 *	5.90265E-10	0 *
C27	0.00137079	0.68 *	0 *	1.29347E-10	0 *
C28	0.00147159	0.73 *	0 *	7.06909E-11	0 *
C29	0.00171349	0.85 *	0 *	3.7842E-11	0 *
Water	99.8893	0 *	0 *	5.85532	100 *
c30+	0.0231623	11.49 *	0 *	1.49799E-06	0 *

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
Carbon Dioxide	1.72093E-07	4.08885E-07 *	2.08508E-05 *	2.10876E-05	0 *
Nitrogen	1.15771E-08	8.1777E-07 *	4.63351E-05 *	4.71413E-05	0 *
Methane	1.02582E-05	0.000324757 *	0.0191526 *	0.0194671	0 *
Ethane	1.28708E-06	1.95243E-05 *	0.00115374 *	0.00117198	0 *
Propane	2.32619E-06	2.08531E-05 *	0.00105644 *	0.00107497	0 *

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? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
i-Butane	1.49241E-06	7.76882E-06 *	0.000319712 *	0.000325989	0 *
n-Butane	4.03857E-06	1.71732E-05 *	0.00060699 *	0.000620124	0 *
i-Pentane	3.60327E-06	1.02221E-05 *	0.000220092 *	0.000226711	0 *
n-Pentane	4.6459E-06	1.25732E-05 *	0.000217775 *	0.000225702	0 *
Hexane	1.19063E-05	2.22842E-05 *	0.000166806 *	0.000177184	0 *
Methylcyclopentane	3.3086E-06	8.58659E-06 *	4.17016E-05 *	4.69796E-05	0 *
Benzene	1.20759E-06	2.24887E-06 *	9.26702E-06 *	1.03083E-05	0 *
Cyclohexane	3.25056E-06	9.81324E-06 *	2.78011E-05 *	3.43637E-05	0 *
Heptane	1.29245E-05	2.27953E-05 *	5.32854E-05 *	6.31562E-05	0 *
Methylcyclohexane	7.67351E-06	1.63554E-05 *	2.78011E-05 *	3.6483E-05	0 *
Toluene	3.93314E-06	8.68881E-06 *	9.26702E-06 *	1.40227E-05	0 *
Octane	2.05482E-05	2.99508E-05 *	2.31675E-05 *	3.25702E-05	0 *
Ethylbenzene	1.65008E-06	3.78219E-06 *	0 *	2.13211E-06	0 *
m-Xylene	5.28624E-06	9.19992E-06 *	2.31675E-06 *	6.23043E-06	0 *
o-Xylene	1.61695E-06	3.27108E-06 *	0 *	1.65414E-06	0 *
Nonane	1.99849E-05	2.35109E-05 *	6.95026E-06 *	1.04762E-05	0 *
Decane	2.76913E-05	3.26086E-05 *	0 *	4.91725E-06	0 *
Undecane	2.53867E-05	2.68842E-05 *	0 *	1.49752E-06	0 *
C12	2.60364E-05	2.65775E-05 *	0 *	5.41157E-07	0 *
C13	2.55742E-05	2.57598E-05 *	0 *	1.85589E-07	0 *
C14	2.42647E-05	2.43287E-05 *	0 *	6.3934E-08	0 *
C15	2.33866E-05	2.34087E-05 *	0 *	2.20722E-08	0 *
C16	2.08456E-05	2.08531E-05 *	0 *	7.51973E-09	0 *
C17	1.90103E-05	1.90132E-05 *	0 *	2.81846E-09	0 *
C18	1.58433E-05	1.58443E-05 *	0 *	9.64469E-10	0 *
C19	1.59462E-05	1.59465E-05 *	0 *	3.63534E-10	0 *
C20	1.41064E-05	1.41065E-05 *	0 *	8.8635E-11	0 *
C21	1.28798E-05	1.28799E-05 *	0 *	3.65582E-11	0 *
C22	1.1551E-05	1.1551E-05 *	0 *	1.43833E-11	0 *
C23	1.04266E-05	1.04266E-05 *	0 *	3.86081E-12	0 *
C24	1.01199E-05	1.01199E-05 *	0 *	1.3323E-12	0 *
C25	8.27992E-06	8.27992E-06 *	0 *	4.33166E-13	0 *
C26	8.48437E-06	8.48437E-06 *	0 *	1.48115E-13	0 *
C27	6.95105E-06	6.95105E-06 *	0 *	3.24568E-14	0 *
C28	7.46215E-06	7.46215E-06 *	0 *	1.77384E-14	0 *
C29	8.68881E-06	8.68881E-06 *	0 *	9.49565E-15	0 *
Water	0.506521	0 *	0 *	0.00146927	0.50799 *
c30+	0.000117452	0.000117452 *	0 *	3.75889E-10	0 *

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	8.1503E-05	0.00979463 *	0.179979 *	0.167937	0 *
Nitrogen	3.49006E-06	0.0124692 *	0.254583 *	0.238968	0 *
Methane	0.00177096	2.83576 *	60.2632 *	56.5125	0 *
Ethane	0.000416478	0.319547 *	6.80428 *	6.37694	0 *
Propane	0.00110384	0.500504 *	9.13679 *	8.57754	0 *
i-Butane	0.000933458	0.245775 *	3.64464 *	3.4286	0 *
n-Butane	0.00252601	0.543292 *	6.91953 *	6.52218	0 *
i-Pentane	0.00279764	0.401431 *	3.11448 *	2.95987	0 *
n-Pentane	0.00360715	0.49376 *	3.0817 *	2.94671	0 *
Hexane	0.0110415	1.04525 *	2.81935 *	2.763	0 *
Methylcyclopentane	0.00299649	0.393336 *	0.68835 *	0.715458	0 *
Benzene	0.00101508	0.0956139 *	0.141975 *	0.145705	0 *
Cyclohexane	0.00294392	0.449527 *	0.4589 *	0.52333	0 *
Heptane	0.0139365	1.24326 *	1.04722 *	1.14516	0 *
Methylcyclohexane	0.00810791	0.874081 *	0.535383 *	0.648204	0 *
Toluene	0.00389982	0.435754 *	0.167469 *	0.2338	0 *
Octane	0.0252588	1.86219 *	0.519049 *	0.673236	0 *
Ethylbenzene	0.00188517	0.218557 *	0 *	0.0409603	0 *

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? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
m-Xylene	0.0060394	0.531625 *	0.0482408 *	0.119694	0 *
o-Xylene	0.00184732	0.189022 *	0 *	0.0317779	0 *
Nonane	0.0275831	1.64129 *	0.174835 *	0.243137	0 *
Decane	0.0423993	2.52535 *	0 *	0.126603	0 *
Undecane	0.0427025	2.28728 *	0 *	0.0423572	0 *
C12	0.0477254	2.4641 *	0 *	0.0166801	0 *
C13	0.0507384	2.58495 *	0 *	0.00619148	0 *
C14	0.0518032	2.62708 *	0 *	0.00229519	0 *
C15	0.0534585	2.70646 *	0 *	0.000848402	0 *
C16	0.0507967	2.5702 *	0 *	0.000308127	0 *
C17	0.049194	2.48858 *	0 *	0.000122643	0 *
C18	0.04339	2.19478 *	0 *	4.44159E-05	0 *
C19	0.0460786	2.33069 *	0 *	1.76643E-05	0 *
C20	0.0428918	2.16946 *	0 *	4.53178E-06	0 *
C21	0.0411064	2.07915 *	0 *	1.96196E-06	0 *
C22	0.0386089	1.95282 *	0 *	8.08411E-07	0 *
C23	0.0364243	1.84233 *	0 *	2.26796E-07	0 *
C24	0.0368806	1.8654 *	0 *	8.16449E-08	0 *
C25	0.0314248	1.58945 *	0 *	2.76445E-08	0 *
C26	0.0334814	1.69348 *	0 *	9.82854E-09	0 *
C27	0.0284798	1.44049 *	0 *	2.23614E-09	0 *
C28	0.0317003	1.60338 *	0 *	1.26713E-09	0 *
C29	0.0382228	1.93329 *	0 *	7.02415E-10	0 *
Water	98.1983	0 *	0 *	4.78976	100 *
c30+	0.844398	42.7094 *	0 *	4.54416E-05	0 *

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
Carbon Dioxide	7.57371E-06	1.79948E-05 *	0.000917633 *	0.000928054	0 *
Nitrogen	3.24315E-07	2.29085E-05 *	0.001298 *	0.00132059	0 *
Methane	0.000164567	0.0052099 *	0.307255 *	0.3123	0 *
Ethane	3.87014E-05	0.000587076 *	0.034692 *	0.0352403	0 *
Propane	0.000102575	0.000919532 *	0.0465844 *	0.0474013	0 *
i-Butane	8.6742E-05	0.000451541 *	0.0185824 *	0.0189472	0 *
n-Butane	0.00023473	0.000998143 *	0.0352796 *	0.036043	0 *
i-Pentane	0.000259972	0.000737514 *	0.0158793 *	0.0163569	0 *
n-Pentane	0.000335196	0.000907142 *	0.0157122 *	0.0162841	0 *
Hexane	0.00102603	0.00192035 *	0.0143746 *	0.0152689	0 *
Methylcyclopentane	0.00027845	0.000722643 *	0.00350958 *	0.00395378	0 *
Benzene	9.43272E-05	0.000175663 *	0.000723864 *	0.0008052	0 *
Cyclohexane	0.000273565	0.000825877 *	0.00233972 *	0.00289203	0 *
Heptane	0.00129506	0.00228414 *	0.0053393 *	0.00632837	0 *
Methylcyclohexane	0.000753431	0.00160587 *	0.00272968 *	0.00358212	0 *
Toluene	0.000362393	0.000800573 *	0.000853848 *	0.00129203	0 *
Octane	0.00234719	0.00342124 *	0.00264639 *	0.00372045	0 *
Ethylbenzene	0.000175181	0.000401536 *	0 *	0.000226355	0 *
m-Xylene	0.000561214	0.000976709 *	0.000245958 *	0.000661453	0 *
o-Xylene	0.000171663	0.000347274 *	0 *	0.000175611	0 *
Nonane	0.00256317	0.00301539 *	0.000891407 *	0.00134363	0 *
Decane	0.00393997	0.00463961 *	0 *	0.000699635	0 *
Undecane	0.00396815	0.00420222 *	0 *	0.000234075	0 *
C12	0.0044349	0.00452708 *	0 *	9.21779E-05	0 *
C13	0.00471489	0.00474911 *	0 *	3.42155E-05	0 *
C14	0.00481383	0.00482652 *	0 *	1.26837E-05	0 *
C15	0.00496766	0.00497234 *	0 *	4.68845E-06	0 *
C16	0.00472031	0.00472201 *	0 *	1.70278E-06	0 *
C17	0.00457137	0.00457205 *	0 *	6.7775E-07	0 *
C18	0.00403204	0.00403228 *	0 *	2.45452E-07	0 *
C19	0.00428188	0.00428197 *	0 *	9.76165E-08	0 *

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
C20	0.00398574	0.00398577 *	0 *	2.50436E-08	0 *
C21	0.00381983	0.00381984 *	0 *	1.08422E-08	0 *
C22	0.00358775	0.00358775 *	0 *	4.46745E-09	0 *
C23	0.00338475	0.00338475 *	0 *	1.25333E-09	0 *
C24	0.00342714	0.00342715 *	0 *	4.51187E-10	0 *
C25	0.00292017	0.00292017 *	0 *	1.52769E-10	0 *
C26	0.00311128	0.00311128 *	0 *	5.43146E-11	0 *
C27	0.0026465	0.0026465 *	0 *	1.23574E-11	0 *
C28	0.00294576	0.00294576 *	0 *	7.00241E-12	0 *
C29	0.00355187	0.00355187 *	0 *	3.8817E-12	0 *
Water	9.12512	0 *	0 *	0.0264693	9.15159 *
c30+	0.0784661	0.0784663 *	0 *	2.5112E-07	0 *

Stream Properties

Property	Units	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
Temperature	°F	96.6002	100 *	100 *	96.6002	100 *
Pressure	psia	14.6959	389.696 *	389.696 *	14.6959 *	389.696 *
Mole Fraction Vapor	%	0	25.9185	98.0301	100	0
Mole Fraction Light Liquid	%	0.108542	74.0815	1.96993	0	100
Mole Fraction Heavy Liquid	%	99.8915	0	0	0	0
Molecular Weight	lb/lbmol	18.3255	179.729	22.0117	22.023	18.0153
Mass Density	lb/ft^3	61.8723	25.8182	1.58448	0.0544135	61.9724
Molar Flow	lbmol/h	0.507083	0.00102221	0.0231629	0.0250929	0.50799
Mass Flow	lb/h	9.29255	0.183721	0.509855	0.552622	9.15159
Vapor Volumetric Flow	ft^3/h	0.150189	0.00711596	0.321781	10.156	0.147672
Liquid Volumetric Flow	gpm	0.0187249	0.000887185	0.0401181	1.2662	0.018411
Std Vapor Volumetric Flow	MMSCFD	0.00461831	9.30992E-06	0.000210959 *	0.000228536	0.00462658
Std Liquid Volumetric Flow	sgpm	0.0186188	0.000444946 *	0.00281462	0.00293543	0.0182947 *
Compressibility		0.000729135	0.451672	0.901358	0.996367	0.0188614
Specific Gravity		0.992037			0.760396	0.993642
API Gravity		10.2458				9.95343
Enthalpy	Btu/h	-62192.6	-142.798	-817.027	-976.416	-62209.2
Mass Enthalpy	Btu/lb	-6692.74	-777.255	-1602.47	-1766.88	-6797.63
Mass Cp	Btu/(lb*°F)	0.970713	0.422532	0.544214	0.483753	0.980205
Ideal Gas CpCv Ratio		1.31918	1.0326	1.2274	1.23007	1.32441
Dynamic Viscosity	cP	0.773306			0.0109337	0.704198
Kinematic Viscosity	cSt	0.78025			12.5441	0.709374
Thermal Conductivity	Btu/(h*ft*°F)	0.353103 ?			0.0179197	0.360083
Surface Tension	lbf/ft	0.00478521 ?				0.00480959
Net Ideal Gas Heating Value	Btu/ft^3	15.6993	8622.07	1201.74	1143.3	0
Net Liquid Heating Value	Btu/lb	-717.896	18077.1	20655.8	19588.8	-1059.76
Gross Ideal Gas Heating Value	Btu/ft^3	66.9725	9200.76	1322.93	1261.09	50.3101
Gross Liquid Heating Value	Btu/lb	343.868	19298.9	22745.1	21618.6	0

Remarks

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Connections

	3				
From Block	MIX-100				
To Block	VSSL-101				

Stream Composition

Mole Fraction	3 %				
Carbon Dioxide	0.00399486				
Nitrogen	0.0088604				
Methane	3.65995				
Ethane	0.220466				
Propane	0.202432				
i-Butane	0.0615363				
n-Butane	0.117285				
i-Pentane	0.0432778				
n-Pentane	0.0432842				
Hexane	0.0355316				
Methylcyclopentane	0.00944954				
Benzene	0.00216393				
Cyclohexane	0.00706802				
Heptane	0.0142962				
Methylcyclohexane	0.00829735				
Toluene	0.00337404				
Octane	0.00998136				
Ethylbenzene	0.000710703				
m-Xylene	0.00216407				
o-Xylene	0.000614662				
Nonane	0.00572389				
Decane	0.00612741				
Undecane	0.00505175				
C12	0.00499413				
C13	0.00484046				
C14	0.00457155				
C15	0.00439867				
C16	0.00391847				
C17	0.00357272				
C18	0.00297727				
C19	0.00299648				
C20	0.00265073				
C21	0.00242023				
C22	0.00217053				
C23	0.00195924				
C24	0.00190161				
C25	0.00155586				
C26	0.00159428				
C27	0.00130616				
C28	0.0014022				
C29	0.0016327				
Water	95.4554				
c30+	0.0220702				

Molar Flow	3 lbmol/h				
Carbon Dioxide	2.12597E-05				
Nitrogen	4.71529E-05				
Methane	0.0194774				
Ethane	0.00117327				
Propane	0.00107729				
i-Butane	0.000327481				
n-Butane	0.000624163				
i-Pentane	0.000230314				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Molar Flow	3 lbmol/h				
n-Pentane	0.000230348				
Hexane	0.000189091				
Methylcyclopentane	5.02882E-05				
Benzene	1.15159E-05				
Cyclohexane	3.76143E-05				
Heptane	7.60807E-05				
Methylcyclohexane	4.41565E-05				
Toluene	1.79558E-05				
Octane	5.31184E-05				
Ethylbenzene	3.78219E-06				
m-Xylene	1.15167E-05				
o-Xylene	3.27108E-06				
Nonane	3.04612E-05				
Decane	3.26086E-05				
Undecane	2.68842E-05				
C12	2.65775E-05				
C13	2.57598E-05				
C14	2.43287E-05				
C15	2.34087E-05				
C16	2.08531E-05				
C17	1.90132E-05				
C18	1.58443E-05				
C19	1.59465E-05				
C20	1.41065E-05				
C21	1.28799E-05				
C22	1.1551E-05				
C23	1.04266E-05				
C24	1.01199E-05				
C25	8.27992E-06				
C26	8.48437E-06				
C27	6.95105E-06				
C28	7.46215E-06				
C29	8.68881E-06				
Water	0.50799				
c30+	0.000117452				

Mass Fraction	3 %				
Carbon Dioxide	0.00950342				
Nitrogen	0.0134169				
Methane	3.17379				
Ethane	0.358339				
Propane	0.48251				
i-Butane	0.193333				
n-Butane	0.368483				
i-Pentane	0.168782				
n-Pentane	0.168807				
Hexane	0.165512				
Methylcyclopentane	0.0429879				
Benzene	0.00913674				
Cyclohexane	0.0321538				
Heptane	0.0774333				
Methylcyclohexane	0.0440373				
Toluene	0.0168044				
Octane	0.0616306				
Ethylbenzene	0.00407851				
m-Xylene	0.012419				
o-Xylene	0.00352736				
Nonane	0.0396824				
Decane	0.0471257				
Undecane	0.0426831				

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? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	3 %				
C12	0.0459828				
C13	0.0482379				
C14	0.0490242				
C15	0.0505054				
C16	0.0479627				
C17	0.0464396				
C18	0.040957				
C19	0.0434932				
C20	0.0404845				
C21	0.0387991				
C22	0.0364417				
C23	0.0343798				
C24	0.0348104				
C25	0.0296609				
C26	0.0316021				
C27	0.0268812				
C28	0.0299209				
C29	0.0360773				
Water	92.9552				
c30+	0.797004				

Mass Flow	3 lb/h				
Carbon Dioxide	0.000935628				
Nitrogen	0.00132091				
Methane	0.312465				
Ethane	0.035279				
Propane	0.0475039				
i-Butane	0.0190339				
n-Butane	0.0362777				
i-Pentane	0.0166169				
n-Pentane	0.0166193				
Hexane	0.0162949				
Methylcyclopentane	0.00423223				
Benzene	0.000899527				
Cyclohexane	0.0031656				
Heptane	0.00762343				
Methylcyclohexane	0.00433555				
Toluene	0.00165442				
Octane	0.00606763				
Ethylbenzene	0.000401536				
m-Xylene	0.00122267				
o-Xylene	0.000347274				
Nonane	0.0039068				
Decane	0.00463961				
Undecane	0.00420222				
C12	0.00452708				
C13	0.00474911				
C14	0.00482652				
C15	0.00497234				
C16	0.00472201				
C17	0.00457205				
C18	0.00403228				
C19	0.00428197				
C20	0.00398577				
C21	0.00381984				
C22	0.00358775				
C23	0.00338475				
C24	0.00342715				
C25	0.00292017				
C26	0.00311128				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Mass Flow	3 lb/h				
C27	0.0026465				
C28	0.00294576				
C29	0.00355187				
Water	9.15159				
c30+	0.0784663				

Stream Properties

Property	Units	3				
Temperature	°F	100.322				
Pressure	psia	389.696				
Mole Fraction Vapor	%	4.1999				
Mole Fraction Light Liquid	%	0.307115				
Mole Fraction Heavy Liquid	%	95.493				
Molecular Weight	lb/lbmol	18.4998				
Mass Density	lb/ft^3	20.9058				
Molar Flow	lbmol/h	0.532176				
Mass Flow	lb/h	9.84517				
Vapor Volumetric Flow	ft^3/h	0.47093				
Liquid Volumetric Flow	gpm	0.0587134				
Std Vapor Volumetric Flow	MMSCFD	0.00484685				
Std Liquid Volumetric Flow	sgpm	0.0215543				
Compressibility		0.0573829				
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	-63169				
Mass Enthalpy	Btu/lb	-6416.24				
Mass Cp	Btu/(lb*°F)	0.947967				
Ideal Gas CpCv Ratio		1.31319				
Dynamic Viscosity	cP					
Kinematic Viscosity	cSt					
Thermal Conductivity	Btu/(h*ft*°F)					
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	68.8672				
Net Liquid Heating Value	Btu/lb	421.946				
Gross Ideal Gas Heating Value	Btu/ft^3	123.277				
Gross Liquid Heating Value	Btu/lb	1538.05				

Remarks

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1J-159_Well Maintenance Flowback Emissions Summary

Well	1J-159
Date	7/10/2018
Reservoir	West Sak A, B and D Sand
Flow Duration	Flow Duration is Unknown

ProMax Inputs [1]

Wellhead Stream Composition [2]	Wellhead fluid composition taken from 1H-105 Well West Sak A2 Sand Sampled 12/14/2006 analyzed by Schlumberger
Tubing Pressure[3]	375.0 psig
Tubing Temperature[3]	100.0 °F
Atmospheric Pressure[4]	14.7 psia
Liquid to Tanks[5]	400.0 bbl/flowback

ProMax Output Summary[6]

Phase	Volumetric Flow (MSCFD)	Cumulative Gas Volume (MSCF)	Total Fluid Volume (STB)
Vapor	0	194.1	400.0

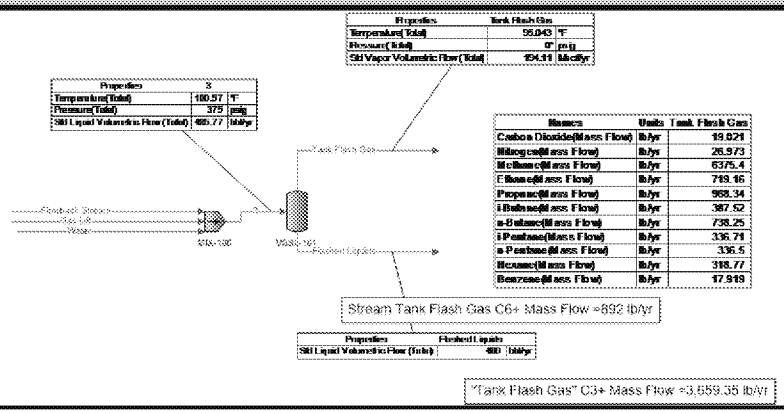
Compostion	Mass Flow (lb/hr)	Total Mass[7] (lb)	Mass (tonne)	Mass (ton)
Carbon Dioxide	0.0	19.0	0.009	0.010
Nitrogen	0.0	27.0	0.012	0.01
Methane	0.0	6,375.4	2.9	3.2
Ethane	0.0	719.2	0.33	0.36
Propane	0.0	968.3	0.44	0.48
i-Butane	0.0	387.5	0.18	0.19
n-Butane	0.0	738.3	0.33	0.37
i-Pentane	0.0	336.7	0.15	0.17
n-Pentane	0.0	336.5	0.15	0.17
n-Hexane	0.0	318.8	0.14	0.16
Hexane+[8]	0.0	555.3	0.25	0.28
Benzene	0.0	17.9	0.008	0.009
C3 Plus VOC	**0.0**	**3,659.3**	**1.7**	**1.8**

ProMax® (the successor to PROSIM®) was used to estimate emissions from the open top tanks during a well flowback. In the model, wellhead fluid is routed directly to a flowback tank. Thus, emissions from the flowback are only those that occur when the oil flashes due to the change in pressure from the wellhead to the tank.

Notes:
(1) All inputs to the model are denoted by a * symbol in the ProMax® generated report.
(2) The composition of the sample is entered in ProMax® as the "wellhead feed" stream composition.
(3) Tubing pressure and temperature are estimates provided by Conoco Phillips.
(4) The atmospheric pressure is assumed to be equal to sea level pressure.
(5) The amount of Liquid produced during the flowback is entered in ProMax® as "Flashed Liquids". bbl/year is equivalent to bbl/flowback for purposes of this model.
(6) A detailed ProMax® generated report is attached.
(7) Mass emission rates equal "Tank Flash Gas" emission rates in the ProMax® generated report.
(8) Hexane+ does not include n-Hexane or Benzene.

Flowsheet1
Plant Schematic

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-10-2018	
Flowsheet:	Flowsheet1	



Names	Units	Tank Flash Gas
Carbon Dioxide(Mass Flow)	lb/yr	19.021
Nitrogen(Mass Flow)	lb/yr	26.973
Methane(Mass Flow)	lb/yr	6375.4
Ethane(Mass Flow)	lb/yr	719.16
Propane(Mass Flow)	lb/yr	968.34
i-Butane(Mass Flow)	lb/yr	387.52
n-Butane(Mass Flow)	lb/yr	738.25
i-Pentane(Mass Flow)	lb/yr	336.74
n-Pentane(Mass Flow)	lb/yr	336.5
Hexane(Mass Flow)	lb/yr	318.77
Benzene(Mass Flow)	lb/yr	17.919

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-10-2018	
Flowsheet:	Flowsheet1	

Connections

	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
From Block	VSSL-101	--	--	VSSL-101	--
To Block	--	MIX-100	MIX-100	--	MIX-100

Stream Composition

Mole Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	3.64528E-05	0.04 *	0.090018 *	0.0844953	0 *
Nitrogen	2.82011E-06	0.08 *	0.20004 *	0.188247	0 *
Methane	0.00262961	31.77 *	82.6865 *	77.6952	0 *
Ethane	0.000448488	1.91 *	4.981 *	4.67584	0 *
Propane	0.00107485	2.04 *	4.56091 *	4.29325	0 *
i-Butane	0.000757901	0.76 *	1.38028 *	1.30349	0 *
n-Butane	0.0020535	1.68 *	2.62052 *	2.48325	0 *
i-Pentane	0.00189883	1 *	0.95019 *	0.912407	0 *
n-Pentane	0.00247614	1.23 *	0.940188 *	0.911819	0 *
Hexane	0.00646509	2.18 *	0.720144 *	0.723179	0 *
Methylcyclopentane	0.00185318	0.84 *	0.180036 *	0.199031	0 *
Benzene	0.000538034	0.22 *	0.040008 *	0.0448497	0 *
Cyclohexane	0.00190298	0.96 *	0.120024 *	0.1524	0 *
Heptane	0.00731871	2.23 *	0.230046 *	0.267582	0 *
Methylcyclohexane	0.00452725	1.6 *	0.120024 *	0.161406	0 *
Toluene	0.00228609	0.85 *	0.040008 *	0.0658086	0 *
Octane	0.0116644	2.93 *	0.10002 *	0.137501	0 *
Ethylbenzene	0.00111785	0.37 *	0 *	0.0109885	0 *
m-Xylene	0.00321783	0.9 *	0.010002 *	0.0286275	0 *
o-Xylene	0.00105424	0.32 *	0 *	0.00823725	0 *
Nonane	0.0106923	2.3 *	0.030006 *	0.0414617	0 *
Decane	0.0148405	3.19 *	0 *	0.019401	0 *
Undecane	0.0129535	2.63 *	0 *	0.00559579	0 *
C12	0.0130512	2.6 *	0 *	0.0019779	0 *
C13	0.0127356	2.52 *	0 *	0.000670786	0 *
C14	0.012056	2.38 *	0 *	0.000229566	0 *
C15	0.0116099	2.29 *	0 *	7.89233E-05	0 *
C16	0.0103455	2.04 *	0 *	2.67763E-05	0 *
C17	0.00943362	1.86 *	0 *	1.00041E-05	0 *
C18	0.00786169	1.55 *	0 *	3.40826E-06	0 *
C19	0.00791256	1.56 *	0 *	1.27906E-06	0 *
C20	0.00699963	1.38 *	0 *	3.09647E-07	0 *
C21	0.00639098	1.26 *	0 *	1.27377E-07	0 *
C22	0.0057316	1.13 *	0 *	4.99542E-08	0 *
C23	0.00517366	1.02 *	0 *	1.33319E-08	0 *
C24	0.00502149	0.99 *	0 *	4.5784E-09	0 *
C25	0.00410849	0.81 *	0 *	1.48256E-09	0 *
C26	0.00420994	0.83 *	0 *	5.04409E-10	0 *
C27	0.0034491	0.68 *	0 *	1.09794E-10	0 *
C28	0.00370271	0.73 *	0 *	5.98643E-11	0 *
C29	0.00431138	0.85 *	0 *	3.19471E-11	0 *
Water	99.7158	0 *	0 *	5.58292	100 *
c30+	0.0582796	11.49 *	0 *	1.3064E-06	0 *

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
Carbon Dioxide	3.08205E-07	1.7154E-06 *	4.79297E-05 *	4.93369E-05	0 *
Nitrogen	2.38437E-08	3.4308E-06 *	0.000106511 *	0.000109918	0 *
Methane	2.22331E-05	0.00136246 *	0.0440261 *	0.0453664	0 *
Ethane	3.79192E-06	8.19104E-05 *	0.00265211 *	0.00273023	0 *
Propane	9.08776E-06	8.74855E-05 *	0.00242844 *	0.00250684	0 *

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-10-2018	
Flowsheet:	Flowsheet1	

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
i-Butane	6.40798E-06	3.25926E-05 *	0.000734923 *	0.000761107	0 *
n-Butane	1.73621E-05	7.20469E-05 *	0.00139529 *	0.00144997	0 *
i-Pentane	1.60544E-05	4.2885E-05 *	0.000505925 *	0.000532756	0 *
n-Pentane	2.09355E-05	5.27486E-05 *	0.0005006 *	0.000532413	0 *
Hexane	5.46617E-05	9.34894E-05 *	0.000383438 *	0.000422266	0 *
Methylcyclopentane	1.56684E-05	3.60234E-05 *	9.58595E-05 *	0.000116215	0 *
Benzene	4.54903E-06	9.43471E-06 *	2.13021E-05 *	2.61878E-05	0 *
Cyclohexane	1.60895E-05	4.11696E-05 *	6.39063E-05 *	8.89865E-05	0 *
Heptane	6.1879E-05	9.56336E-05 *	0.000122487 *	0.000156242	0 *
Methylcyclohexane	3.82774E-05	6.86161E-05 *	6.39063E-05 *	9.4245E-05	0 *
Toluene	1.93287E-05	3.64523E-05 *	2.13021E-05 *	3.84257E-05	0 *
Octane	9.86213E-05	0.000125653 *	5.32553E-05 *	8.02871E-05	0 *
Ethylbenzene	9.45128E-06	1.58675E-05 *	0 *	6.41619E-06	0 *
m-Xylene	2.72064E-05	3.85965E-05 *	5.32553E-06 *	1.67157E-05	0 *
o-Xylene	8.91347E-06	1.37232E-05 *	0 *	4.80974E-06	0 *
Nonane	9.04027E-05	9.86356E-05 *	1.59766E-05 *	2.42095E-05	0 *
Decane	0.000125475	0.000136803 *	0 *	1.13283E-05	0 *
Undecane	0.00010952	0.000112788 *	0 *	3.26739E-06	0 *
C12	0.000110346	0.000111501 *	0 *	1.1549E-06	0 *
C13	0.000107679	0.00010807 *	0 *	3.91673E-07	0 *
C14	0.000101932	0.000102066 *	0 *	1.34044E-07	0 *
C15	9.81607E-05	9.82068E-05 *	0 *	4.60835E-08	0 *
C16	8.74699E-05	8.74855E-05 *	0 *	1.56347E-08	0 *
C17	7.97603E-05	7.97662E-05 *	0 *	5.84141E-09	0 *
C18	6.64698E-05	6.64718E-05 *	0 *	1.99009E-09	0 *
C19	6.68999E-05	6.69007E-05 *	0 *	7.46846E-10	0 *
C20	5.91812E-05	5.91814E-05 *	0 *	1.80803E-10	0 *
C21	5.40351E-05	5.40352E-05 *	0 *	7.43756E-11	0 *
C22	4.84601E-05	4.84601E-05 *	0 *	2.91683E-11	0 *
C23	4.37427E-05	4.37427E-05 *	0 *	7.78451E-12	0 *
C24	4.24562E-05	4.24562E-05 *	0 *	2.67334E-12	0 *
C25	3.47369E-05	3.47369E-05 *	0 *	8.65669E-13	0 *
C26	3.55946E-05	3.55946E-05 *	0 *	2.94525E-13	0 *
C27	2.91618E-05	2.91618E-05 *	0 *	6.41091E-14	0 *
C28	3.13061E-05	3.13061E-05 *	0 *	3.49549E-14	0 *
C29	3.64523E-05	3.64523E-05 *	0 *	1.86539E-14	0 *
Water	0.843087	0 *	0 *	0.00325988	0.846347 *
c30+	0.000492748	0.000492749 *	0 *	7.62812E-10	0 *

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	8.53166E-05	0.00979463 *	0.179979 *	0.168109	0 *
Nitrogen	4.20134E-06	0.0124692 *	0.254583 *	0.2384	0 *
Methane	0.00224346	2.83576 *	60.2632 *	56.348	0 *
Ethane	0.000717177	0.319547 *	6.80428 *	6.35612	0 *
Propane	0.00252058	0.500504 *	9.13679 *	8.55845	0 *
i-Butane	0.00234267	0.245775 *	3.64464 *	3.42501	0 *
n-Butane	0.00634734	0.543292 *	6.91953 *	6.52492	0 *
i-Pentane	0.0072857	0.401431 *	3.11448 *	2.97598	0 *
n-Pentane	0.00950079	0.49376 *	3.0817 *	2.97407	0 *
Hexane	0.0296288	1.04525 *	2.81935 *	2.81736	0 *
Methylcyclopentane	0.00829423	0.393336 *	0.68835 *	0.757246	0 *
Benzene	0.00223503	0.0956139 *	0.141975 *	0.158376	0 *
Cyclohexane	0.00851712	0.449527 *	0.4589 *	0.57983	0 *
Heptane	0.0390002	1.24326 *	1.04722 *	1.21212	0 *
Methylcyclohexane	0.0236396	0.874081 *	0.535383 *	0.716443	0 *
Toluene	0.0112019	0.435754 *	0.167469 *	0.274117	0 *
Octane	0.0708587	1.86219 *	0.519049 *	0.710058	0 *
Ethylbenzene	0.00631131	0.218557 *	0 *	0.052739	0 *

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-10-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
m-Xylene	0.0181677	0.531625 *	0.0482408 *	0.137397	0 *
o-Xylene	0.00595218	0.189022 *	0 *	0.0395345	0 *
Nonane	0.0729296	1.64129 *	0.174835 *	0.2404	0 *
Decane	0.112293	2.52535 *	0 *	0.124792	0 *
Undecane	0.107677	2.28728 *	0 *	0.0395418	0 *
C12	0.118225	2.4641 *	0 *	0.0152307	0 *
C13	0.124867	2.58495 *	0 *	0.00559071	0 *
C14	0.127197	2.62708 *	0 *	0.0020589	0 *
C15	0.13115	2.70646 *	0 *	0.000757884	0 *
C16	0.124584	2.5702 *	0 *	0.000274106	0 *
C17	0.12064	2.48858 *	0 *	0.000108755	0 *
C18	0.106402	2.19478 *	0 *	3.92124E-05	0 *
C19	0.112993	2.33069 *	0 *	1.55268E-05	0 *
C20	0.105178	2.16946 *	0 *	3.95522E-06	0 *
C21	0.100799	2.07915 *	0 *	1.7078E-06	0 *
C22	0.0946748	1.95282 *	0 *	7.01435E-07	0 *
C23	0.0893179	1.84233 *	0 *	1.95654E-07	0 *
C24	0.0904367	1.8654 *	0 *	7.00943E-08	0 *
C25	0.0770584	1.58945 *	0 *	2.36378E-08	0 *
C26	0.0821015	1.69348 *	0 *	8.36209E-09	0 *
C27	0.0698367	1.44049 *	0 *	1.88979E-09	0 *
C28	0.0777338	1.60338 *	0 *	1.06835E-09	0 *
C29	0.093728	1.93329 *	0 *	5.90392E-10	0 *
Water	95.5347	0 *	0 *	4.5469	100 *
c30+	2.07059	42.7094 *	0 *	3.9456E-05	0 *

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
Carbon Dioxide	1.35639E-05	7.5494E-05 *	0.00210936 *	0.00217129	0 *
Nitrogen	6.67944E-07	9.61085E-05 *	0.00298372 *	0.00307916	0 *
Methane	0.000356674	0.0218572 *	0.706287 *	0.727788	0 *
Ethane	0.000114019	0.00246297 *	0.0797465 *	0.0820954	0 *
Propane	0.00040073	0.00385773 *	0.107084 *	0.110541	0 *
i-Butane	0.000372446	0.00189436 *	0.0427153 *	0.0442372	0 *
n-Butane	0.00100912	0.00418752 *	0.0810972 *	0.0842756	0 *
i-Pentane	0.00115831	0.0030941 *	0.0365019 *	0.0384377	0 *
n-Pentane	0.00151047	0.00380575 *	0.0361176 *	0.0384129	0 *
Hexane	0.00471049	0.00805648 *	0.0330429 *	0.0363889	0 *
Methylcyclopentane	0.00131865	0.00303171 *	0.00806748 *	0.00978055	0 *
Benzene	0.000355333	0.000736963 *	0.00166395 *	0.00204558	0 *
Cyclohexane	0.00135408	0.00346482 *	0.00537832 *	0.00748906	0 *
Heptane	0.00620039	0.00958268 *	0.0122734 *	0.0156557	0 *
Methylcyclohexane	0.00375831	0.00673714 *	0.00627471 *	0.00925354	0 *
Toluene	0.00178091	0.00335866 *	0.00196274 *	0.00354049	0 *
Octane	0.0112654	0.0143532 *	0.00608327 *	0.00917108	0 *
Ethylbenzene	0.00100339	0.00168457 *	0 *	0.000681175	0 *
m-Xylene	0.00288837	0.0040976 *	0.000565385 *	0.00177462	0 *
o-Xylene	0.000946299	0.00145693 *	0 *	0.000510626	0 *
Nonane	0.0115946	0.0126505 *	0.00204908 *	0.00310499	0 *
Decane	0.0178528	0.0194646 *	0 *	0.0016118	0 *
Undecane	0.0171189	0.0176296 *	0 *	0.00051072	0 *
C12	0.0187958	0.0189925 *	0 *	0.00019672	0 *
C13	0.0198518	0.019924 *	0 *	7.22094E-05	0 *
C14	0.0202222	0.0202487 *	0 *	2.65927E-05	0 *
C15	0.0208508	0.0208605 *	0 *	9.7888E-06	0 *
C16	0.0198068	0.0198103 *	0 *	3.54034E-06	0 *
C17	0.0191798	0.0191812 *	0 *	1.40467E-06	0 *
C18	0.0169162	0.0169167 *	0 *	5.06466E-07	0 *
C19	0.017964	0.0179642 *	0 *	2.00544E-07	0 *

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-10-2018	
Flowsheet:	Flowsheet1	

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
C20	0.0167215	0.0167215 *	0 *	5.10855E-08	0 *
C21	0.0160254	0.0160254 *	0 *	2.20579E-08	0 *
C22	0.0150517	0.0150517 *	0 *	9.0597E-09	0 *
C23	0.0142001	0.0142001 *	0 *	2.52706E-09	0 *
C24	0.014378	0.014378 *	0 *	9.05335E-10	0 *
C25	0.012251	0.012251 *	0 *	3.05305E-10	0 *
C26	0.0130528	0.0130528 *	0 *	1.08004E-10	0 *
C27	0.0111029	0.0111029 *	0 *	2.44085E-11	0 *
C28	0.0123584	0.0123584 *	0 *	1.37988E-11	0 *
C29	0.0149012	0.0149012 *	0 *	7.62548E-12	0 *
Water	15.1884	0 *	0 *	0.0587276	15.2472 *
c30+	0.32919	0.329191 *	0 *	5.09612E-07	0 *

Stream Properties

Property	Units	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
Temperature	°F	95.0434	100 *	100 *	95.0434	100 *
Pressure	psia	14.6959	389.696 *	389.696 *	14.6959 *	389.696 *
Mole Fraction Vapor	%	0	25.9185	98.0301	100	0
Mole Fraction Light Liquid	%	0.28203	74.0815	1.96993	0	100
Mole Fraction Heavy Liquid	%	99.718	0	0	0	0
Molecular Weight	lb/lbmol	18.8037	179.729	22.0117	22.1201	18.0153
Mass Density	lb/ft^3	61.7099	25.8182	1.58448	0.0548099	61.9724
Molar Flow	lbmol/h	0.84549	0.0042885	0.0532446	0.0583902	0.846347
Mass Flow	lb/h	15.8984	0.770769	1.172	1.2916	15.2472
Vapor Volumetric Flow	ft^3/h	0.257631	0.0298537	0.739677	23.565	0.246032
Liquid Volumetric Flow	gpm	0.0321202	0.00372202	0.0922195	2.93797	0.0306741
Std Vapor Volumetric Flow	MMSCFD	0.0077004	3.9058E-05	0.000484932 *	0.000531795	0.0077082
Std Liquid Volumetric Flow	sgpm	0.0319635	0.00186669 *	0.00646998	0.0068534	0.0304802 *
Compressibility		0.000752237	0.451672	0.901358	0.996307	0.0188614
Specific Gravity		0.989432			0.763747	0.993642
API Gravity		10.6216				9.95343
Enthalpy	Btu/h	-103859	-599.084	-1878.1	-2263.32	-103645
Mass Enthalpy	Btu/lb	-6532.66	-777.255	-1602.47	-1752.35	-6797.63
Mass Cp	Btu/(lb*°F)	0.955494	0.422532	0.544214	0.482541	0.980205
Ideal Gas CpCv Ratio		1.3113	1.0326	1.2274	1.22955	1.32441
Dynamic Viscosity	cP	0.848933			0.0108915	0.704198
Kinematic Viscosity	cSt	0.858811			12.4053	0.709374
Thermal Conductivity	Btu/(h*ft*°F)	0.344262 ?			0.0178435	0.360083
Surface Tension	lbf/ft	0.004723 ?				0.00480959
Net Ideal Gas Heating Value	Btu/ft^3	39.9433	8622.07	1201.74	1150.71	0
Net Liquid Heating Value	Btu/lb	-212.125	18077.1	20655.8	19631.6	-1059.76
Gross Ideal Gas Heating Value	Btu/ft^3	92.7053	9200.76	1322.93	1268.96	50.3101
Gross Liquid Heating Value	Btu/lb	852.682	19298.9	22745.1	21660.1	0

Remarks

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-10-2018	
Flowsheet:	Flowsheet1	

Connections

	3				
From Block	MIX-100				
To Block	VSSL-101				

Stream Composition

Mole Fraction	3 %				
Carbon Dioxide	0.00549245				
Nitrogen	0.0121633				
Methane	5.02153				
Ethane	0.302476				
Propane	0.278347				
i-Butane	0.0849134				
n-Butane	0.162337				
i-Pentane	0.0607171				
n-Pentane	0.0612192				
Hexane	0.0527644				
Methylcyclopentane	0.0145908				
Benzene	0.00340054				
Cyclohexane	0.011625				
Heptane	0.0241316				
Methylcyclohexane	0.0146615				
Toluene	0.00638961				
Octane	0.0197934				
Ethylbenzene	0.00175548				
m-Xylene	0.00485928				
o-Xylene	0.00151826				
Nonane	0.01268				
Decane	0.0151351				
Undecane	0.0124782				
C12	0.0123358				
C13	0.0119563				
C14	0.011292				
C15	0.010865				
C16	0.00967888				
C17	0.00882486				
C18	0.00735405				
C19	0.0074015				
C20	0.00654748				
C21	0.00597813				
C22	0.00536134				
C23	0.00483944				
C24	0.0046971				
C25	0.00384309				
C26	0.00393798				
C27	0.00322629				
C28	0.00346352				
C29	0.00403287				
Water	93.6349				
c30+	0.0545149				

Molar Flow	3 lbmol/h				
Carbon Dioxide	4.96451E-05				
Nitrogen	0.000109941				
Methane	0.0453886				
Ethane	0.00273402				
Propane	0.00251593				
i-Butane	0.000767515				
n-Butane	0.00146734				
i-Pentane	0.00054881				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-10-2018	
Flowsheet:	Flowsheet1	

Molar Flow	3 lbmol/h				
n-Pentane	0.000553348				
Hexane	0.000476927				
Methylcyclopentane	0.000131883				
Benzene	3.07368E-05				
Cyclohexane	0.000105076				
Heptane	0.000218121				
Methylcyclohexane	0.000132522				
Toluene	5.77544E-05				
Octane	0.000178908				
Ethylbenzene	1.58675E-05				
m-Xylene	4.39221E-05				
o-Xylene	1.37232E-05				
Nonane	0.000114612				
Decane	0.000136803				
Undecane	0.000112788				
C12	0.000111501				
C13	0.00010807				
C14	0.000102066				
C15	9.82068E-05				
C16	8.74855E-05				
C17	7.97662E-05				
C18	6.64718E-05				
C19	6.69007E-05				
C20	5.91814E-05				
C21	5.40352E-05				
C22	4.84601E-05				
C23	4.37427E-05				
C24	4.24562E-05				
C25	3.47369E-05				
C26	3.55946E-05				
C27	2.91618E-05				
C28	3.13061E-05				
C29	3.64523E-05				
Water	0.846347				
c30+	0.000492749				

Mass Fraction	3 %				
Carbon Dioxide	0.0127101				
Nitrogen	0.0179165				
Methane	4.23587				
Ethane	0.478241				
Propane	0.645385				
i-Butane	0.25951				
n-Butane	0.496131				
i-Pentane	0.230344				
n-Pentane	0.232248				
Hexane	0.23909				
Methylcyclopentane	0.0645679				
Benzene	0.0139669				
Cyclohexane	0.0514437				
Heptane	0.127145				
Methylcyclohexane	0.0756945				
Toluene	0.0309565				
Octane	0.118886				
Ethylbenzene	0.00979973				
m-Xylene	0.0271262				
o-Xylene	0.00847545				
Nonane	0.0855127				
Decane	0.113232				
Undecane	0.102558				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-10-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	3 %				
C12	0.110486				
C13	0.115905				
C14	0.117794				
C15	0.121353				
C16	0.115244				
C17	0.111584				
C18	0.0984104				
C19	0.104504				
C20	0.0972751				
C21	0.0932255				
C22	0.0875613				
C23	0.0826069				
C24	0.0836416				
C25	0.0712685				
C26	0.0759326				
C27	0.0645894				
C28	0.0718931				
C29	0.0866856				
Water	88.6982				
c30+	1.91502				

Mass Flow	3 lb/h				
Carbon Dioxide	0.00218486				
Nitrogen	0.00307983				
Methane	0.728145				
Ethane	0.0822094				
Propane	0.110941				
i-Butane	0.0446097				
n-Butane	0.0852847				
i-Pentane	0.039596				
n-Pentane	0.0399234				
Hexane	0.0410994				
Methylcyclopentane	0.0110992				
Benzene	0.00240091				
Cyclohexane	0.00884314				
Heptane	0.0218561				
Methylcyclohexane	0.0130119				
Toluene	0.0053214				
Octane	0.0204364				
Ethylbenzene	0.00168457				
m-Xylene	0.00466299				
o-Xylene	0.00145693				
Nonane	0.0146996				
Decane	0.0194646				
Undecane	0.0176296				
C12	0.0189925				
C13	0.019924				
C14	0.0202487				
C15	0.0208605				
C16	0.0198103				
C17	0.0191812				
C18	0.0169167				
C19	0.0179642				
C20	0.0167215				
C21	0.0160254				
C22	0.0150517				
C23	0.0142001				
C24	0.014378				
C25	0.012251				
C26	0.0130528				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-159 Flowback Report 7-10-2018	
Flowsheet:	Flowsheet1	

Mass Flow	3 lb/h				
C27	0.0111029				
C28	0.0123584				
C29	0.0149012				
Water	15.2472				
c30+	0.329191				

Stream Properties

Property	Units	3				
Temperature	°F	100.57				
Pressure	psia	389.696				
Mole Fraction Vapor	%	5.71655				
Mole Fraction Light Liquid	%	0.616226				
Mole Fraction Heavy Liquid	%	93.6672				
Molecular Weight	lb/lbmol	19.018				
Mass Density	lb/ft^3	17.1525				
Molar Flow	lbmol/h	0.90388				
Mass Flow	lb/h	17.19				
Vapor Volumetric Flow	ft^3/h	1.00218				
Liquid Volumetric Flow	gpm	0.124947				
Std Vapor Volumetric Flow	MMSCFD	0.00823219				
Std Liquid Volumetric Flow	sgpm	0.0388169				
Compressibility		0.0718661				
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	-106122				
Mass Enthalpy	Btu/lb	-6173.49				
Mass Cp	Btu/(lb*°F)	0.926333				
Ideal Gas CpCv Ratio		1.30382				
Dynamic Viscosity	cP					
Kinematic Viscosity	cSt					
Thermal Conductivity	Btu/(h*ft*°F)					
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	111.699				
Net Liquid Heating Value	Btu/lb	1278.86				
Gross Ideal Gas Heating Value	Btu/ft^3	168.691				
Gross Liquid Heating Value	Btu/lb	2416.08				

Remarks

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1J-166_Well Maintenance Flowback Emissions Summary

Well	1J-166
Date	7/6/2018
Reservoir	West Sak A, B and D Sand
Flow Duration	Flow Duration is Unknown

ProMax Inputs [1]

Wellhead Stream Composition [2]	Wellhead fluid composition taken from 1H-105 Well West Sak A2 Sand Sampled 12/14/2006 analyzed by Schlumberger
Tubing Pressure[3]	350.0 psig
Tubing Temperature[3]	100.0 °F
Atmospheric Pressure[4]	14.7 psia
Liquid to Tanks[5]	236.0 bbl/flowback

ProMax Output Summary[6]

Phase	Volumetric Flow (MSCFD)	Cumulative Gas Volume (MSCF)	Total Fluid Volume (STB)
Vapor	0	55.9	236.0

Compostion	Mass Flow (lb/hr)	Total Mass[7] (lb)	Mass (tonne)	Mass (ton)
Carbon Dioxide	0.0	5.4	0.002	0.003
Nitrogen	0.0	7.7	0.004	0.004
Methane	0.0	1,826.7	0.83	0.91
Ethane	0.0	206.1	0.09	0.10
Propane	0.0	277.4	0.13	0.14
i-Butane	0.0	111.0	0.05	0.06
n-Butane	0.0	211.4	0.10	0.11
i-Pentane	0.0	96.3	0.04	0.05
n-Pentane	0.0	96.2	0.04	0.05
n-Hexane	0.0	91.2	0.04	0.05
Hexane+[8]	0.0	159.2	0.07	0.08
Benzene	0.0	4.9	0.002	0.002
C3 Plus VOC	**0.0**	**1,047.6**	**0.5**	**0.5**

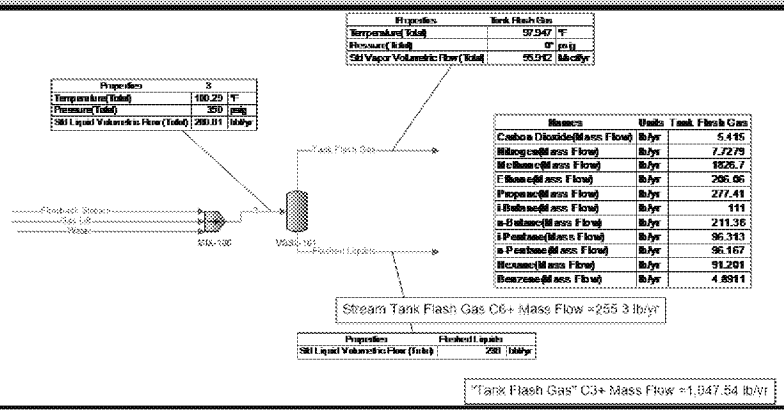
ProMax® (the successor to PROSIM®) was used to estimate emissions from the open top tanks during a well flowback. In the model, wellhead fluid is routed directly to a flowback tank. Thus, emissions from the flowback are only those that occur when the oil flashes due to the change in pressure from the wellhead to the tank.

Notes:
(1) All inputs to the model are denoted by a * symbol in the ProMax® generated report.
(2) The composition of the sample is entered in ProMax® as the "wellhead feed" stream composition.
(3) Tubing pressure and temperature are estimates provided by Conoco Phillips.
(4) The atmospheric pressure is assumed to be equal to sea level pressure.
(5) The amount of Liquid produced during the flowback is entered in ProMax® as "Flashed Liquids". bbl/year is equivalent to bbl/flowback for purposes of this model.
(6) A detailed ProMax® generated report is attached.
(7) Mass emission rates equal "Tank Flash Gas" emission rates in the ProMax® generated report.
(8) Hexane+ does not include n-Hexane or Benzene.

ED_004016I_00012170-00036

Flowsheet1
Plant Schematic

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	



Names	Units	Tank Flash Gas
Carbon Dioxide(Mass Flow)	lb/yr	5.415
Nitrogen(Mass Flow)	lb/yr	7.7279
Methane(Mass Flow)	lb/yr	1826.7
Ethane(Mass Flow)	lb/yr	266.06
Propane(Mass Flow)	lb/yr	277.41
i-Butane(Mass Flow)	lb/yr	111
n-Butane(Mass Flow)	lb/yr	211.36
i-Pentane(Mass Flow)	lb/yr	96.313
n-Pentane(Mass Flow)	lb/yr	96.167
Hexane(Mass Flow)	lb/yr	91.201
Benzene(Mass Flow)	lb/yr	4.8911

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? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Connections

	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
From Block	VSSL-101	--	--	VSSL-101	--
To Block	--	MIX-100	MIX-100	--	MIX-100

Stream Composition

Mole Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	3.32877E-05	0.04 *	0.090018 *	0.0835101	0 *
Nitrogen	2.25935E-06	0.08 *	0.20004 *	0.187231	0 *
Methane	0.00199952	31.77 *	82.6865 *	77.281	0 *
Ethane	0.000249157	1.91 *	4.981 *	4.65121	0 *
Propane	0.000448191	2.04 *	4.56091 *	4.26981	0 *
i-Butane	0.000286389	0.76 *	1.38028 *	1.2962	0 *
n-Butane	0.000775197	1.68 *	2.62052 *	2.46815	0 *
i-Pentane	0.000691585	1 *	0.95019 *	0.906027	0 *
n-Pentane	0.000893069	1.23 *	0.940188 *	0.904652	0 *
Hexane	0.00230319	2.18 *	0.720144 *	0.718292	0 *
Methylcyclopentane	0.00065585	0.84 *	0.180036 *	0.194959	0 *
Benzene	0.000238749	0.22 *	0.040008 *	0.0424983	0 *
Cyclohexane	0.000664588	0.96 *	0.120024 *	0.147206	0 *
Heptane	0.00258277	2.23 *	0.230046 *	0.265736	0 *
Methylcyclohexane	0.00157927	1.6 *	0.120024 *	0.157952	0 *
Toluene	0.000833677	0.85 *	0.040008 *	0.0624065	0 *
Octane	0.00418904	2.93 *	0.10002 *	0.140383	0 *
Ethylbenzene	0.000386758	0.37 *	0 *	0.0105512	0 *
m-Xylene	0.00114582	0.9 *	0.010002 *	0.0285248	0 *
o-Xylene	0.00037087	0.32 *	0 *	0.00801421	0 *
Nonane	0.00399226	2.3 *	0.030006 *	0.0444506	0 *
Decane	0.00561629	3.19 *	0 *	0.0212714	0 *
Undecane	0.00499763	2.63 *	0 *	0.00631912	0 *
C12	0.00507087	2.6 *	0 *	0.00226867	0 *
C13	0.00496135	2.52 *	0 *	0.000778562	0 *
C14	0.00470098	2.38 *	0 *	0.000269007	0 *
C15	0.00452864	2.29 *	0 *	9.31137E-05	0 *
C16	0.00403592	2.04 *	0 *	3.18449E-05	0 *
C17	0.00368037	1.86 *	0 *	1.19778E-05	0 *
C18	0.00306717	1.55 *	0 *	4.11472E-06	0 *
C19	0.00308704	1.56 *	0 *	1.5575E-06	0 *
C20	0.00273087	1.38 *	0 *	3.82115E-07	0 *
C21	0.00249341	1.26 *	0 *	1.58056E-07	0 *
C22	0.00223616	1.13 *	0 *	6.24025E-08	0 *
C23	0.00201848	1.02 *	0 *	1.68427E-08	0 *
C24	0.00195911	0.99 *	0 *	5.83873E-09	0 *
C25	0.00160291	0.81 *	0 *	1.90589E-09	0 *
C26	0.00164249	0.83 *	0 *	6.54971E-10	0 *
C27	0.00134565	0.68 *	0 *	1.44397E-10	0 *
C28	0.0014446	0.73 *	0 *	7.91484E-11	0 *
C29	0.00168207	0.85 *	0 *	4.2514E-11	0 *
Water	99.89	0 *	0 *	6.10021	100 *
c30+	0.0227375	11.49 *	0 *	1.60996E-06	0 *

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
Carbon Dioxide	1.71012E-07	4.06657E-07 *	1.38103E-05 *	1.40459E-05	0 *
Nitrogen	1.16072E-08	8.13313E-07 *	3.06895E-05 *	3.14912E-05	0 *
Methane	1.02723E-05	0.000322987 *	0.0126855 *	0.0129982	0 *
Ethane	1.28002E-06	1.94179E-05 *	0.000764168 *	0.000782306	0 *
Propane	2.30254E-06	2.07395E-05 *	0.00069972 *	0.000718157	0 *

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
i-Butane	1.47129E-06	7.72648E-06 *	0.000211757 *	0.000218013	0 *
n-Butane	3.98249E-06	1.70796E-05 *	0.000402032 *	0.000415129	0 *
i-Pentane	3.55295E-06	1.01664E-05 *	0.000145775 *	0.000152388	0 *
n-Pentane	4.58805E-06	1.25047E-05 *	0.000144241 *	0.000152157	0 *
Hexane	1.18324E-05	2.21628E-05 *	0.000110482 *	0.000120813	0 *
Methylcyclopentane	3.36936E-06	8.53979E-06 *	2.76205E-05 *	3.2791E-05	0 *
Benzene	1.22655E-06	2.23661E-06 *	6.1379E-06 *	7.14796E-06	0 *
Cyclohexane	3.41425E-06	9.75976E-06 *	1.84137E-05 *	2.47592E-05	0 *
Heptane	1.32687E-05	2.26711E-05 *	3.52929E-05 *	4.46953E-05	0 *
Methylcyclohexane	8.11334E-06	1.62663E-05 *	1.84137E-05 *	2.65666E-05	0 *
Toluene	4.28293E-06	8.64145E-06 *	6.1379E-06 *	1.04964E-05	0 *
Octane	2.15208E-05	2.97876E-05 *	1.53447E-05 *	2.36116E-05	0 *
Ethylbenzene	1.98693E-06	3.76157E-06 *	0 *	1.77464E-06	0 *
m-Xylene	5.88654E-06	9.14977E-06 *	1.53447E-06 *	4.79771E-06	0 *
o-Xylene	1.90531E-06	3.25325E-06 *	0 *	1.34794E-06	0 *
Nonane	2.05098E-05	2.33828E-05 *	4.60342E-06 *	7.47633E-06	0 *
Decane	2.88531E-05	3.24309E-05 *	0 *	3.57772E-06	0 *
Undecane	2.56748E-05	2.67377E-05 *	0 *	1.06284E-06	0 *
C12	2.60511E-05	2.64327E-05 *	0 *	3.81578E-07	0 *
C13	2.54884E-05	2.56194E-05 *	0 *	1.3095E-07	0 *
C14	2.41508E-05	2.41961E-05 *	0 *	4.52455E-08	0 *
C15	2.32654E-05	2.32811E-05 *	0 *	1.56612E-08	0 *
C16	2.07341E-05	2.07395E-05 *	0 *	5.35612E-09	0 *
C17	1.89075E-05	1.89095E-05 *	0 *	2.0146E-09	0 *
C18	1.57573E-05	1.57579E-05 *	0 *	6.92071E-10	0 *
C19	1.58593E-05	1.58596E-05 *	0 *	2.61963E-10	0 *
C20	1.40296E-05	1.40297E-05 *	0 *	6.42695E-11	0 *
C21	1.28097E-05	1.28097E-05 *	0 *	2.65841E-11	0 *
C22	1.1488E-05	1.1488E-05 *	0 *	1.04957E-11	0 *
C23	1.03697E-05	1.03697E-05 *	0 *	2.83284E-12	0 *
C24	1.00647E-05	1.00648E-05 *	0 *	9.8204E-13	0 *
C25	8.2348E-06	8.2348E-06 *	0 *	3.2056E-13	0 *
C26	8.43812E-06	8.43812E-06 *	0 *	1.10162E-13	0 *
C27	6.91316E-06	6.91316E-06 *	0 *	2.42868E-14	0 *
C28	7.42148E-06	7.42148E-06 *	0 *	1.33123E-14	0 *
C29	8.64145E-06	8.64145E-06 *	0 *	7.15061E-15	0 *
Water	0.513175	0 *	0 *	0.00102602	0.514201 *
c30+	0.000116812	0.000116812 *	0 *	2.70785E-10	0 *

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	7.99611E-05	0.00979463 *	0.179979 *	0.166343	0 *
Nitrogen	3.45461E-06	0.0124692 *	0.254583 *	0.237391	0 *
Methane	0.00175083	2.83576 *	60.2632 *	56.113	0 *
Ethane	0.000408923	0.319547 *	6.80428 *	6.33002	0 *
Propane	0.00107872	0.500504 *	9.13679 *	8.52165	0 *
i-Butane	0.000908546	0.245775 *	3.64464 *	3.40983	0 *
n-Butane	0.00245925	0.543292 *	6.91953 *	6.49283	0 *
i-Pentane	0.00272347	0.401431 *	3.11448 *	2.95863	0 *
n-Pentane	0.00351692	0.49376 *	3.0817 *	2.95414	0 *
Hexane	0.0108333	1.04525 *	2.81935 *	2.80159	0 *
Methylcyclopentane	0.0030127	0.393336 *	0.68835 *	0.742619	0 *
Benzene	0.0010179	0.0956139 *	0.141975 *	0.150248	0 *
Cyclohexane	0.00305284	0.449527 *	0.4589 *	0.560723	0 *
Heptane	0.0141257	1.24326 *	1.04722 *	1.20517	0 *
Methylcyclohexane	0.00846359	0.874081 *	0.535383 *	0.701932	0 *
Toluene	0.00419264	0.435754 *	0.167469 *	0.26025	0 *
Octane	0.0261179	1.86219 *	0.519049 *	0.725786	0 *
Ethylbenzene	0.00224114	0.218557 *	0 *	0.0506992	0 *

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? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
m-Xylene	0.00663967	0.531625 *	0.0482408 *	0.137064	0 *
o-Xylene	0.00214908	0.189022 *	0 *	0.038509	0 *
Nonane	0.0279475	1.64129 *	0.174835 *	0.258031	0 *
Decane	0.0436162	2.52535 *	0 *	0.136982	0 *
Undecane	0.0426378	2.28728 *	0 *	0.0447052	0 *
C12	0.0471449	2.4641 *	0 *	0.0174902	0 *
C13	0.049925	2.58495 *	0 *	0.00649656	0 *
C14	0.0509041	2.62708 *	0 *	0.00241546	0 *
C15	0.052505	2.70646 *	0 *	0.000895196	0 *
C16	0.0498823	2.5702 *	0 *	0.000326373	0 *
C17	0.0483055	2.48858 *	0 *	0.000130363	0 *
C18	0.0426053	2.19478 *	0 *	4.73956E-05	0 *
C19	0.0452448	2.33069 *	0 *	1.89289E-05	0 *
C20	0.0421155	2.16946 *	0 *	4.88658E-06	0 *
C21	0.0403623	2.07915 *	0 *	2.1216E-06	0 *
C22	0.03791	1.95282 *	0 *	8.77252E-07	0 *
C23	0.035765	1.84233 *	0 *	2.47466E-07	0 *
C24	0.036213	1.8654 *	0 *	8.9494E-08	0 *
C25	0.030856	1.58945 *	0 *	3.04228E-08	0 *
C26	0.0328753	1.69348 *	0 *	1.08708E-08	0 *
C27	0.0279643	1.44049 *	0 *	2.48828E-09	0 *
C28	0.0311264	1.60338 *	0 *	1.41415E-09	0 *
C29	0.0375309	1.93329 *	0 *	7.86591E-10	0 *
Water	98.2227	0 *	0 *	4.974	100 *
c30+	0.829114	42.7094 *	0 *	4.86806E-05	0 *

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
Carbon Dioxide	7.52616E-06	1.78968E-05 *	0.000607783 *	0.000618153	0 *
Nitrogen	3.25157E-07	2.27837E-05 *	0.000859717 *	0.000882175	0 *
Methane	0.000164793	0.00518151 *	0.203507 *	0.208523	0 *
Ethane	3.84889E-05	0.000583876 *	0.0229778 *	0.0235232	0 *
Propane	0.000101532	0.00091452 *	0.0308546 *	0.0316676	0 *
i-Butane	8.55149E-05	0.00044908 *	0.0123078 *	0.0126714	0 *
n-Butane	0.000231471	0.000992703 *	0.023367 *	0.0241282	0 *
i-Pentane	0.000256341	0.000733494 *	0.0105175 *	0.0109946	0 *
n-Pentane	0.000331022	0.000902198 *	0.0104068 *	0.010978	0 *
Hexane	0.00101966	0.00190989 *	0.00952084 *	0.0104111	0 *
Methylcyclopentane	0.000283564	0.000718704 *	0.00232453 *	0.00275967	0 *
Benzene	9.58079E-05	0.000174706 *	0.000479442 *	0.00055834	0 *
Cyclohexane	0.000287342	0.000821376 *	0.00154969 *	0.00208372	0 *
Heptane	0.00132955	0.00227169 *	0.00353642 *	0.00447856	0 *
Methylcyclohexane	0.000796617	0.00159712 *	0.00180797 *	0.00260847	0 *
Toluene	0.000394623	0.00079621 *	0.000565536 *	0.000967123	0 *
Octane	0.00245829	0.00340259 *	0.00175281 *	0.00269711	0 *
Ethylbenzene	0.000210943	0.000399347 *	0 *	0.000188405	0 *
m-Xylene	0.000624944	0.000971386 *	0.000162907 *	0.000509349	0 *
o-Xylene	0.000202277	0.000345382 *	0 *	0.000143104	0 *
Nonane	0.00263049	0.00299896 *	0.000590412 *	0.000958878	0 *
Decane	0.00410527	0.00461432 *	0 *	0.000509044	0 *
Undecane	0.00401319	0.00417932 *	0 *	0.000166131	0 *
C12	0.00443741	0.00450241 *	0 *	6.4996E-05	0 *
C13	0.00469908	0.00472322 *	0 *	2.41421E-05	0 *
C14	0.00479123	0.00480021 *	0 *	8.97616E-06	0 *
C15	0.00494192	0.00494524 *	0 *	3.32666E-06	0 *
C16	0.00469506	0.00469627 *	0 *	1.21285E-06	0 *
C17	0.00454665	0.00454713 *	0 *	4.84447E-07	0 *
C18	0.00401013	0.00401031 *	0 *	1.76128E-07	0 *
C19	0.00425857	0.00425864 *	0 *	7.03424E-08	0 *

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
C20	0.00396402	0.00396404 *	0 *	1.81592E-08	0 *
C21	0.00379901	0.00379902 *	0 *	7.88415E-09	0 *
C22	0.00356819	0.0035682 *	0 *	3.25998E-09	0 *
C23	0.0033663	0.0033663 *	0 *	9.19617E-10	0 *
C24	0.00340847	0.00340847 *	0 *	3.32571E-10	0 *
C25	0.00290425	0.00290425 *	0 *	1.13055E-10	0 *
C26	0.00309432	0.00309432 *	0 *	4.03973E-11	0 *
C27	0.00263207	0.00263207 *	0 *	9.24678E-12	0 *
C28	0.00292971	0.00292971 *	0 *	5.25517E-12	0 *
C29	0.00353251	0.00353251 *	0 *	2.92308E-12	0 *
Water	9.24499	0 *	0 *	0.018484	9.26347 *
c30+	0.0780385	0.0780387 *	0 *	1.80903E-07	0 *

Stream Properties

Property	Units	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
Temperature	°F	97.9471	100 *	100 *	97.9471	100 *
Pressure	psia	14.6959	364.696 *	364.696 *	14.6959 *	364.696 *
Mole Fraction Vapor	%	0	26.514	98.1911	100	0
Mole Fraction Light Liquid	%	0.107773	73.486	1.8089	0	100
Mole Fraction Heavy Liquid	%	99.8922	0	0	0	0
Molecular Weight	lb/lbmol	18.3211	179.729	22.0117	22.0943	18.0153
Mass Density	lb/ft^3	61.8558	24.5436	1.47341	0.0544575	61.971
Molar Flow	lbmol/h	0.51374	0.00101664	0.0153417	0.0168194	0.514201
Mass Flow	lb/h	9.41228	0.18272	0.337696	0.371613	9.26347
Vapor Volumetric Flow	ft^3/h	0.152165	0.0074447	0.229193	6.82391	0.149481
Liquid Volumetric Flow	gpm	0.0189712	0.000928171	0.0285748	0.850773	0.0186366
Std Vapor Volumetric Flow	MMSCFD	0.00467894	9.25918E-06	0.000139726 *	0.000153185	0.00468314
Std Liquid Volumetric Flow	sgpm	0.0188585	0.000442521 *	0.00186423	0.00196665	0.0185184 *
Compressibility		0.000727393	0.444647	0.907121	0.996369	0.0176518
Specific Gravity		0.991772			0.762856	0.993618
API Gravity		10.2447				9.95646
Enthalpy	Btu/h	-62995.5	-142.013	-540.643	-657.516	-62970.3
Mass Enthalpy	Btu/lb	-6692.91	-777.218	-1600.97	-1769.36	-6797.7
Mass Cp	Btu/(lb*°F)	0.97086	0.42234	0.540202	0.483695	0.980256
Ideal Gas CpCv Ratio		1.31918	1.0326	1.2274	1.22919	1.32441
Dynamic Viscosity	cP	0.760376			0.0109548	0.703962
Kinematic Viscosity	cSt	0.767409			12.5582	0.709153
Thermal Conductivity	Btu/(h*ft*°F)	0.353704 ?			0.0179477	0.360083
Surface Tension	lbf/ft	0.00477588 ?				0.00480959
Net Ideal Gas Heating Value	Btu/ft^3	15.4864	8622.07	1201.74	1144.29	0
Net Liquid Heating Value	Btu/lb	-722.458	18077.1	20655.8	19540.1	-1059.76
Gross Ideal Gas Heating Value	Btu/ft^3	66.7466	9200.76	1322.93	1262.17	50.3101
Gross Liquid Heating Value	Btu/lb	339.292	19298.9	22745.1	21564.7	0

Remarks

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Connections

	3				
From Block	MIX-100				
To Block	VSSL-101				

Stream Composition

Mole Fraction	3 %				
Carbon Dioxide	0.00267961				
Nitrogen	0.00593766				
Methane	2.45184				
Ethane	0.147691				
Propane	0.135792				
i-Butane	0.0413684				
n-Butane	0.0789943				
i-Pentane	0.0293919				
n-Pentane	0.0295434				
Hexane	0.025001				
Methylcyclopentane	0.00681551				
Benzene	0.00157843				
Cyclohexane	0.00531014				
Heptane	0.0109251				
Methylcyclohexane	0.00653649				
Toluene	0.00278562				
Octane	0.00850656				
Ethylbenzene	0.000708983				
m-Xylene	0.00201377				
o-Xylene	0.000613174				
Nonane	0.00527484				
Decane	0.00611258				
Undecane	0.00503953				
C12	0.00498204				
C13	0.00482875				
C14	0.00456048				
C15	0.00438803				
C16	0.00390899				
C17	0.00356408				
C18	0.00297006				
C19	0.00298922				
C20	0.00264431				
C21	0.00241437				
C22	0.00216527				
C23	0.00195449				
C24	0.00189701				
C25	0.0015521				
C26	0.00159042				
C27	0.001303				
C28	0.0013988				
C29	0.00162874				
Water	96.9168				
c30+	0.0220168				

Molar Flow	3 lbmol/h				
Carbon Dioxide	1.42169E-05				
Nitrogen	3.15028E-05				
Methane	0.0130085				
Ethane	0.000783586				
Propane	0.00072046				
i-Butane	0.000219484				
n-Butane	0.000419112				
i-Pentane	0.000155941				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Molar Flow	3 lbmol/h				
n-Pentane	0.000156745				
Hexane	0.000132645				
Methylcyclopentane	3.61603E-05				
Benzene	8.37451E-06				
Cyclohexane	2.81734E-05				
Heptane	5.7964E-05				
Methylcyclohexane	3.468E-05				
Toluene	1.47793E-05				
Octane	4.51323E-05				
Ethylbenzene	3.76157E-06				
m-Xylene	1.06842E-05				
o-Xylene	3.25325E-06				
Nonane	2.79862E-05				
Decane	3.24309E-05				
Undecane	2.67377E-05				
C12	2.64327E-05				
C13	2.56194E-05				
C14	2.41961E-05				
C15	2.32811E-05				
C16	2.07395E-05				
C17	1.89095E-05				
C18	1.57579E-05				
C19	1.58596E-05				
C20	1.40297E-05				
C21	1.28097E-05				
C22	1.1488E-05				
C23	1.03697E-05				
C24	1.00648E-05				
C25	8.2348E-06				
C26	8.43812E-06				
C27	6.91316E-06				
C28	7.42148E-06				
C29	8.64145E-06				
Water	0.514201				
c30+	0.000116812				

Mass Fraction	3 %				
Carbon Dioxide	0.006395				
Nitrogen	0.00901993				
Methane	2.13298				
Ethane	0.240821				
Propane	0.324708				
i-Butane	0.130387				
n-Butane	0.248978				
i-Pentane	0.114995				
n-Pentane	0.115588				
Hexane	0.116832				
Methylcyclopentane	0.0311045				
Benzene	0.00668597				
Cyclohexane	0.0242344				
Heptane	0.059364				
Methylcyclohexane	0.034803				
Toluene	0.0139182				
Octane	0.0526927				
Ethylbenzene	0.00408168				
m-Xylene	0.0115935				
o-Xylene	0.0035301				
Nonane	0.0366865				
Decane	0.0471624				
Undecane	0.0427163				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	3 %				
C12	0.0460186				
C13	0.0482755				
C14	0.0490624				
C15	0.0505448				
C16	0.0480001				
C17	0.0464757				
C18	0.0409889				
C19	0.043527				
C20	0.040516				
C21	0.0388293				
C22	0.0364701				
C23	0.0344066				
C24	0.0348375				
C25	0.029684				
C26	0.0316267				
C27	0.0269021				
C28	0.0299442				
C29	0.0361054				
Water	94.6809				
c30+	0.797624				

Mass Flow	3 lb/h				
Carbon Dioxide	0.00062568				
Nitrogen	0.0008825				
Methane	0.208688				
Ethane	0.0235617				
Propane	0.0317691				
i-Butane	0.0127569				
n-Butane	0.0243597				
i-Pentane	0.011251				
n-Pentane	0.011309				
Hexane	0.0114307				
Methylcyclopentane	0.00304323				
Benzene	0.000654148				
Cyclohexane	0.00237106				
Heptane	0.00580811				
Methylcyclohexane	0.00340509				
Toluene	0.00136175				
Octane	0.0051554				
Ethylbenzene	0.000399347				
m-Xylene	0.00113429				
o-Xylene	0.000345382				
Nonane	0.00358937				
Decane	0.00461432				
Undecane	0.00417932				
C12	0.00450241				
C13	0.00472322				
C14	0.00480021				
C15	0.00494524				
C16	0.00469627				
C17	0.00454713				
C18	0.00401031				
C19	0.00425864				
C20	0.00396404				
C21	0.00379902				
C22	0.0035682				
C23	0.0033663				
C24	0.00340847				
C25	0.00290425				
C26	0.00309432				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-6-2018	
Flowsheet:	Flowsheet1	

Mass Flow	3 lb/h				
C27	0.00263207				
C28	0.00292971				
C29	0.00353251				
Water	9.26347				
c30+	0.0780387				

Stream Properties

Property	Units	3				
Temperature	°F	100.295				
Pressure	psia	364.696				
Mole Fraction Vapor	%	2.786				
Mole Fraction Light Liquid	%	0.258413				
Mole Fraction Heavy Liquid	%	96.9556				
Molecular Weight	lb/lbmol	18.4407				
Mass Density	lb/ft^3	25.7282				
Molar Flow	lbmol/h	0.530559				
Mass Flow	lb/h	9.78389				
Vapor Volumetric Flow	ft^3/h	0.380279				
Liquid Volumetric Flow	gpm	0.0474114				
Std Vapor Volumetric Flow	MMSCFD	0.00483213				
Std Liquid Volumetric Flow	sgpm	0.0208251				
Compressibility		0.0434986				
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	-63653				
Mass Enthalpy	Btu/lb	-6505.9				
Mass Cp	Btu/(lb*°F)	0.95538				
Ideal Gas CpCv Ratio		1.3151				
Dynamic Viscosity	cP					
Kinematic Viscosity	cSt					
Thermal Conductivity	Btu/(h*ft*°F)					
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	51.271				
Net Liquid Heating Value	Btu/lb	47.1566				
Gross Ideal Gas Heating Value	Btu/ft^3	104.643				
Gross Liquid Heating Value	Btu/lb	1145.48				

Remarks

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1J-166_Well Maintenance Flowback Emissions Summary

Well	1J-166
Date	7/11/2018
Reservoir	West Sak A, B and D Sand
Flow Duration	Flow Duration is Unknown

ProMax Inputs [1]

Wellhead Stream Composition [2]	Wellhead fluid composition taken from 1H-105 Well West Sak A2 Sand Sampled 12/14/2006 analyzed by Schlumberger
Tubing Pressure[3]	350.0 psig
Tubing Temperature[3]	100.0 °F
Atmospheric Pressure[4]	14.7 psia
Liquid to Tanks[5]	405.0 bbl/flowback

ProMax Output Summary[6]

Phase	Volumetric Flow (MSCFD)	Cumulative Gas Volume (MSCF)	Total Fluid Volume (STB)
Vapor	0	186.5	405.0

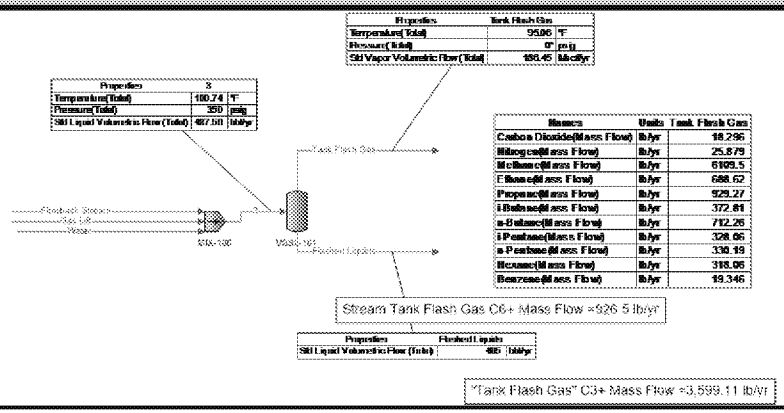
Compostion	Mass Flow (lb/hr)	Total Mass[7] (lb)	Mass (tonne)	Mass (ton)
Carbon Dioxide	0.0	18.3	0.008	0.009
Nitrogen	0.0	25.9	0.012	0.013
Methane	0.0	6,109.5	2.8	3.1
Ethane	0.0	688.6	0.31	0.34
Propane	0.0	929.3	0.42	0.46
i-Butane	0.0	372.8	0.17	0.19
n-Butane	0.0	712.3	0.32	0.36
i-Pentane	0.0	328.1	0.15	0.16
n-Pentane	0.0	330.2	0.15	0.17
n-Hexane	0.0	318.1	0.14	0.16
Hexane+[8]	0.0	589.1	0.27	0.29
Benzene	0.0	19.3	0.009	0.010
C3 Plus VOC	**0.0**	**3,599.1**	**1.6**	**1.8**

ProMax® (the successor to PROSIM®) was used to estimate emissions from the open top tanks during a well flowback. In the model, wellhead fluid is routed directly to a flowback tank. Thus, emissions from the flowback are only those that occur when the oil flashes due to the change in pressure from the wellhead to the tank.

Notes:
(1) All inputs to the model are denoted by a * symbol in the ProMax® generated report.
(2) The composition of the sample is entered in ProMax® as the "wellhead feed" stream composition.
(3) Tubing pressure and temperature are estimates provided by Conoco Phillips.
(4) The atmospheric pressure is assumed to be equal to sea level pressure.
(5) The amount of Liquid produced during the flowback is entered in ProMax® as "Flashed Liquids". bbl/year is equivalent to bbl/flowback for purposes of this model.
(6) A detailed ProMax® generated report is attached.
(7) Mass emission rates equal "Tank Flash Gas" emission rates in the ProMax® generated report.
(8) Hexane+ does not include n-Hexane or Benzene.

Flowsheet1
Plant Schematic

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-11-2018	
Flowsheet:	Flowsheet1	



Names	Units	Tank Flash Gas
Carbon Dioxide(Mass Flow)	lb/yr	18.296
Nitrogen(Mass Flow)	lb/yr	25.879
Methane(Mass Flow)	lb/yr	6109.5
Ethane(Mass Flow)	lb/yr	688.62
Propane(Mass Flow)	lb/yr	929.27
i-Butane(Mass Flow)	lb/yr	372.81
n-Butane(Mass Flow)	lb/yr	712.26
i-Pentane(Mass Flow)	lb/yr	328.06
n-Pentane(Mass Flow)	lb/yr	330.19
Hexane(Mass Flow)	lb/yr	318.06
Benzene(Mass Flow)	lb/yr	19.346

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-11-2018	
Flowsheet:	Flowsheet1	

Connections

	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
From Block	VSSL-101	--	--	VSSL-101	--
To Block	--	MIX-100	MIX-100	--	MIX-100

Stream Composition

Mole Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	3.9166E-05	0.04 *	0.090018 *	0.0846141	0 *
Nitrogen	3.57107E-06	0.08 *	0.20004 *	0.188027	0 *
Methane	0.00348382	31.77 *	82.6865 *	77.5121	0 *
Ethane	0.000726742	1.91 *	4.981 *	4.66119	0 *
Propane	0.00196437	2.04 *	4.56091 *	4.28925	0 *
i-Butane	0.00142964	0.76 *	1.38028 *	1.30552	0 *
n-Butane	0.00388369	1.68 *	2.62052 *	2.49422	0 *
i-Pentane	0.00365478	1 *	0.95019 *	0.925454	0 *
n-Pentane	0.0048088	1.23 *	0.940188 *	0.93146	0 *
Hexane	0.012775	2.18 *	0.720144 *	0.751203	0 *
Methylcyclopentane	0.00386692	0.84 *	0.180036 *	0.218684	0 *
Benzene	0.0010498	0.22 *	0.040008 *	0.0504092	0 *
Cyclohexane	0.00420071	0.96 *	0.120024 *	0.17726	0 *
Heptane	0.0150979	2.23 *	0.230046 *	0.290347	0 *
Methylcyclohexane	0.00979378	1.6 *	0.120024 *	0.183694	0 *
Toluene	0.00506944	0.85 *	0.040008 *	0.0785217	0 *
Octane	0.0236547	2.93 *	0.10002 *	0.146564	0 *
Ethylbenzene	0.00257389	0.37 *	0 *	0.0133866	0 *
m-Xylene	0.0068812	0.9 *	0.010002 *	0.0323212	0 *
o-Xylene	0.00235168	0.32 *	0 *	0.00973666	0 *
Nonane	0.0206214	2.3 *	0.030006 *	0.0420356	0 *
Decane	0.0287192	3.19 *	0 *	0.0197403	0 *
Undecane	0.0244096	2.63 *	0 *	0.00554594	0 *
C12	0.0243727	2.6 *	0 *	0.00194339	0 *
C13	0.0237064	2.52 *	0 *	0.000657296	0 *
C14	0.0224164	2.38 *	0 *	0.000224817	0 *
C15	0.0215782	2.29 *	0 *	7.72749E-05	0 *
C16	0.0192254	2.04 *	0 *	2.62277E-05	0 *
C17	0.01753	1.86 *	0 *	9.80582E-06	0 *
C18	0.0146087	1.55 *	0 *	3.341E-06	0 *
C19	0.0147031	1.56 *	0 *	1.25431E-06	0 *
C20	0.0130066	1.38 *	0 *	3.03701E-07	0 *
C21	0.0118756	1.26 *	0 *	1.24985E-07	0 *
C22	0.0106504	1.13 *	0 *	4.90462E-08	0 *
C23	0.0096136	1.02 *	0 *	1.30954E-08	0 *
C24	0.00933085	0.99 *	0 *	4.4991E-09	0 *
C25	0.00763433	0.81 *	0 *	1.45753E-09	0 *
C26	0.00782284	0.83 *	0 *	4.96201E-10	0 *
C27	0.00640907	0.68 *	0 *	1.08041E-10	0 *
C28	0.00688032	0.73 *	0 *	5.89531E-11	0 *
C29	0.00801134	0.85 *	0 *	3.14799E-11	0 *
Water	99.4613	0 *	0 *	5.58574	100 *
c30+	0.108294	11.49 *	0 *	1.27099E-06	0 *

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
Carbon Dioxide	3.21944E-07	3.09897E-06 *	4.46803E-05 *	4.74573E-05	0 *
Nitrogen	2.93542E-08	6.19795E-06 *	9.92895E-05 *	0.000105458	0 *
Methane	2.8637E-05	0.00246136 *	0.0410413 *	0.043474	0 *
Ethane	5.97382E-06	0.000147976 *	0.00247231 *	0.00261431	0 *
Propane	1.61471E-05	0.000158048 *	0.0022638 *	0.0024057	0 *

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-11-2018	
Flowsheet:	Flowsheet1	

Molar Flow	Flashed Liquids lbmol/h	Flowback Stream lbmol/h	Gas Lift lbmol/h	Tank Flash Gas lbmol/h	Water lbmol/h
i-Butane	1.17517E-05	5.88805E-05 *	0.000685097 *	0.000732226	0 *
n-Butane	3.19239E-05	0.000130157 *	0.00130069 *	0.00139893	0 *
i-Pentane	3.00423E-05	7.74743E-05 *	0.000471625 *	0.000519057	0 *
n-Pentane	3.95283E-05	9.52934E-05 *	0.000466661 *	0.000522426	0 *
Hexane	0.000105011	0.000168894 *	0.000357442 *	0.000421325	0 *
Methylcyclopentane	3.17861E-05	6.50784E-05 *	8.93605E-05 *	0.000122653	0 *
Benzene	8.62939E-06	1.70444E-05 *	1.98579E-05 *	2.82729E-05	0 *
Cyclohexane	3.45298E-05	7.43754E-05 *	5.95737E-05 *	9.94192E-05	0 *
Heptane	0.000124105	0.000172768 *	0.000114183 *	0.000162846	0 *
Methylcyclohexane	8.05048E-05	0.000123959 *	5.95737E-05 *	0.000103028	0 *
Toluene	4.16708E-05	6.58532E-05 *	1.98579E-05 *	4.40403E-05	0 *
Octane	0.000194442	0.000227 *	4.96447E-05 *	8.2203E-05	0 *
Ethylbenzene	2.11574E-05	2.86655E-05 *	0 *	7.50812E-06	0 *
m-Xylene	5.65635E-05	6.97269E-05 *	4.96447E-06 *	1.81279E-05	0 *
o-Xylene	1.93308E-05	2.47918E-05 *	0 *	5.46097E-06	0 *
Nonane	0.000169508	0.000178191 *	1.48934E-05 *	2.35764E-05	0 *
Decane	0.000236071	0.000247143 *	0 *	1.10717E-05	0 *
Undecane	0.000200647	0.000203757 *	0 *	3.11054E-06	0 *
C12	0.000200343	0.000201433 *	0 *	1.08998E-06	0 *
C13	0.000194867	0.000195235 *	0 *	3.68656E-07	0 *
C14	0.000184263	0.000184389 *	0 *	1.26092E-07	0 *
C15	0.000177373	0.000177416 *	0 *	4.3341E-08	0 *
C16	0.000158033	0.000158048 *	0 *	1.47103E-08	0 *
C17	0.000144097	0.000144102 *	0 *	5.49977E-09	0 *
C18	0.000120083	0.000120085 *	0 *	1.87386E-09	0 *
C19	0.000120859	0.00012086 *	0 *	7.03501E-10	0 *
C20	0.000106914	0.000106915 *	0 *	1.70336E-10	0 *
C21	9.76176E-05	9.76177E-05 *	0 *	7.00999E-11	0 *
C22	8.7546E-05	8.7546E-05 *	0 *	2.75084E-11	0 *
C23	7.90238E-05	7.90238E-05 *	0 *	7.34477E-12	0 *
C24	7.66996E-05	7.66996E-05 *	0 *	2.5234E-12	0 *
C25	6.27542E-05	6.27542E-05 *	0 *	8.1748E-13	0 *
C26	6.43037E-05	6.43037E-05 *	0 *	2.78303E-13	0 *
C27	5.26825E-05	5.26825E-05 *	0 *	6.05969E-14	0 *
C28	5.65563E-05	5.65563E-05 *	0 *	3.30649E-14	0 *
C29	6.58532E-05	6.58532E-05 *	0 *	1.7656E-14	0 *
Water	0.817572	0 *	0 *	0.00313286	0.820704 *
c30+	0.000890179	0.00089018 *	0 *	7.1286E-10	0 *

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
Carbon Dioxide	8.84331E-05	0.00979463 *	0.179979 *	0.167303	0 *
Nitrogen	5.13244E-06	0.0124692 *	0.254583 *	0.236646	0 *
Methane	0.00286739	2.83576 *	60.2632 *	55.8669	0 *
Ethane	0.00112114	0.319547 *	6.80428 *	6.29695	0 *
Propane	0.00444405	0.500504 *	9.13679 *	8.49749	0 *
i-Butane	0.00426314	0.245775 *	3.64464 *	3.40911	0 *
n-Butane	0.011581	0.543292 *	6.91953 *	6.51313	0 *
i-Pentane	0.0135285	0.401431 *	3.11448 *	2.99984	0 *
n-Pentane	0.0178002	0.49376 *	3.0817 *	3.0193	0 *
Hexane	0.0564813	1.04525 *	2.81935 *	2.9084	0 *
Methylcyclopentane	0.0166966	0.393336 *	0.68835 *	0.826864	0 *
Benzene	0.00420712	0.0956139 *	0.141975 *	0.176905	0 *
Cyclohexane	0.0181378	0.449527 *	0.4589 *	0.670234	0 *
Heptane	0.0776161	1.24326 *	1.04722 *	1.30709	0 *
Methylcyclohexane	0.0493355	0.874081 *	0.535383 *	0.810322	0 *
Toluene	0.0239641	0.435754 *	0.167469 *	0.325046	0 *
Octane	0.138628	1.86219 *	0.519049 *	0.752169	0 *
Ethylbenzene	0.0140195	0.218557 *	0 *	0.0638507	0 *

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-11-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	Flashed Liquids %	Flowback Stream %	Gas Lift %	Tank Flash Gas %	Water %
m-Xylene	0.0374805	0.531625 *	0.0482408 *	0.154164	0 *
o-Xylene	0.0128091	0.189022 *	0 *	0.0464413	0 *
Nonane	0.135692	1.64129 *	0.174835 *	0.242218	0 *
Decane	0.209643	2.52535 *	0 *	0.126188	0 *
Undecane	0.19575	2.28728 *	0 *	0.0389467	0 *
C12	0.212993	2.4641 *	0 *	0.0148723	0 *
C13	0.224231	2.58495 *	0 *	0.00544433	0 *
C14	0.228161	2.62708 *	0 *	0.00200382	0 *
C15	0.235158	2.70646 *	0 *	0.000737456	0 *
C16	0.223353	2.5702 *	0 *	0.000266827	0 *
C17	0.216271	2.48858 *	0 *	0.000105939	0 *
C18	0.190743	2.19478 *	0 *	3.82005E-05	0 *
C19	0.202556	2.33069 *	0 *	1.5132E-05	0 *
C20	0.188545	2.16946 *	0 *	3.85523E-06	0 *
C21	0.180696	2.07915 *	0 *	1.66534E-06	0 *
C22	0.169717	1.95282 *	0 *	6.84418E-07	0 *
C23	0.160115	1.84233 *	0 *	1.90992E-07	0 *
C24	0.16212	1.8654 *	0 *	6.84535E-08	0 *
C25	0.138138	1.58945 *	0 *	2.30947E-08	0 *
C26	0.147178	1.69348 *	0 *	8.17506E-09	0 *
C27	0.125192	1.44049 *	0 *	1.8481E-09	0 *
C28	0.139348	1.60338 *	0 *	1.04557E-09	0 *
C29	0.16802	1.93329 *	0 *	5.78153E-10	0 *
Water	91.9295	0 *	0 *	4.52101	100 *
c30+	3.71183	42.7094 *	0 *	3.81487E-05	0 *

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
Carbon Dioxide	1.41686E-05	0.000136384 *	0.00196636 *	0.00208857	0 *
Nitrogen	8.2231E-07	0.000173626 *	0.00278144 *	0.00295424	0 *
Methane	0.000459408	0.0394863 *	0.658404 *	0.69743	0 *
Ethane	0.000179627	0.0044495 *	0.0743399 *	0.0786098	0 *
Propane	0.000712018	0.00696921 *	0.0998237 *	0.106081	0 *
i-Butane	0.000683033	0.00342226 *	0.0398194 *	0.0425586	0 *
n-Butane	0.00185549	0.007565 *	0.0755991 *	0.0813086	0 *
i-Pentane	0.00216751	0.00558968 *	0.0340272 *	0.0374493	0 *
n-Pentane	0.00285192	0.0068753 *	0.033669 *	0.0376924	0 *
Hexane	0.00904934	0.0145545 *	0.0308027 *	0.0363079	0 *
Methylcyclopentane	0.0026751	0.00547697 *	0.00752054 *	0.0103224	0 *
Benzene	0.000674058	0.00133137 *	0.00155114 *	0.00220845	0 *
Cyclohexane	0.00290601	0.00625939 *	0.00501369 *	0.00836707	0 *
Heptane	0.0124355	0.0173117 *	0.0114413 *	0.0163175	0 *
Methylcyclohexane	0.00790445	0.012171 *	0.00584931 *	0.0101159	0 *
Toluene	0.00383948	0.00606761 *	0.00182968 *	0.0040578	0 *
Octane	0.0222108	0.0259299 *	0.00567085 *	0.00938992	0 *
Ethylbenzene	0.00224617	0.00304327 *	0 *	0.000797099	0 *
m-Xylene	0.00600506	0.00740256 *	0.000527053 *	0.00192455	0 *
o-Xylene	0.00205226	0.00263202 *	0 *	0.000579764	0 *
Nonane	0.0217403	0.0228539 *	0.00191016 *	0.00302379	0 *
Decane	0.0335886	0.0351639 *	0 *	0.0015753	0 *
Undecane	0.0313628	0.031849 *	0 *	0.000486203	0 *
C12	0.0341254	0.0343111 *	0 *	0.000185662	0 *
C13	0.0359259	0.0359939 *	0 *	6.79659E-05	0 *
C14	0.0365555	0.0365805 *	0 *	2.50152E-05	0 *
C15	0.0376766	0.0376858 *	0 *	9.20625E-06	0 *
C16	0.0357852	0.0357885 *	0 *	3.33101E-06	0 *
C17	0.0346506	0.0346519 *	0 *	1.32252E-06	0 *
C18	0.0305605	0.030561 *	0 *	4.76887E-07	0 *
C19	0.0324532	0.0324534 *	0 *	1.88905E-07	0 *

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? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-11-2018	
Flowsheet:	Flowsheet1	

Mass Flow	Flashed Liquids lb/h	Flowback Stream lb/h	Gas Lift lb/h	Tank Flash Gas lb/h	Water lb/h
C20	0.0302084	0.0302084 *	0 *	4.8128E-08	0 *
C21	0.0289508	0.0289509 *	0 *	2.07898E-08	0 *
C22	0.0271918	0.0271918 *	0 *	8.54413E-09	0 *
C23	0.0256533	0.0256533 *	0 *	2.38431E-09	0 *
C24	0.0259746	0.0259746 *	0 *	8.54559E-10	0 *
C25	0.0221322	0.0221322 *	0 *	2.88309E-10	0 *
C26	0.0235806	0.0235806 *	0 *	1.02056E-10	0 *
C27	0.020058	0.020058 *	0 *	2.30713E-11	0 *
C28	0.0223262	0.0223262 *	0 *	1.30527E-11	0 *
C29	0.0269199	0.0269199 *	0 *	7.21755E-12	0 *
Water	14.7288	0 *	0 *	0.0564394	14.7852 *
c30+	0.594702	0.594703 *	0 *	4.7624E-07	0 *

Stream Properties

Property	Units	Flashed Liquids	Flowback Stream	Gas Lift	Tank Flash Gas	Water
Temperature	°F	95.06	100 *	100 *	95.06	100 *
Pressure	psia	14.6959	364.696 *	364.696 *	14.6959 *	364.696 *
Mole Fraction Vapor	%	0	26.514	98.1911	100	0
Mole Fraction Light Liquid	%	0.536659	73.486	1.8089	0	100
Mole Fraction Heavy Liquid	%	99.4633	0	0	0	0
Molecular Weight	lb/lbmol	19.4913	179.729	22.0117	22.258	18.0153
Mass Density	lb/ft^3	61.4603	24.5436	1.47341	0.0551524	61.971
Molar Flow	lbmol/h	0.822	0.00774743	0.0496348	0.0560868	0.820704
Mass Flow	lb/h	16.0218	1.39244	1.09255	1.24838	14.7852
Vapor Volumetric Flow	ft^3/h	0.260686	0.0567332	0.741508	22.6351	0.238583
Liquid Volumetric Flow	gpm	0.0325011	0.00707323	0.0924478	2.82204	0.0297454
Std Vapor Volumetric Flow	MMSCFD	0.00748646	7.05606E-05	0.000452055 *	0.000510817	0.00747466
Std Liquid Volumetric Flow	sgpm	0.032363	0.00337228 *	0.00603134	0.00659732	0.0295567 *
Compressibility		0.000782886	0.444647	0.907121	0.996264	0.0176518
Specific Gravity		0.98543			0.768509	0.993618
API Gravity		11.1405				9.95646
Enthalpy	Btu/h	-101160	-1082.23	-1749.14	-2176.48	-100506
Mass Enthalpy	Btu/lb	-6313.91	-777.218	-1600.97	-1743.45	-6797.7
Mass Cp	Btu/(lb*°F)	0.934919	0.42234	0.540202	0.481568	0.980256
Ideal Gas CpCv Ratio		1.30052	1.0326	1.2274	1.22837	1.32441
Dynamic Viscosity	cP	0.927185			0.0108781	0.703962
Kinematic Viscosity	cSt	0.941784			12.3132	0.709153
Thermal Conductivity	Btu/(h*ft*°F)	0.333192 ?			0.0178101	0.360083
Surface Tension	lbf/ft	0.00462333 ?				0.00480959
Net Ideal Gas Heating Value	Btu/ft^3	74.8594	8622.07	1201.74	1157.36	0
Net Liquid Heating Value	Btu/lb	472.74	18077.1	20655.8	19622	-1059.76
Gross Ideal Gas Heating Value	Btu/ft^3	129.765	9200.76	1322.93	1276.03	50.3101
Gross Liquid Heating Value	Btu/lb	1541.73	19298.9	22745.1	21645.2	0

Remarks

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-11-2018	
Flowsheet:	Flowsheet1	

Connections

	3				
From Block	MIX-100				
To Block	VSSL-101				

Stream Composition

Mole Fraction	3 %				
Carbon Dioxide	0.00544129				
Nitrogen	0.0120133				
Methane	4.95426				
Ethane	0.298408				
Propane	0.27581				
i-Butane	0.0847272				
n-Butane	0.162951				
i-Pentane	0.0625336				
n-Pentane	0.0639976				
Hexane	0.0599413				
Methylcyclopentane	0.0175881				
Benzene	0.00420258				
Cyclohexane	0.0152547				
Heptane	0.0326791				
Methylcyclohexane	0.0209014				
Toluene	0.00976112				
Octane	0.0315054				
Ethylbenzene	0.00326454				
m-Xylene	0.00850615				
o-Xylene	0.00282339				
Nonane	0.0219892				
Decane	0.0281456				
Undecane	0.0232047				
C12	0.02294				
C13	0.0222342				
C14	0.0209989				
C15	0.0202049				
C16	0.0179991				
C17	0.0164109				
C18	0.0136758				
C19	0.013764				
C20	0.0121759				
C21	0.0111171				
C22	0.00997009				
C23	0.00899955				
C24	0.00873485				
C25	0.0071467				
C26	0.00732316				
C27	0.0059997				
C28	0.00644085				
C29	0.00749962				
Water	93.4651				
c30+	0.101377				

Molar Flow	3 lbmol/h				
Carbon Dioxide	4.77792E-05				
Nitrogen	0.000105487				
Methane	0.0435027				
Ethane	0.00262028				
Propane	0.00242185				
i-Butane	0.000743978				
n-Butane	0.00143085				
i-Pentane	0.000549099				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-11-2018	
Flowsheet:	Flowsheet1	

Molar Flow	3 lbmol/h				
n-Pentane	0.000561954				
Hexane	0.000526336				
Methylcyclopentane	0.000154439				
Benzene	3.69023E-05				
Cyclohexane	0.000133949				
Heptane	0.000286951				
Methylcyclohexane	0.000183533				
Toluene	8.57111E-05				
Octane	0.000276645				
Ethylbenzene	2.86655E-05				
m-Xylene	7.46914E-05				
o-Xylene	2.47918E-05				
Nonane	0.000193084				
Decane	0.000247143				
Undecane	0.000203757				
C12	0.000201433				
C13	0.000195235				
C14	0.000184389				
C15	0.000177416				
C16	0.000158048				
C17	0.000144102				
C18	0.000120085				
C19	0.00012086				
C20	0.000106915				
C21	9.76177E-05				
C22	8.7546E-05				
C23	7.90238E-05				
C24	7.66996E-05				
C25	6.27542E-05				
C26	6.43037E-05				
C27	5.26825E-05				
C28	5.65563E-05				
C29	6.58532E-05				
Water	0.820704				
c30+	0.00089018				

Mass Fraction	3 %				
Carbon Dioxide	0.0121755				
Nitrogen	0.0171108				
Methane	4.04101				
Ethane	0.456216				
Propane	0.618365				
i-Butane	0.250383				
n-Butane	0.481547				
i-Pentane	0.229394				
n-Pentane	0.234764				
Hexane	0.262633				
Methylcyclopentane	0.0752597				
Benzene	0.0166906				
Cyclohexane	0.0652747				
Heptane	0.166489				
Methylcyclohexane	0.104344				
Toluene	0.0457278				
Octane	0.182978				
Ethylbenzene	0.0176215				
m-Xylene	0.045915				
o-Xylene	0.0152402				
Nonane	0.143392				
Decane	0.20361				
Undecane	0.184416				

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-11-2018	
Flowsheet:	Flowsheet1	

Mass Fraction	3 %				
C12	0.198672				
C13	0.208416				
C14	0.211813				
C15	0.218213				
C16	0.207227				
C17	0.200646				
C18	0.176958				
C19	0.187916				
C20	0.174917				
C21	0.167635				
C22	0.157449				
C23	0.148541				
C24	0.150401				
C25	0.128152				
C26	0.136539				
C27	0.116142				
C28	0.129276				
C29	0.155875				
Water	85.6111				
c30+	3.44352				

Mass Flow	3 lb/h				
Carbon Dioxide	0.00210274				
Nitrogen	0.00295506				
Methane	0.69789				
Ethane	0.0787894				
Propane	0.106793				
i-Butane	0.0432416				
n-Butane	0.0831641				
i-Pentane	0.0396169				
n-Pentane	0.0405443				
Hexane	0.0453572				
Methylcyclopentane	0.0129975				
Benzene	0.0028825				
Cyclohexane	0.0112731				
Heptane	0.028753				
Methylcyclohexane	0.0180203				
Toluene	0.00789728				
Octane	0.0316007				
Ethylbenzene	0.00304327				
m-Xylene	0.00792961				
o-Xylene	0.00263202				
Nonane	0.0247641				
Decane	0.0351639				
Undecane	0.031849				
C12	0.0343111				
C13	0.0359939				
C14	0.0365805				
C15	0.0376858				
C16	0.0357885				
C17	0.0346519				
C18	0.030561				
C19	0.0324534				
C20	0.0302084				
C21	0.0289509				
C22	0.0271918				
C23	0.0256533				
C24	0.0259746				
C25	0.0221322				
C26	0.0235806				

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-166 Flowback Report 7-11-2018	
Flowsheet:	Flowsheet1	

Mass Flow	3 lb/h				
C27	0.020058				
C28	0.0223262				
C29	0.0269199				
Water	14.7852				
c30+	0.594703				

Stream Properties

Property	Units	3				
Temperature	°F	100.743				
Pressure	psia	364.696				
Mole Fraction Vapor	%	5.56244				
Mole Fraction Light Liquid	%	0.943683				
Mole Fraction Heavy Liquid	%	93.4939				
Molecular Weight	lb/lbmol	19.668				
Mass Density	lb/ft^3	16.9435				
Molar Flow	lbmol/h	0.878087				
Mass Flow	lb/h	17.2702				
Vapor Volumetric Flow	ft^3/h	1.01928				
Liquid Volumetric Flow	gpm	0.127079				
Std Vapor Volumetric Flow	MMSCFD	0.00799728				
Std Liquid Volumetric Flow	sgpm	0.0389603				
Compressibility		0.0703908				
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	-103337				
Mass Enthalpy	Btu/lb	-5983.54				
Mass Cp	Btu/(lb*°F)	0.908398				
Ideal Gas CpCv Ratio		1.29402				
Dynamic Viscosity	cP					
Kinematic Viscosity	cSt					
Thermal Conductivity	Btu/(h*ft*°F)					
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	144.003				
Net Liquid Heating Value	Btu/lb	1856.95				
Gross Ideal Gas Heating Value	Btu/ft^3	202.982				
Gross Liquid Heating Value	Btu/lb	2994.91				

Remarks

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Operator's Gas Venting Logsheet
CPF1 ORL 267CP02
DS 1E / 1J
Aug-18

Date/Time Start	Date/Time Finish	Well/Area	Fluid ID	Total Vol Crude (BBL)	Est Gas Vol Vented MCF	Est VOC Tons	Comments/Description
N/A	N/A	1E	N/A	0.0	0.0	0.00	No gas venting from 1E West Sak wells during this month
N/A	N/A	1J	N/A	0.0	0.0	0.00	No gas venting from 1J West Sak wells during this month

Monthly Total VOC's 0.000
Prior 11 months rolling Cumulative Volume = 0.243
Rolling 12 month cumulative Total = 0.243

Rolling 12 month VOC Limit: 34 Tons

Production Engineer: _____

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete.

PREVIOUS VOC'S FROM INITIAL OBM FLOWBACKS HAVE BEEN REMOVED PER ADEC

DSO Responsibility: Notify CPF1 Production Engineer of event description, duration and liquid volumes within 24 hours
Forward to CPF1 Production Engineer at the end of each month for final MCF and VOC calculation

Operator's Gas Venting Logsheet
CPF1 ORL 267CP02
DS 1E / 1J
Sep-18

Date/Time Start	Date/Time Finish	Well/Area	Fluid ID	Total Vol Crude (BBL)	Est Gas Vol Vented MCF	Est VOC Tons	Comments/Description
09/13/2018 23:59	09/14/2018 09:58	1J-166	West Sak A, B and D Sand	180.0	198.6	1.60	Flowback to Tanks for 1J-164 Marcit treatment which is offset of 1J-166
09/28/2018 23:29	09/29/2018 11:31	1J-135	West Sak A, B and D Sand	150.0	303.8	2.70	Flowback to Tanks for 1J-136i Marcit treatment which is offset of 1J-135
N/A	N/A	1E	N/A	0.0	0.0	0.00	No gas venting from 1E West Sak wells during this month

Monthly Total VOC's 4.300
Prior 11 months rolling Cumulative Volume = 0.243
Rolling 12 month cumulative Total = 4.543

Rolling 12 month VOC Limit: 34 Tons

Production Engineer:

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete.

PREVIOUS VOC'S FROM INITIAL OBM FLOWBACKS HAVE BEEN REMOVED PER ADEC

DSO Responsibility: Notify CPF1 Production Engineer of event description, duration and liquid volumes within 24 hours
Forward to CPF1 Production Engineer at the end of each month for final MCF and VOC calculation

1J-166_Well Maintenance Flowback Emissions Summary

Well	1J-166	
Date	9/14/2018	
Reservoir	West Sak A, B and D Sand	
Flow Duration	6.25 hrs	Flow Duration is Unknown

ProMax Inputs [1]

Wellhead Stream Composition [2]	Wellhead fluid composition taken from 1H-105 Well West Sak A2 Sand Sampled 12/14/2006 analyzed by Schlumberger
Tubing Pressure[3]	500.0 psig
Tubing Temperature[3]	49.0 °F
Atmospheric Pressure[4]	14.7 psia
Liquid to Tanks[5]	130.0 bbl/flowback

ProMax Output Summary[6]

Phase	Volumetric Flow (MSCFD)	Cumulative Gas Volume (MSCF)	Total Fluid Volume (STB)
Vapor	718.2336	187.0	130.0

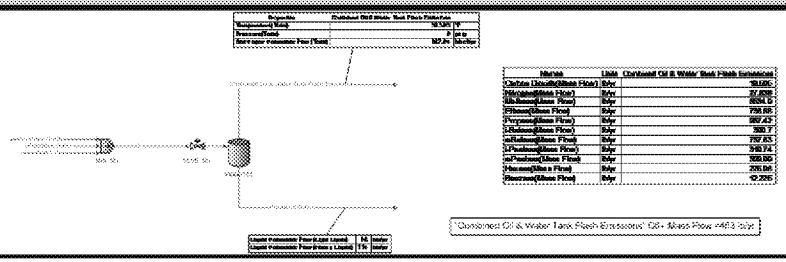
Compostion	Mass Flow (lb/hr)	Total Mass[7] (lb)	Mass (tonne)	Mass (ton)
Carbon Dioxide	3.1	19.5	0.009	0.010
Nitrogen	4.4	27.6	0.013	0.01
Methane	1045.6	6,534.9	3.0	3.3
Ethane	117.9	736.7	0.33	0.37
Propane	158.0	987.4	0.45	0.49
i-Butane	62.5	390.7	0.18	0.20
n-Butane	118.0	737.6	0.33	0.37
i-Pentane	51.2	319.7	0.15	0.16
n-Pentane	49.6	310.0	0.14	0.15
n-Hexane	36.0	225.1	0.10	0.11
Hexane+[8]	36.1	225.7	0.10	0.11
Benzene	2.0	12.2	0.006	0.006
C3 Plus VOC	**513.4**	**3,208.5**	**1.5**	**1.6**

ProMax® (the successor to PROSIM®) was used to estimate emissions from the open top tanks during a well flowback. In the model, wellhead fluid is routed directly to a flowback tank. Thus, emissions from the flowback are only those that occur when the oil flashes due to the change in pressure from the wellhead to the tank.

Notes:
(1) All inputs to the model are denoted by a * symbol in the ProMax® generated report.
(2) The composition of the sample is entered in ProMax® as the "wellhead feed" stream composition.
(3) Tubing pressure and temperature are estimates provided by Conoco Phillips.
(4) The atmospheric pressure is assumed to be equal to sea level pressure.
(5) The amount of Liquid produced during the flowback is entered in ProMax® as "Flashed Liquids". bbl/year is equivalent to bbl/flowback for purposes of this model.
(6) A detailed ProMax® generated report is attached.
(7) Mass emission rates equal "Tank Flash Gas" emission rates in the ProMax® generated report.
(8) Hexane+ does not include n-Hexane or Benzene.

Flowsheet1
Plant Schematic

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	



Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Connections

	Combined Oil & Water Tank Flash Emissions	Flowback Crude	Flowback Water	Gas Lift	Produced Water
From Block	VSSL-103	--	--	--	VSSL-103
To Block	--	MIX-101	MIX-101	MIX-101	--

Stream Composition

Mole Fraction	Combined Oil & Water Tank Flash Emissions %	Flowback Crude %	Flowback Water %	Gas Lift %	Produced Water %
Carbon Dioxide	0.0899195	0.04 *	0 *	0.090018 *	8.6254E-05
Nitrogen	0.200168	0.08 *	0 *	0.20004 *	6.12072E-06
Methane	82.6469	31.77 *	0 *	82.6865 *	0.00688739
Ethane	4.97068	1.91 *	0 *	4.981 *	0.00211169
Propane	4.54321	2.04 *	0 *	4.56091 *	0.00732969
i-Butane	1.36382	0.76 *	0 *	1.38028 *	0.00641238
n-Butane	2.57486	1.68 *	0 *	2.62052 *	0.0182643
i-Pentane	0.899128	1 *	0 *	0.95019 *	0.0190176
n-Pentane	0.871706	1.23 *	0 *	0.940188 *	0.0257249
Hexane	0.529875	2.18 *	0 *	0.720144 *	0.0652351
Methylcyclopentane	0.144577	0.84 *	0 *	0.180036 *	0.0172766
Benzene	0.0317535	0.22 *	0 *	0.040008 *	0.00433176
Cyclohexane	0.09681	0.96 *	0 *	0.120024 *	0.016346
Heptane	0.113308	2.23 *	0 *	0.230046 *	0.0520119
Methylcyclohexane	0.0675663	1.6 *	0 *	0.120024 *	0.0306502
Toluene	0.0250083	0.85 *	0 *	0.040008 *	0.0135666
Octane	0.0289309	2.93 *	0 *	0.10002 *	0.0512065
Ethylbenzene	0.00203582	0.37 *	0 *	0 *	0.00410507
m-Xylene	0.00536385	0.9 *	0 *	0.010002 *	0.0120463
o-Xylene	0.00139859	0.32 *	0 *	0 *	0.00362995
Nonane	0.00500737	2.3 *	0 *	0.030006 *	0.0336539
Decane	0.00160657	3.19 *	0 *	0 *	0.0388981
Undecane	0.000348943	2.63 *	0 *	0 *	0.0322841
C12	0.000100345	2.6 *	0 *	0 *	0.0319696
C13	2.74982E-05	2.52 *	0 *	0 *	0.0310013
C14	7.73286E-06	2.38 *	0 *	0 *	0.029283
C15	2.31535E-06	2.29 *	0 *	0 *	0.0281768
C16	6.57377E-07	2.04 *	0 *	0 *	0.025101
C17	2.11933E-07	1.86 *	0 *	0 *	0.0228863
C18	6.00503E-08	1.55 *	0 *	0 *	0.0190719
C19	1.8625E-08	1.56 *	0 *	0 *	0.019195
C20	3.34671E-09	1.38 *	0 *	0 *	0.0169802
C21	1.22171E-09	1.26 *	0 *	0 *	0.0155037
C22	4.1321E-10	1.13 *	0 *	0 *	0.0139041
C23	8.58987E-11	1.02 *	0 *	0 *	0.0125506
C24	2.39739E-11	0.99 *	0 *	0 *	0.0121814
C25	6.50751E-12	0.81 *	0 *	0 *	0.00996664
C26	1.77351E-12	0.83 *	0 *	0 *	0.0102127
C27	2.91269E-13	0.68 *	0 *	0 *	0.00836705
C28	1.41492E-13	0.73 *	0 *	0 *	0.00898228
C29	6.5469E-14	0.85 *	0 *	0 *	0.0104588
Water	0.785921	0 *	100 *	0 *	99.0717
c30+	1.48719E-08	11.49 *	0 *	0 *	0.141379

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Molar Flow	Combined Oil & Water Tank Flash Emissions lbmol/h	Flowback Crude lbmol/h	Flowback Water lbmol/h	Gas Lift lbmol/h	Produced Water lbmol/h
Carbon Dioxide	5.05933E-05	1.25957E-06 *	0 *	4.95545E-05 *	2.20739E-07
Nitrogen	0.000112625	2.51914E-06 *	0 *	0.000110121 *	1.5664E-08
Methane	0.0465013	0.00100042 *	0 *	0.0455185 *	1.7626E-05
Ethane	0.00279676	6.01446E-05 *	0 *	0.00274201 *	5.40417E-06
Propane	0.00255624	6.42382E-05 *	0 *	0.00251076 *	1.87579E-05
i-Butane	0.000767357	2.39319E-05 *	0 *	0.000759835 *	1.64104E-05
n-Butane	0.00144875	5.2902E-05 *	0 *	0.00144259 *	4.67415E-05
i-Pentane	0.000505895	3.14893E-05 *	0 *	0.000523075 *	4.86692E-05
n-Pentane	0.000490466	3.87319E-05 *	0 *	0.000517569 *	6.58345E-05
Hexane	0.000298135	6.86467E-05 *	0 *	0.000396436 *	0.000166948
Methylcyclopentane	8.13462E-05	2.6451E-05 *	0 *	9.9109E-05 *	4.42138E-05
Benzene	1.78661E-05	6.92765E-06 *	0 *	2.20242E-05 *	1.10857E-05
Cyclohexane	5.44702E-05	3.02297E-05 *	0 *	6.60726E-05 *	4.18322E-05
Heptane	6.3753E-05	7.02212E-05 *	0 *	0.000126639 *	0.000133107
Methylcyclohexane	3.80163E-05	5.03829E-05 *	0 *	6.60726E-05 *	7.84393E-05
Toluene	1.40709E-05	2.67659E-05 *	0 *	2.20242E-05 *	3.47192E-05
Octane	1.6278E-05	9.22637E-05 *	0 *	5.50605E-05 *	0.000131046
Ethylbenzene	1.14546E-06	1.1651E-05 *	0 *	0 *	1.05056E-05
m-Xylene	3.01798E-06	2.83404E-05 *	0 *	5.50605E-06 *	3.08285E-05
o-Xylene	7.86916E-07	1.00766E-05 *	0 *	0 *	9.28966E-06
Nonane	2.8174E-06	7.24254E-05 *	0 *	1.65182E-05 *	8.61262E-05
Decane	9.03938E-07	0.000100451 *	0 *	0 *	9.9547E-05
Undecane	1.96333E-07	8.28169E-05 *	0 *	0 *	8.26205E-05
C12	5.64594E-08	8.18722E-05 *	0 *	0 *	8.18157E-05
C13	1.54719E-08	7.93531E-05 *	0 *	0 *	7.93376E-05
C14	4.3509E-09	7.49446E-05 *	0 *	0 *	7.49402E-05
C15	1.30273E-09	7.21105E-05 *	0 *	0 *	7.21092E-05
C16	3.69874E-10	6.42382E-05 *	0 *	0 *	6.42378E-05
C17	1.19245E-10	5.85701E-05 *	0 *	0 *	5.857E-05
C18	3.37874E-11	4.88084E-05 *	0 *	0 *	4.88084E-05
C19	1.04794E-11	4.91233E-05 *	0 *	0 *	4.91233E-05
C20	1.88303E-12	4.34552E-05 *	0 *	0 *	4.34552E-05
C21	6.87395E-13	3.96765E-05 *	0 *	0 *	3.96765E-05
C22	2.32493E-13	3.55829E-05 *	0 *	0 *	3.55829E-05
C23	4.8331E-14	3.21191E-05 *	0 *	0 *	3.21191E-05
C24	1.3489E-14	3.11744E-05 *	0 *	0 *	3.11744E-05
C25	3.66146E-15	2.55063E-05 *	0 *	0 *	2.55063E-05
C26	9.97867E-16	2.61361E-05 *	0 *	0 *	2.61361E-05
C27	1.63883E-16	2.14127E-05 *	0 *	0 *	2.14127E-05
C28	7.96108E-17	2.29872E-05 *	0 *	0 *	2.29872E-05
C29	3.68362E-17	2.67659E-05 *	0 *	0 *	2.67659E-05
Water	0.000442199	0 *	0.253984 *	0 *	0.253542
c30+	8.36768E-12	0.000361812 *	0 *	0 *	0.000361812

Mass Fraction	Combined Oil & Water Tank Flash Emissions %	Flowback Crude %	Flowback Water %	Gas Lift %	Produced Water %
Carbon Dioxide	0.18406	0.00979463 *	0 *	0.179979 *	0.000188869
Nitrogen	0.260807	0.0124692 *	0 *	0.254583 *	8.53106E-06
Methane	61.6676	2.83576 *	0 *	60.2632 *	0.00549744
Ethane	6.95176	0.319547 *	0 *	6.80428 *	0.00315925
Propane	9.3179	0.500504 *	0 *	9.13679 *	0.0160811
i-Butane	3.68689	0.245775 *	0 *	3.64464 *	0.0185437
n-Butane	6.96074	0.543292 *	0 *	6.91953 *	0.0528177
i-Pentane	3.01724	0.401431 *	0 *	3.11448 *	0.0682682
n-Pentane	2.92522	0.49376 *	0 *	3.0817 *	0.0923459

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Mass Fraction	Combined Oil & Water Tank Flash Emissions %	Flowback Crude %	Flowback Water %	Gas Lift %	Produced Water %
Hexane	2.12381	1.04525 *	0 *	2.81935 *	0.279704
Methylcyclopentane	0.565928	0.393336 *	0 *	0.68835 *	0.0723428
Benzene	0.115364	0.0956139 *	0 *	0.141975 *	0.0168351
Cyclohexane	0.378951	0.449527 *	0 *	0.4589 *	0.068446
Heptane	0.528078	1.24326 *	0 *	1.04722 *	0.259306
Methylcyclohexane	0.30856	0.874081 *	0 *	0.535383 *	0.149733
Toluene	0.107173	0.435754 *	0 *	0.167469 *	0.0621936
Octane	0.153708	1.86219 *	0 *	0.519049 *	0.291028
Ethylbenzene	0.0100527	0.218557 *	0 *	0 *	0.0216839
m-Xylene	0.0264861	0.531625 *	0 *	0.0482408 *	0.0636309
o-Xylene	0.00690606	0.189022 *	0 *	0 *	0.0191742
Nonane	0.0298706	1.64129 *	0 *	0.174835 *	0.214756
Decane	0.0106318	2.52535 *	0 *	0 *	0.275367
Undecane	0.00253686	2.28728 *	0 *	0 *	0.251076
C12	0.000794989	2.4641 *	0 *	0 *	0.270941
C13	0.000235795	2.58495 *	0 *	0 *	0.28437
C14	7.13535E-05	2.62708 *	0 *	0 *	0.289045
C15	2.2875E-05	2.70646 *	0 *	0 *	0.29779
C16	6.92357E-06	2.5702 *	0 *	0 *	0.282801
C17	2.37037E-06	2.48858 *	0 *	0 *	0.273821
C18	7.1081E-07	2.19478 *	0 *	0 *	0.241495
C19	2.32613E-07	2.33069 *	0 *	0 *	0.256449
C20	4.39815E-08	2.16946 *	0 *	0 *	0.238709
C21	1.68523E-08	2.07915 *	0 *	0 *	0.228771
C22	5.96944E-09	1.95282 *	0 *	0 *	0.214872
C23	1.29697E-09	1.84233 *	0 *	0 *	0.202714
C24	3.7762E-10	1.8654 *	0 *	0 *	0.205253
C25	1.06747E-10	1.58945 *	0 *	0 *	0.17489
C26	3.02491E-11	1.69348 *	0 *	0 *	0.186335
C27	5.15794E-12	1.44049 *	0 *	0 *	0.1585
C28	2.59792E-12	1.60338 *	0 *	0 *	0.176423
C29	1.24478E-12	1.93329 *	0 *	0 *	0.212723
Water	0.658536	0 *	100 *	0 *	88.8025
c30+	4.62113E-07	42.7094 *	0 *	0 *	4.69938

Mass Flow	Combined Oil & Water Tank Flash Emissions lb/h	Flowback Crude lb/h	Flowback Water lb/h	Gas Lift lb/h	Produced Water lb/h
Carbon Dioxide	0.00222659	5.54331E-05 *	0 *	0.00218087 *	9.71461E-06
Nitrogen	0.003155	7.05698E-05 *	0 *	0.00308487 *	4.38802E-07
Methane	0.745996	0.0160491 *	0 *	0.730229 *	0.000282765
Ethane	0.0840957	0.00180849 *	0 *	0.0824497 *	0.000162498
Propane	0.112719	0.00283262 *	0 *	0.110714 *	0.000827143
i-Butane	0.0446005	0.00139097 *	0 *	0.0441633 *	0.000953808
n-Butane	0.0842043	0.00307478 *	0 *	0.0838463 *	0.00271672
i-Pentane	0.0364997	0.00227192 *	0 *	0.0377392 *	0.00351142
n-Pentane	0.0353866	0.00279446 *	0 *	0.037342 *	0.00474988
Hexane	0.0256919	0.00591565 *	0 *	0.034163 *	0.0143868
Methylcyclopentane	0.00684606	0.0022261 *	0 *	0.00834096 *	0.00372101
Benzene	0.00139556	0.000541131 *	0 *	0.00172035 *	0.000865926
Cyclohexane	0.00458419	0.00254412 *	0 *	0.00556064 *	0.00352057
Heptane	0.00638818	0.0070363 *	0 *	0.0126895 *	0.0133376
Methylcyclohexane	0.00373267	0.0049469 *	0 *	0.00648741 *	0.00770164
Toluene	0.00129647	0.00246617 *	0 *	0.00202928 *	0.00319897
Octane	0.00185941	0.0105391 *	0 *	0.00628948 *	0.0149692
Ethylbenzene	0.000121607	0.00123693 *	0 *	0 *	0.00111533

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Mass Flow	Combined Oil & Water Tank Flash Emissions lb/h	Flowback Crude lb/h	Flowback Water lb/h	Gas Lift lb/h	Produced Water lb/h
m-Xylene	0.000320404	0.00300876 *	0 *	0.00058455 *	0.0032729
o-Xylene	8.35429E-05	0.00106978 *	0 *	0 *	0.000986237
Nonane	0.000361346	0.00928893 *	0 *	0.00211854 *	0.0110461
Decane	0.000128614	0.0142923 *	0 *	0 *	0.0141637
Undecane	3.06885E-05	0.012945 *	0 *	0 *	0.0129143
C12	9.61701E-06	0.0139457 *	0 *	0 *	0.0139361
C13	2.85242E-06	0.0146296 *	0 *	0 *	0.0146268
C14	8.63166E-07	0.0148681 *	0 *	0 *	0.0148672
C15	2.76719E-07	0.0153173 *	0 *	0 *	0.015317
C16	8.37546E-08	0.0145462 *	0 *	0 *	0.0145461
C17	2.86745E-08	0.0140842 *	0 *	0 *	0.0140842
C18	8.59869E-09	0.0124215 *	0 *	0 *	0.0124215
C19	2.81393E-09	0.0131906 *	0 *	0 *	0.0131906
C20	5.32045E-10	0.0122782 *	0 *	0 *	0.0122782
C21	2.03863E-10	0.011767 *	0 *	0 *	0.011767
C22	7.22125E-11	0.0110521 *	0 *	0 *	0.0110521
C23	1.56896E-11	0.0104267 *	0 *	0 *	0.0104267
C24	4.56809E-12	0.0105573 *	0 *	0 *	0.0105573
C25	1.29132E-12	0.00899559 *	0 *	0 *	0.00899559
C26	3.65925E-13	0.0095843 *	0 *	0 *	0.0095843
C27	6.23958E-14	0.00815254 *	0 *	0 *	0.00815254
C28	3.14272E-14	0.00907443 *	0 *	0 *	0.00907443
C29	1.50582E-14	0.0109415 *	0 *	0 *	0.0109415
Water	0.00796634	0 *	4.57559 *	0 *	4.56762
c30+	5.5902E-09	0.241716 *	0 *	0 *	0.241716

Stream Properties

Property	Units	Combined Oil & Water Tank Flash Emissions	Flowback Crude	Flowback Water	Gas Lift	Produced Water
Temperature	°F	38.5033	49 *	49 *	49 *	38.5033
Pressure	psia	14.6959	514.696 *	514.696 *	514.696 *	14.6959
Mole Fraction Vapor	%	100	19.8496	0	92.8323	0
Mole Fraction Light Liquid	%	0	80.1504	100	7.1677	0.924651
Mole Fraction Heavy Liquid	%	0	0	0	0	99.0753
Molecular Weight	lb/lbmol	21.5001	179.729	18.0153	22.0117	20.0986
Mass Density	lb/ft^3	0.0593894	35.6398	62.479	2.53093	61.7318
Molar Flow	lbmol/h	0.0562651	0.00314893	0.253984	0.0550495	0.255917
Mass Flow	lb/h	1.2097	0.565954	4.57559	1.21173	5.14357
Vapor Volumetric Flow	ft^3/h	20.369	0.0158799	0.0732341	0.47877	0.0833214
Liquid Volumetric Flow	gpm	2.53951	0.00197983	0.00913049	0.0596908	0.0103881
Std Vapor Volumetric Flow	MMSCFD	0.000512441	2.86793E-05	0.00231319	0.00050137 *	0.0023308
Std Liquid Volumetric Flow	sgpm	0.00674351	0.00137044 *	0.00914694 *	0.00668929	0.0104632
Compressibility		0.995142	0.475483	0.0271868	0.82002	0.000894974
Specific Gravity		0.742342		1.00176		0.989783
API Gravity				9.93831		11.9387
Enthalpy	Btu/h	-2008.6 ?	-452.085 ?	-31330.6	-2000.38	-31774.4 ?
Mass Enthalpy	Btu/lb	-1660.41 ?	-798.801 ?	-6847.33	-1650.84	-6177.5 ?
Mass Cp	Btu/(lb*°F)	0.466604 ?	0.400425 ?	0.983613	0.569548	0.919497 ?
Ideal Gas CpCv Ratio		1.24816	1.0352	1.32685	1.24035	1.29628
Dynamic Viscosity	cP	0.00986509		1.32943		1.77398
Kinematic Viscosity	cSt	10.3698		1.32834		1.79399
Thermal Conductivity	Btu/(h*ft*°F)	0.015915 ?		0.336786		0.300362 ?
Surface Tension	lbf/ft			0.00519079		0.00492981 ?
Net Ideal Gas Heating Value	Btu/ft^3	1168.57	8619.4	0	1201.73	107.64
Net Liquid Heating Value	Btu/lb	20560.9	18086.4	-1059.76	20657.3	1078.16

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Combined Oil & Water Tank Flash Emissions	Flowback Crude	Flowback Water	Gas Lift	Produced Water
Gross Ideal Gas Heating Value	Btu/ft^3	1287.57	9198.28	50.31	1322.92	164.599
Gross Liquid Heating Value	Btu/lb	22661.3	19308.5	0	22746.8	2153.61

Warnings

ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Combined Oil & Water Tank Flash Emissions
Warning: The temperature of 38.5033 °F is within 10 °F of ice formation.
ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water
Warning: The temperature of 38.5033 °F is within 10 °F of ice formation.

Remarks

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Connections

	2	4			
From Block	MIX-101	VLVE-101			
To Block	VLVE-101	VSSL-103			

Stream Composition

Mole Fraction	2 %	4 %			
Carbon Dioxide	0.016277	0.016277			
Nitrogen	0.0360815	0.0360815			
Methane	14.9012	14.9012			
Ethane	0.897603	0.897603			
Propane	0.824838	0.824838			
i-Butane	0.251061	0.251061			
n-Butane	0.479043	0.479043			
i-Pentane	0.177641	0.177641			
n-Pentane	0.178197	0.178197			
Hexane	0.148978	0.148978			
Methylcyclopentane	0.0402201	0.0402201			
Benzene	0.00927402	0.00927402			
Cyclohexane	0.0308481	0.0308481			
Heptane	0.0630594	0.0630594			
Methylcyclohexane	0.0373037	0.0373037			
Toluene	0.0156287	0.0156287			
Octane	0.0471917	0.0471917			
Ethylbenzene	0.00373213	0.00373213			
m-Xylene	0.0108419	0.0108419			
o-Xylene	0.00322779	0.00322779			
Nonane	0.0284909	0.0284909			
Decane	0.032177	0.032177			
Undecane	0.0265284	0.0265284			
C12	0.0262258	0.0262258			
C13	0.0254188	0.0254188			
C14	0.0240067	0.0240067			
C15	0.0230988	0.0230988			
C16	0.0205771	0.0205771			
C17	0.0187615	0.0187615			
C18	0.0156346	0.0156346			
C19	0.0157355	0.0157355			
C20	0.0139198	0.0139198			
C21	0.0127094	0.0127094			
C22	0.0113981	0.0113981			
C23	0.0102886	0.0102886			
C24	0.00998596	0.00998596			
C25	0.00817033	0.00817033			
C26	0.00837207	0.00837207			
C27	0.00685905	0.00685905			
C28	0.00736339	0.00736339			
C29	0.00857381	0.00857381			
Water	81.3575	81.3575			
c30+	0.115898	0.115898			

Molar Flow	2 lbmol/h	4 lbmol/h			
Carbon Dioxide	5.08141E-05	5.08141E-05			
Nitrogen	0.00011264	0.00011264			
Methane	0.046519	0.046519			
Ethane	0.00280216	0.00280216			
Propane	0.002575	0.002575			
i-Butane	0.000783767	0.000783767			
n-Butane	0.00149549	0.00149549			
i-Pentane	0.000554564	0.000554564			

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Molar Flow	2 lbmol/h	4 lbmol/h			
n-Pentane	0.000556301	0.000556301			
Hexane	0.000465083	0.000465083			
Methylcyclopentane	0.00012556	0.00012556			
Benzene	2.89519E-05	2.89519E-05			
Cyclohexane	9.63024E-05	9.63024E-05			
Heptane	0.00019686	0.00019686			
Methylcyclohexane	0.000116456	0.000116456			
Toluene	4.87901E-05	4.87901E-05			
Octane	0.000147324	0.000147324			
Ethylbenzene	1.1651E-05	1.1651E-05			
m-Xylene	3.38464E-05	3.38464E-05			
o-Xylene	1.00766E-05	1.00766E-05			
Nonane	8.89436E-05	8.89436E-05			
Decane	0.000100451	0.000100451			
Undecane	8.28169E-05	8.28169E-05			
C12	8.18722E-05	8.18722E-05			
C13	7.93531E-05	7.93531E-05			
C14	7.49446E-05	7.49446E-05			
C15	7.21105E-05	7.21105E-05			
C16	6.42382E-05	6.42382E-05			
C17	5.85701E-05	5.85701E-05			
C18	4.88084E-05	4.88084E-05			
C19	4.91233E-05	4.91233E-05			
C20	4.34552E-05	4.34552E-05			
C21	3.96765E-05	3.96765E-05			
C22	3.55829E-05	3.55829E-05			
C23	3.21191E-05	3.21191E-05			
C24	3.11744E-05	3.11744E-05			
C25	2.55063E-05	2.55063E-05			
C26	2.61361E-05	2.61361E-05			
C27	2.14127E-05	2.14127E-05			
C28	2.29872E-05	2.29872E-05			
C29	2.67659E-05	2.67659E-05			
Water	0.253984	0.253984			
c30+	0.000361812	0.000361812			

Mass Fraction	2 %	4 %			
Carbon Dioxide	0.0351992	0.0351992			
Nitrogen	0.0496663	0.0496663			
Methane	11.7464	11.7464			
Ethane	1.32622	1.32622			
Propane	1.78721	1.78721			
i-Butane	0.71702	0.71702			
n-Butane	1.36813	1.36813			
i-Pentane	0.629772	0.629772			
n-Pentane	0.631744	0.631744			
Hexane	0.630834	0.630834			
Methylcyclopentane	0.166325	0.166325			
Benzene	0.0355955	0.0355955			
Cyclohexane	0.127568	0.127568			
Heptane	0.310482	0.310482			
Methylcyclohexane	0.179975	0.179975			
Toluene	0.0707579	0.0707579			
Octane	0.264881	0.264881			
Ethylbenzene	0.0194692	0.0194692			
m-Xylene	0.0565583	0.0565583			
o-Xylene	0.0168382	0.0168382			
Nonane	0.179552	0.179552			
Decane	0.22496	0.22496			
Undecane	0.203752	0.203752			

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Process Streams Report
All Streams
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Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Mass Fraction	2 %	4 %			
C12	0.219504	0.219504			
C13	0.230269	0.230269			
C14	0.234023	0.234023			
C15	0.241093	0.241093			
C16	0.228955	0.228955			
C17	0.221684	0.221684			
C18	0.195513	0.195513			
C19	0.207619	0.207619			
C20	0.193257	0.193257			
C21	0.185212	0.185212			
C22	0.173959	0.173959			
C23	0.164116	0.164116			
C24	0.166171	0.166171			
C25	0.14159	0.14159			
C26	0.150856	0.150856			
C27	0.12832	0.12832			
C28	0.142831	0.142831			
C29	0.172219	0.172219			
Water	72.0194	72.0194			
c30+	3.80458	3.80458			

Mass Flow	2 lb/h	4 lb/h			
Carbon Dioxide	0.0022363	0.0022363			
Nitrogen	0.00315544	0.00315544			
Methane	0.746279	0.746279			
Ethane	0.0842582	0.0842582			
Propane	0.113546	0.113546			
i-Butane	0.0455543	0.0455543			
n-Butane	0.0869211	0.0869211			
i-Pentane	0.0400111	0.0400111			
n-Pentane	0.0401364	0.0401364			
Hexane	0.0400787	0.0400787			
Methylcyclopentane	0.0105671	0.0105671			
Benzene	0.00226148	0.00226148			
Cyclohexane	0.00810476	0.00810476			
Heptane	0.0197258	0.0197258			
Methylcyclohexane	0.0114343	0.0114343			
Toluene	0.00449545	0.00449545			
Octane	0.0168286	0.0168286			
Ethylbenzene	0.00123693	0.00123693			
m-Xylene	0.00359331	0.00359331			
o-Xylene	0.00106978	0.00106978			
Nonane	0.0114075	0.0114075			
Decane	0.0142923	0.0142923			
Undecane	0.012945	0.012945			
C12	0.0139457	0.0139457			
C13	0.0146296	0.0146296			
C14	0.0148681	0.0148681			
C15	0.0153173	0.0153173			
C16	0.0145462	0.0145462			
C17	0.0140842	0.0140842			
C18	0.0124215	0.0124215			
C19	0.0131906	0.0131906			
C20	0.0122782	0.0122782			
C21	0.011767	0.011767			
C22	0.0110521	0.0110521			
C23	0.0104267	0.0104267			
C24	0.0105573	0.0105573			
C25	0.00899559	0.00899559			
C26	0.0095843	0.0095843			

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Mass Flow	2 lb/h	4 lb/h			
C27	0.00815254	0.00815254			
C28	0.00907443	0.00907443			
C29	0.0109415	0.0109415			
Water	4.57559	4.57559			
c30+	0.241716	0.241716			

Stream Properties

Property	Units	2	4			
Temperature	°F	49.9606	38.5033			
Pressure	psia	514.696	14.6959 *			
Mole Fraction Vapor	%	16.2638	18.0232			
Mole Fraction Light Liquid	%	2.31053	0.758			
Mole Fraction Heavy Liquid	%	81.4257	81.2188			
Molecular Weight	lb/lbmol	20.3512	20.3512			
Mass Density	lb/ft^3	11.2474	0.310638			
Molar Flow	lbmol/h	0.312182	0.312182			
Mass Flow	lb/h	6.35328	6.35328			
Vapor Volumetric Flow	ft^3/h	0.564868	20.4523			
Liquid Volumetric Flow	gpm	0.0704251	2.5499			
Std Vapor Volumetric Flow	MMSCFD	0.00284324	0.00284324			
Std Liquid Volumetric Flow	sgpm	0.0172067	0.0172067			
Compressibility		0.170283	0.18009			
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	-33783	-33783			
Mass Enthalpy	Btu/lb	-5317.42	-5317.42			
Mass Cp	Btu/(lb*°F)	0.852819 ?	0.833263 ?			
Ideal Gas CpCv Ratio		1.28483	1.28628			
Dynamic Viscosity	cP					
Kinematic Viscosity	cSt					
Thermal Conductivity	Btu/(h*ft*°F)					
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	298.853	298.853			
Net Liquid Heating Value	Btu/lb	4787.8	4787.8			
Gross Ideal Gas Heating Value	Btu/ft^3	366.993	366.993			
Gross Liquid Heating Value	Btu/lb	6058.41	6058.41			

Warnings

ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!2
Warning: The temperature of 49.9606 °F is below hydrate formation.
ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!4
Warning: The temperature of 38.5033 °F is within 10 °F of ice formation.

Remarks

* User Specified Values
? Extrapolated or Approximate Values

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Blocks
MIX-101
Mixer/Splitter Report

Client Name:	ConocoPhilips Alaska Inc.	Job:	Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	Modified:	3:03 PM, 9/19/2018
Flowsheet:	Flowsheet1	Status:	Solved 11:23 AM, 9/21/2018

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
Flowback Water	Inlet		Gas Lift	Inlet	
Flowback Crude	Inlet		2	Outlet	VLVE-101

Block Parameters

Pressure Drop	0 psi	Fraction to PStream 2	100 %

Remarks

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Blocks
VLVE-101
JT-Valve Report

Client Name:	ConocoPhilips Alaska Inc.	Job:	Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	Modified:	3:03 PM, 9/19/2018
Flowsheet:	Flowsheet1	Status:	Solved 11:23 AM, 9/21/2018

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
2	Inlet	MIX-101	4	Outlet	VSSL-103

Block Parameters

Pressure Drop	500	psi	Pressure Drop Method	User Set
Joule-Thomson Coefficient	0.0229146	°F/psi		

Remarks

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Blocks
VSSL-103
Separator Report

Client Name:	ConocoPhilips Alaska Inc.	Job:	Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	Modified:	3:05 PM, 9/19/2018
Flowsheet:	Flowsheet1	Status:	Solved 11:23 AM, 9/21/2018

Connections

Stream	Connection Type	Other Block	Stream	Connection Type	Other Block
4	Inlet	VLVE-101	Combined Oil & Water Tank Flash Emissions	Vapor Outlet	
Produced Water	Light Liquid Outlet				

Block Parameters

* Pressure Drop	0	psi	Main Liquid Phase	Light Liquid	
Mole Fraction Vapor	18.0232	%	Heat Duty	0	Btu/h
Mole Fraction Light Liquid	0.758	%	Heat Release Curve Type	Plug Flow	
Mole Fraction Heavy Liquid	81.2188	%	Heat Release Curve Increments	10	

Remarks

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Flowsheet Environment
Environment1

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	
Flowsheet:	Flowsheet1	

Environment Settings

Number of Poynting Intervals	0	Phase Tolerance	1 %
Gibbs Excess Model Evaluation Temperature	77 °F	Emulsion Enabled	False
Freeze Out Temperature Threshold Difference	10 °F		

Components

Component Name	Henry's Law Component	Phase Initiator	Component Name	Henry's Law Component	Phase Initiator
Carbon Dioxide	False	False	Undecane	False	False
Nitrogen	False	False	C12	False	False
Methane	False	False	C13	False	False
Ethane	False	False	C14	False	False
Propane	False	False	C15	False	False
i-Butane	False	False	C16	False	False
n-Butane	False	False	C17	False	False
i-Pentane	False	False	C18	False	False
n-Pentane	False	False	C19	False	False
Hexane	False	False	C20	False	False
Methylcyclopentane	False	False	C21	False	False
Benzene	False	False	C22	False	False
Cyclohexane	False	False	C23	False	False
Heptane	False	False	C24	False	False
Methylcyclohexane	False	False	C25	False	False
Toluene	False	False	C26	False	False
Octane	False	False	C27	False	False
Ethylbenzene	False	False	C28	False	False
m-Xylene	False	False	C29	False	False
o-Xylene	False	False	Water	False	True
Nonane	False	False	c30+	False	False
Decane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

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Environments Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Project-Wide Constants

Atmospheric Pressure	14.6959 psia	Ideal Gas Reference Pressure	14.6959 psia
Ideal Gas Reference Temperature	60 °F	Ideal Gas Reference Volume	379.484 ft^3/lbmol
Liquid Reference Temperature	60 °F		

Environment [Environment1]

Environment Settings

Number of Poynting Intervals	0	Phase Tolerance	1 %
Gibbs Excess Model Evaluation Temperature	77 °F	Emulsion Enabled	False
Freeze Out Temperature Threshold Difference	10 °F		

Components

Component Name	Henry's Law Component	Phase Initiator	Component Name	Henry's Law Component	Phase Initiator
Carbon Dioxide	False	False	Undecane	False	False
Nitrogen	False	False	C12	False	False
Methane	False	False	C13	False	False
Ethane	False	False	C14	False	False
Propane	False	False	C15	False	False
i-Butane	False	False	C16	False	False
n-Butane	False	False	C17	False	False
i-Pentane	False	False	C18	False	False
n-Pentane	False	False	C19	False	False
Hexane	False	False	C20	False	False
Methylcyclopentane	False	False	C21	False	False
Benzene	False	False	C22	False	False
Cyclohexane	False	False	C23	False	False
Heptane	False	False	C24	False	False
Methylcyclohexane	False	False	C25	False	False
Toluene	False	False	C26	False	False
Octane	False	False	C27	False	False
Ethylbenzene	False	False	C28	False	False
m-Xylene	False	False	C29	False	False
o-Xylene	False	False	Water	False	True
Nonane	False	False	c30+	False	False
Decane	False	False			

Physical Property Method Sets

Liquid Molar Volume	COSTALD	Overall Package	Peng-Robinson
Stability Calculation	Peng-Robinson	Vapor Package	Peng-Robinson
Light Liquid Package	Peng-Robinson	Heavy Liquid Package	Peng-Robinson

Remarks

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Single Oil Report
c30+

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Properties

Volume Average Boiling Point	737.874	°F	Low Temperature Viscosity	94.8165	cP
* Molecular Weight	668.07	lb/lbmol	Temperature of High T Viscosity	210	°F
* Specific Gravity	1.0741		High Temperature Viscosity	5.63904	cP
API Gravity	0.238199		Watson K	9.88672	
Critical Temperature	1158.76	°F	ASTM D86 10-90% Slope	0	°F/%
Critical Pressure	322.41	psia	ASTM D93 Flash Point	390.933	°F
Critical Volume	11.5227	ft^3/lbmol	? Pour Point	-14.0347	°F
Acentric Factor	0.655008		? Paraffinic Fraction	0	%
? Carbon to Hydrogen Ratio	8.96047		? Naphthenic Fraction	40.8434	%
? Refractive Index	1.65586		? Aromatic Fraction	59.1566	%
Temperature of Low T Viscosity	100	°F	Ideal Gas Heat Capacity	169.662	Btu/(lbmol*°F)

Warnings

ProMax:ProMax!Project!Oils!c30+!Properties!Carbon to Hydrogen Ratio
Warning: Carbon to Hydrogen Ratio calculation: The value of 737.874 °F for Volume Average Boiling Point should be between 80 °F and 650 °F.
ProMax:ProMax!Project!Oils!c30+!Properties!Pour Point
Warning: Pour Point calculation: The value of 1.0741 for Specific Gravity should be between 0.8 and 1.
ProMax:ProMax!Project!Oils!c30+!Properties!Paraffinic Fraction
Warning: Paraffinic Fraction calculation: The value of 668.07 lb/lbmol for Molecular Weight should be between 70 lb/lbmol and 600 lb/lbmol.
ProMax:ProMax!Project!Oils!c30+!Properties!Naphthenic Fraction
Warning: Naphthenic Fraction calculation: The value of 668.07 lb/lbmol for Molecular Weight should be between 70 lb/lbmol and 600 lb/lbmol.
ProMax:ProMax!Project!Oils!c30+!Properties!Aromatic Fraction
Warning: Aromatic Fraction calculation: The value of 668.07 lb/lbmol for Molecular Weight should be between 70 lb/lbmol and 600 lb/lbmol.

Remarks

* User Specified Values
? Extrapolated or Approximate Values

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Calculator Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Simple Solver 1

Source Code

Residual Error (for CV1) = MV1/130-1

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Flowback Crude!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	17.1501
Unit	

Measured Variable [MV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water!Phases!Total!Properties!Liquid Volumetric Flow
Value	130
Unit	

Solver Properties

Status: Solved

Error	-1.10213E-06		Iterations	2
Calculated Value	0.00137044	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		Group	
Algorithm	Default		Skip Dependency Check	False

Remarks

Simple Solver 2

Source Code

Residual Error (for CV1) = MV1/114-1

Calculated Variable [CV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Flowback Water!Phases!Total!Properties!Std Liquid Volumetric Flow
Value	114.467
Unit	

Measured Variable [MV1]

Source Moniker	ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water!Phases!Heavy Liquid!Properties!Liquid Volumetric Flow
Value	114
Unit	

Solver Properties

Status: Solved

Error	5.44699E-09		Iterations	2
Calculated Value	0.00914694	sgpm	Max Iterations	20
Lower Bound		sgpm	Weighting	1
Upper Bound		sgpm	Priority	0
Step Size		sgpm	Solver Active	Active
Is Minimizer	False		Group	
Algorithm	Default		Skip Dependency Check	False

Remarks

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User Value Sets Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Cn+ Flow/Frac.22

User Value [CnPlusSum]

* Parameter	463.004 lb/yr	Upper Bound	
Lower Bound		* Enforce Bounds	False

Remarks

This User Value Set was programmatically generated. GUID={2D897AFC-69A0-4053-BFF0-DE93000CEC21}

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Component Recoveries - Project Inlets

Status: Solved

Recovery Stream Data Source - All Inlets in Project

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Flowback Crude	Flowsheet1	Gas Lift
Flowsheet1	Flowback Water		

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Flowsheet1:Flowback Crude lbmol/h	Flowsheet1:Flowback Water lbmol/h	Flowsheet1:Gas Lift lbmol/h	Summary Table lbmol/h
Carbon Dioxide	1.25957E-06	0	4.95545E-05	5.08141E-05
Nitrogen	2.51914E-06	0	0.000110121	0.00011264
Methane	0.00100042	0	0.0455185	0.046519
Ethane	6.01446E-05	0	0.00274201	0.00280216
Propane	6.42382E-05	0	0.00251076	0.002575
i-Butane	2.39319E-05	0	0.000759835	0.000783767
n-Butane	5.2902E-05	0	0.00144259	0.00149549
i-Pentane	3.14893E-05	0	0.000523075	0.000554564
n-Pentane	3.87319E-05	0	0.000517569	0.000556301
Hexane	6.86467E-05	0	0.000396436	0.000465083
Methylcyclopentane	2.6451E-05	0	9.9109E-05	0.00012556
Benzene	6.92765E-06	0	2.20242E-05	2.89519E-05
Cyclohexane	3.02297E-05	0	6.60726E-05	9.63024E-05
Heptane	7.02212E-05	0	0.000126639	0.00019686
Methylcyclohexane	5.03829E-05	0	6.60726E-05	0.000116456
Toluene	2.67659E-05	0	2.20242E-05	4.87901E-05
Octane	9.22637E-05	0	5.50605E-05	0.000147324
Ethylbenzene	1.1651E-05	0	0	1.1651E-05
m-Xylene	2.83404E-05	0	5.50605E-06	3.38464E-05
o-Xylene	1.00766E-05	0	0	1.00766E-05
Nonane	7.24254E-05	0	1.65182E-05	8.89436E-05
Decane	0.000100451	0	0	0.000100451
Undecane	8.28169E-05	0	0	8.28169E-05
C12	8.18722E-05	0	0	8.18722E-05
C13	7.93531E-05	0	0	7.93531E-05
C14	7.49446E-05	0	0	7.49446E-05
C15	7.21105E-05	0	0	7.21105E-05
C16	6.42382E-05	0	0	6.42382E-05
C17	5.85701E-05	0	0	5.85701E-05
C18	4.88084E-05	0	0	4.88084E-05
C19	4.91233E-05	0	0	4.91233E-05
C20	4.34552E-05	0	0	4.34552E-05
C21	3.96765E-05	0	0	3.96765E-05
C22	3.55829E-05	0	0	3.55829E-05
C23	3.21191E-05	0	0	3.21191E-05
C24	3.11744E-05	0	0	3.11744E-05
C25	2.55063E-05	0	0	2.55063E-05
C26	2.61361E-05	0	0	2.61361E-05
C27	2.14127E-05	0	0	2.14127E-05
C28	2.29872E-05	0	0	2.29872E-05
C29	2.67659E-05	0	0	2.67659E-05
Water	0	0.253984	0	0.253984
c30+	0.000361812	0	0	0.000361812
Total	0.00314893	0.253984	0.0550495	0.312182

Remarks

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Component Recoveries - Project Outlets

Status: Solved

Recovery Stream Data Source - All Outlets in Project

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Combined Oil & Water Tank Flash Emissions	Flowsheet1	Produced Water

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Flowsheet1:Combined Oil & Water Tank Flash Emissions lbmol/h	Flowsheet1:Produced Water lbmol/h	Summary Table lbmol/h	
Carbon Dioxide	5.05933E-05	2.20739E-07	5.08141E-05	
Nitrogen	0.000112625	1.5664E-08	0.00011264	
Methane	0.0465013	1.7626E-05	0.046519	
Ethane	0.00279676	5.40417E-06	0.00280216	
Propane	0.00255624	1.87579E-05	0.002575	
i-Butane	0.000767357	1.64104E-05	0.000783767	
n-Butane	0.00144875	4.67415E-05	0.00149549	
i-Pentane	0.000505895	4.86692E-05	0.000554564	
n-Pentane	0.000490466	6.58345E-05	0.000556301	
Hexane	0.000298135	0.000166948	0.000465083	
Methylcyclopentane	8.13462E-05	4.42138E-05	0.00012556	
Benzene	1.78661E-05	1.10857E-05	2.89519E-05	
Cyclohexane	5.44702E-05	4.18322E-05	9.63024E-05	
Heptane	6.3753E-05	0.000133107	0.00019686	
Methylcyclohexane	3.80163E-05	7.84393E-05	0.000116456	
Toluene	1.40709E-05	3.47192E-05	4.87901E-05	
Octane	1.6278E-05	0.000131046	0.000147324	
Ethylbenzene	1.14546E-06	1.05056E-05	1.1651E-05	
m-Xylene	3.01798E-06	3.08285E-05	3.38464E-05	
o-Xylene	7.86916E-07	9.28966E-06	1.00766E-05	
Nonane	2.8174E-06	8.61262E-05	8.89436E-05	
Decane	9.03938E-07	9.9547E-05	0.000100451	
Undecane	1.96333E-07	8.26205E-05	8.28169E-05	
C12	5.64594E-08	8.18157E-05	8.18722E-05	
C13	1.54719E-08	7.93376E-05	7.93531E-05	
C14	4.3509E-09	7.49402E-05	7.49446E-05	
C15	1.30273E-09	7.21092E-05	7.21105E-05	
C16	3.69874E-10	6.42378E-05	6.42382E-05	
C17	1.19245E-10	5.857E-05	5.85701E-05	
C18	3.37874E-11	4.88084E-05	4.88084E-05	
C19	1.04794E-11	4.91233E-05	4.91233E-05	
C20	1.88303E-12	4.34552E-05	4.34552E-05	
C21	6.87395E-13	3.96765E-05	3.96765E-05	
C22	2.32493E-13	3.55829E-05	3.55829E-05	
C23	4.8331E-14	3.21191E-05	3.21191E-05	
C24	1.3489E-14	3.11744E-05	3.11744E-05	
C25	3.66146E-15	2.55063E-05	2.55063E-05	
C26	9.97867E-16	2.61361E-05	2.61361E-05	
C27	1.63883E-16	2.14127E-05	2.14127E-05	
C28	7.96108E-17	2.29872E-05	2.29872E-05	
C29	3.68362E-17	2.67659E-05	2.67659E-05	

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Tabulated Data

Index	Flowsheet1:Combined Oil & Water Tank Flash Emissions lbmol/h	Flowsheet1:Produced Water lbmol/h	Summary Table lbmol/h	
Water	0.000442199	0.253542	0.253984	
c30+	8.36768E-12	0.000361812	0.000361812	
Total	0.0562651	0.255917	0.312182	

Remarks

Component Recoveries - Project Losses

Status: Solved

Reference Stream Data Source - All Outlets in Project

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Combined Oil & Water Tank Flash Emissions	Flowsheet1	Produced Water

Recovery Stream Data Source - All Inlets in Project

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Flowback Crude	Flowsheet1	Gas Lift
Flowsheet1	Flowback Water		

Parameters

* Composition Basis	Molar Flow	* Summation Option	Summation Only
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Summary Table lbmol/h			
Carbon Dioxide	1.14284E-19			
Nitrogen	2.55459E-19			
Methane	1.10143E-16			
Ethane	6.02345E-18			
Propane	7.31419E-18			
i-Butane	2.58148E-18			
n-Butane	4.94783E-18			
i-Pentane	1.3983E-18			
n-Pentane	1.18318E-18			
Hexane	-1.45208E-18			
Methylcyclopentane	-3.76465E-19			
Benzene	-1.042E-19			
Cyclohexane	-5.51253E-19			
Heptane	-2.20501E-18			
Methylcyclohexane	-1.34452E-18			
Toluene	-6.05034E-19			
Octane	-2.50081E-18			
Ethylbenzene	-2.18484E-19			
m-Xylene	-6.18479E-19			
o-Xylene	-1.94955E-19			
Nonane	-1.73443E-18			
Decane	-2.09745E-18			
Undecane	-1.72098E-18			
C12	-1.72098E-18			
C13	-1.68065E-18			
C14	-1.57309E-18			
C15	-1.51931E-18			

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Tabulated Data

Index	Summary Table lbmol/h			
C16	-1.34452E-18			
C17	-1.22351E-18			
C18	-1.02183E-18			
C19	-1.02856E-18			
C20	-9.07551E-19			
C21	-8.40325E-19			
C22	-7.59653E-19			
C23	-6.65537E-19			
C24	-6.52092E-19			
C25	-5.31085E-19			
C26	-5.54614E-19			
C27	-4.57137E-19			
C28	-4.84027E-19			
C29	-5.61337E-19			
Water	5.50715E-16			
c30+	-7.47553E-18			
Total	6.60858E-16			

Remarks

Component Recoveries - Project Recoveries

Status: Solved

Reference Stream Data Source - All Inlets in Project

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Flowback Crude	Flowsheet1	Gas Lift
Flowsheet1	Flowback Water		

Recovery Stream Data Source - All Outlets in Project

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Combined Oil & Water Tank Flash Emissions	Flowsheet1	Produced Water

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	True	* Atomic Basis	False

Tabulated Data

Index	Flowsheet1:Combined Oil & Water Tank Flash Emissions %	Flowsheet1:Produced Water %	Summary Table %	
Carbon Dioxide	99.5656	0.434405	100	
Nitrogen	99.9861	0.0139062	100	
Methane	99.9621	0.03789	100	
Ethane	99.8071	0.192857	100	
Propane	99.2715	0.728464	100	
i-Butane	97.9062	2.09378	100	
n-Butane	96.8745	3.1255	100	
i-Pentane	91.2239	8.77611	100	
n-Pentane	88.1657	11.8343	100	
Hexane	64.1036	35.8964	100	
Methylcyclopentane	64.7867	35.2133	100	
Benzene	61.7098	38.2902	100	

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Tabulated Data

Index	Flowsheet1:Combined Oil & Water Tank Flash Emissions %	Flowsheet1:Produced Water %	Summary Table %
Cyclohexane	56.5617	43.4383	100
Heptane	32.3849	67.6151	100
Methylcyclohexane	32.6444	67.3556	100
Toluene	28.8397	71.1603	100
Octane	11.0491	88.9509	100
Ethylbenzene	9.83136	90.1686	100
m-Xylene	8.91668	91.0833	100
o-Xylene	7.80936	92.1906	100
Nonane	3.16763	96.8324	100
Decane	0.89988	99.1001	100
Undecane	0.237069	99.7629	100
C12	0.0689604	99.931	100
C13	0.0194976	99.9805	100
C14	0.00580549	99.9942	100
C15	0.00180658	99.9982	100
C16	0.000575785	99.9994	100
C17	0.000203593	99.9998	100
C18	6.92245E-05	99.9999	100
C19	2.13328E-05	100	100
C20	4.33326E-06	100	100
C21	1.7325E-06	100	100
C22	6.53384E-07	100	100
C23	1.50474E-07	100	100
C24	4.32693E-08	100	100
C25	1.43551E-08	100	100
C26	3.81796E-09	100	100
C27	7.65353E-10	100	100
C28	3.46327E-10	100	100
C29	1.37624E-10	100	100
Water	0.174105	99.8259	100
c30+	2.31271E-06	100	100
Total	18.0232	81.9768	100

Remarks

Component Recoveries - Flowsheet1 Inlets

Status: Solved

Recovery Stream Data Source - All Inlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Flowback Crude	Flowsheet1	Gas Lift
Flowsheet1	Flowback Water		

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Flowsheet1:Flowback Crude lbmol/h	Flowsheet1:Flowback Water lbmol/h	Flowsheet1:Gas Lift lbmol/h	Summary Table lbmol/h
Carbon Dioxide	1.25957E-06	0	4.95545E-05	5.08141E-05
Nitrogen	2.51914E-06	0	0.000110121	0.00011264

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Tabulated Data

Index	Flowsheet1:Flowback Crude lbmol/h	Flowsheet1:Flowback Water lbmol/h	Flowsheet1:Gas Lift lbmol/h	Summary Table lbmol/h
Methane	0.00100042	0	0.0455185	0.046519
Ethane	6.01446E-05	0	0.00274201	0.00280216
Propane	6.42382E-05	0	0.00251076	0.002575
i-Butane	2.39319E-05	0	0.000759835	0.000783767
n-Butane	5.2902E-05	0	0.00144259	0.00149549
i-Pentane	3.14893E-05	0	0.000523075	0.000554564
n-Pentane	3.87319E-05	0	0.000517569	0.000556301
Hexane	6.86467E-05	0	0.000396436	0.000465083
Methylcyclopentane	2.6451E-05	0	9.9109E-05	0.00012556
Benzene	6.92765E-06	0	2.20242E-05	2.89519E-05
Cyclohexane	3.02297E-05	0	6.60726E-05	9.63024E-05
Heptane	7.02212E-05	0	0.000126639	0.00019686
Methylcyclohexane	5.03829E-05	0	6.60726E-05	0.000116456
Toluene	2.67659E-05	0	2.20242E-05	4.87901E-05
Octane	9.22637E-05	0	5.50605E-05	0.000147324
Ethylbenzene	1.1651E-05	0	0	1.1651E-05
m-Xylene	2.83404E-05	0	5.50605E-06	3.38464E-05
o-Xylene	1.00766E-05	0	0	1.00766E-05
Nonane	7.24254E-05	0	1.65182E-05	8.89436E-05
Decane	0.000100451	0	0	0.000100451
Undecane	8.28169E-05	0	0	8.28169E-05
C12	8.18722E-05	0	0	8.18722E-05
C13	7.93531E-05	0	0	7.93531E-05
C14	7.49446E-05	0	0	7.49446E-05
C15	7.21105E-05	0	0	7.21105E-05
C16	6.42382E-05	0	0	6.42382E-05
C17	5.85701E-05	0	0	5.85701E-05
C18	4.88084E-05	0	0	4.88084E-05
C19	4.91233E-05	0	0	4.91233E-05
C20	4.34552E-05	0	0	4.34552E-05
C21	3.96765E-05	0	0	3.96765E-05
C22	3.55829E-05	0	0	3.55829E-05
C23	3.21191E-05	0	0	3.21191E-05
C24	3.11744E-05	0	0	3.11744E-05
C25	2.55063E-05	0	0	2.55063E-05
C26	2.61361E-05	0	0	2.61361E-05
C27	2.14127E-05	0	0	2.14127E-05
C28	2.29872E-05	0	0	2.29872E-05
C29	2.67659E-05	0	0	2.67659E-05
Water	0	0.253984	0	0.253984
c30+	0.000361812	0	0	0.000361812
Total	0.00314893	0.253984	0.0550495	0.312182

Remarks

Component Recoveries - Flowsheet1 Outlets

Status: Solved

Recovery Stream Data Source - All Outlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Combined Oil & Water Tank Flash Emissions	Flowsheet1	Produced Water

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Parameters

* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Flowsheet1:Combined Oil & Water Tank Flash Emissions lbmol/h	Flowsheet1:Produced Water lbmol/h	Summary Table lbmol/h
Carbon Dioxide	5.05933E-05	2.20739E-07	5.08141E-05
Nitrogen	0.000112625	1.5664E-08	0.00011264
Methane	0.0465013	1.7626E-05	0.046519
Ethane	0.00279676	5.40417E-06	0.00280216
Propane	0.00255624	1.87579E-05	0.002575
i-Butane	0.000767357	1.64104E-05	0.000783767
n-Butane	0.00144875	4.67415E-05	0.00149549
i-Pentane	0.000505895	4.86692E-05	0.000554564
n-Pentane	0.000490466	6.58345E-05	0.000556301
Hexane	0.000298135	0.000166948	0.000465083
Methylcyclopentane	8.13462E-05	4.42138E-05	0.00012556
Benzene	1.78661E-05	1.10857E-05	2.89519E-05
Cyclohexane	5.44702E-05	4.18322E-05	9.63024E-05
Heptane	6.3753E-05	0.000133107	0.00019686
Methylcyclohexane	3.80163E-05	7.84393E-05	0.000116456
Toluene	1.40709E-05	3.47192E-05	4.87901E-05
Octane	1.6278E-05	0.000131046	0.000147324
Ethylbenzene	1.14546E-06	1.05056E-05	1.1651E-05
m-Xylene	3.01798E-06	3.08285E-05	3.38464E-05
o-Xylene	7.86916E-07	9.28966E-06	1.00766E-05
Nonane	2.8174E-06	8.61262E-05	8.89436E-05
Decane	9.03938E-07	9.9547E-05	0.000100451
Undecane	1.96333E-07	8.26205E-05	8.28169E-05
C12	5.64594E-08	8.18157E-05	8.18722E-05
C13	1.54719E-08	7.93376E-05	7.93531E-05
C14	4.3509E-09	7.49402E-05	7.49446E-05
C15	1.30273E-09	7.21092E-05	7.21105E-05
C16	3.69874E-10	6.42378E-05	6.42382E-05
C17	1.19245E-10	5.857E-05	5.85701E-05
C18	3.37874E-11	4.88084E-05	4.88084E-05
C19	1.04794E-11	4.91233E-05	4.91233E-05
C20	1.88303E-12	4.34552E-05	4.34552E-05
C21	6.87395E-13	3.96765E-05	3.96765E-05
C22	2.32493E-13	3.55829E-05	3.55829E-05
C23	4.8331E-14	3.21191E-05	3.21191E-05
C24	1.3489E-14	3.11744E-05	3.11744E-05
C25	3.66146E-15	2.55063E-05	2.55063E-05
C26	9.97867E-16	2.61361E-05	2.61361E-05
C27	1.63883E-16	2.14127E-05	2.14127E-05
C28	7.96108E-17	2.29872E-05	2.29872E-05
C29	3.68362E-17	2.67659E-05	2.67659E-05
Water	0.000442199	0.253542	0.253984
c30+	8.36768E-12	0.000361812	0.000361812
Total	0.0562651	0.255917	0.312182

Remarks

Component Recoveries - Flowsheet1 Losses

Status: Solved

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Reference Stream Data Source - All Outlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Combined Oil & Water Tank Flash Emissions	Flowsheet1	Produced Water

Recovery Stream Data Source - All Inlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Flowback Crude	Flowsheet1	Gas Lift
Flowsheet1	Flowback Water		

Parameters

* Composition Basis	Molar Flow	* Summation Option	Summation Only
* Calculate Ratios	False	* Atomic Basis	False

Tabulated Data

Index	Summary Table lbmol/h			
Carbon Dioxide	1.14284E-19			
Nitrogen	2.55459E-19			
Methane	1.10143E-16			
Ethane	6.02345E-18			
Propane	7.31419E-18			
i-Butane	2.58148E-18			
n-Butane	4.94783E-18			
i-Pentane	1.3983E-18			
n-Pentane	1.18318E-18			
Hexane	-1.45208E-18			
Methylcyclopentane	-3.76465E-19			
Benzene	-1.042E-19			
Cyclohexane	-5.51253E-19			
Heptane	-2.20501E-18			
Methylcyclohexane	-1.34452E-18			
Toluene	-6.05034E-19			
Octane	-2.50081E-18			
Ethylbenzene	-2.18484E-19			
m-Xylene	-6.18479E-19			
o-Xylene	-1.94955E-19			
Nonane	-1.73443E-18			
Decane	-2.09745E-18			
Undecane	-1.72098E-18			
C12	-1.72098E-18			
C13	-1.68065E-18			
C14	-1.57309E-18			
C15	-1.51931E-18			
C16	-1.34452E-18			
C17	-1.22351E-18			
C18	-1.02183E-18			
C19	-1.02856E-18			
C20	-9.07551E-19			
C21	-8.40325E-19			
C22	-7.59653E-19			
C23	-6.65537E-19			
C24	-6.52092E-19			
C25	-5.31085E-19			
C26	-5.54614E-19			
C27	-4.57137E-19			
C28	-4.84027E-19			
C29	-5.61337E-19			
Water	5.50715E-16			
c30+	-7.47553E-18			
Total	6.60858E-16			

* User Specified Values
? Extrapolated or Approximate Values

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Remarks

Component Recoveries - Flowsheet1 Recoveries

Status: Solved

Reference Stream Data Source - All Inlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Flowback Crude	Flowsheet1	Gas Lift
Flowsheet1	Flowback Water		

Recovery Stream Data Source - All Outlets in Flowsheet

Flowsheet	PStream	Flowsheet	PStream
Flowsheet1	Combined Oil & Water Tank Flash Emissions	Flowsheet1	Produced Water

Parameters

* Composition Basis	Molar Flow	* Summation Option	Streams and Summation
* Calculate Ratios	True	* Atomic Basis	False

Tabulated Data

Index	Flowsheet1:Combined Oil & Water Tank Flash Emissions %	Flowsheet1:Produced Water %	Summary Table %	
Carbon Dioxide	99.5656	0.434405	100	
Nitrogen	99.9861	0.0139062	100	
Methane	99.9621	0.03789	100	
Ethane	99.8071	0.192857	100	
Propane	99.2715	0.728464	100	
i-Butane	97.9062	2.09378	100	
n-Butane	96.8745	3.1255	100	
i-Pentane	91.2239	8.77611	100	
n-Pentane	88.1657	11.8343	100	
Hexane	64.1036	35.8964	100	
Methylcyclopentane	64.7867	35.2133	100	
Benzene	61.7098	38.2902	100	
Cyclohexane	56.5617	43.4383	100	
Heptane	32.3849	67.6151	100	
Methylcyclohexane	32.6444	67.3556	100	
Toluene	28.8397	71.1603	100	
Octane	11.0491	88.9509	100	
Ethylbenzene	9.83136	90.1686	100	
m-Xylene	8.91668	91.0833	100	
o-Xylene	7.80936	92.1906	100	
Nonane	3.16763	96.8324	100	
Decane	0.89988	99.1001	100	
Undecane	0.237069	99.7629	100	
C12	0.0689604	99.931	100	
C13	0.0194976	99.9805	100	
C14	0.00580549	99.9942	100	
C15	0.00180658	99.9982	100	
C16	0.000575785	99.9994	100	
C17	0.000203593	99.9998	100	
C18	6.92245E-05	99.9999	100	
C19	2.13328E-05	100	100	
C20	4.33326E-06	100	100	
C21	1.7325E-06	100	100	

* User Specified Values
? Extrapolated or Approximate Values

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Recoveries Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Tabulated Data

Index	Flowsheet1:Combined Oil & Water Tank Flash Emissions %	Flowsheet1:Produced Water %	Summary Table %
C22	6.53384E-07	100	100
C23	1.50474E-07	100	100
C24	4.32693E-08	100	100
C25	1.43551E-08	100	100
C26	3.81796E-09	100	100
C27	7.65353E-10	100	100
C28	3.46327E-10	100	100
C29	1.37624E-10	100	100
Water	0.174105	99.8259	100
c30+	2.31271E-06	100	100
Total	18.0232	81.9768	100

Remarks

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Energy Budgets Report

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	CPAI Flowback Emission Estimate	

Power Budget - Project Power Budget

Status: Solved

Parameters

Net Power	hp	Total Power Required	hp
Total Power Supplied	hp	External Energy Only	True

Remarks

Heat Budget - Project Heat Budget

Status: Solved

Parameters

Net Duty	Btu/h	Total Duty Required	Btu/h
Total Duty Supplied	Btu/h	External Energy Only	True

Remarks

Power Budget - Flowsheet1 Power Budget

Status: Solved

Parameters

Net Power	hp	Total Power Required	hp
Total Power Supplied	hp	External Energy Only	True

Remarks

Heat Budget - Flowsheet1 Heat Budget

Status: Solved

Parameters

Net Duty	Btu/h	Total Duty Required	Btu/h
Total Duty Supplied	Btu/h	External Energy Only	True

Remarks

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1J-166_Well Maintenance Flowback Emissions Summary

Well	1J-135
Date	9/29/2018
Reservoir	West Sak A, B and D Sand
Flow Duration	8.00 hrs

ProMax Inputs (1)

Wellhead Stream Composition (2)	Wellhead fluid composition taken from 1H-105 Well West Sak A2 Sand Sampled 12/14/2006 analyzed by Schlumberger
Tubing Pressure(3)	575.0 psig
Tubing Temperature(3)	49.0 °F
Atmospheric Pressure(4)	14.7 psia
Liquid to Tanks(5)	150.0 bbl/flowback

ProMax Output Summary(6)

Phase	Volumetric Flow (MSCFD)	Cumulative Gas Volume (MSCF)	Total Fluid Volume (STB)
Vapor	911.34	303.8	150.0

Compostion	Mass Flow (lb/hr)	Total Mass(7) (lb)	Mass (tonne)	Mass (ton)
Carbon Dioxide	4.0	31.6	0.01	0.02
Nitrogen	5.6	44.8	0.02	0.02
Methane	1326.1	10,609.0	4.8	5.3
Ethane	149.6	1,196.9	0.54	0.60
Propane	200.6	1,605.1	0.73	0.80
i-Butane	79.7	637.2	0.29	0.32
n-Butane	150.7	1,205.5	0.55	0.60
i-Pentane	66.3	530.4	0.24	0.27
n-Pentane	64.7	517.9	0.23	0.26
n-Hexane	50.7	405.9	0.18	0.20
Hexane+(8)	49.0	391.9	0.18	0.20
Benzene	2.6	20.8	0.01	0.01
C3 Plus VOC	**664.3**	**5,314.7**	**2.4**	**2.7**

ProMax® (the successor to PROSIM®) was used to estimate emissions from the open top tanks during a well flowback. In the model, wellhead fluid is routed directly to a flowback tank. Thus, emissions from the flowback are only those that occur when the oil flashes due to the change in pressure from the wellhead to the tank.

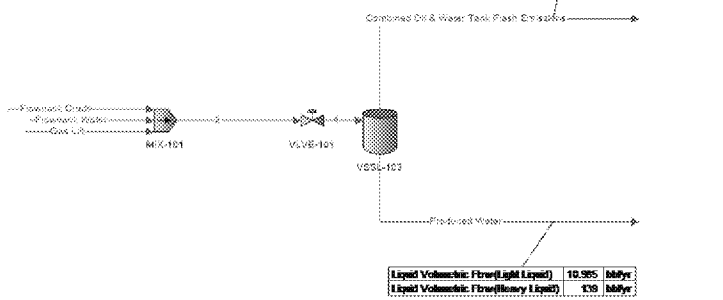
Notes:
(1) All inputs to the model are denoted by a * symbol in the ProMax® generated report.
(2) The composition of the sample is entered in ProMax® as the "wellhead feed" stream composition.
(3) Tubing pressure and temperature are estimates provided by Conoco Phillips.
(4) The atmospheric pressure is assumed to be equal to sea level pressure.
(5) The amount of Liquid produced during the flowback is entered in ProMax® as "Flashed Liquids". bbl/year is equivalent to bbl/flowback for purposes of this model.
(6) A detailed ProMax® generated report is attached.
(7) Mass emission rates equal "Tank Flash Gas" emission rates in the ProMax® generated report.
(8) Hexane+ does not include n-Hexane or Benzene.

Flowsheet1
Plant Schematic

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Names	Units	Combined Oil & Water Tank Flash Emissions
Carbon Dioxide(Mass Flow)	lb/yr	31.63
Nitrogen(Mass Flow)	lb/yr	44.839
Methane(Mass Flow)	lb/yr	10609
Ethane(Mass Flow)	lb/yr	1196.9
Propane(Mass Flow)	lb/yr	1605.1
i-Butane(Mass Flow)	lb/yr	637.21
n-Butane(Mass Flow)	lb/yr	1205.5
i-Pentane(Mass Flow)	lb/yr	530.39
n-Pentane(Mass Flow)	lb/yr	517.91
Hexane(Mass Flow)	lb/yr	405.87
Benzene(Mass Flow)	lb/yr	20.005

Properties	Combined Oil & Water Tank Flash Emissions	
Temperature(Total)	33.920	°F
Pressure(Total)	0	psig
Std Vapor Volumetric Flow (Total)	303.78	Mscf/yr



Liquid Volumetric Flow(Light Liquid)	10.985	Mbl/yr
Liquid Volumetric Flow(Heavy Liquid)	139	Mbl/yr

"Combined Oil & Water Tank Flash Emissions" C6+ Mass Flow =818.6 lb/yr

"Combined Oil & Water Tank Flash Emissions" C3+ Mass Flow =5,315 lb/yr

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Connections

	Combined Oil & Water Tank Flash Emissions	Flowback Crude	Flowback Water	Gas Lift	Produced Water
From Block	VSSL-103	--	--	--	VSSL-103
To Block	--	MIX-101	MIX-101	MIX-101	--

Stream Composition

Mole Fraction	Combined Oil & Water Tank Flash Emissions %	Flowback Crude %	Flowback Water %	Gas Lift %	Produced Water %
Carbon Dioxide	0.0897831	0.04 *	0 *	0.090018 *	8.55339E-05
Nitrogen	0.199952	0.08 *	0 *	0.20004 *	5.23722E-06
Methane	82.6103	31.77 *	0 *	82.6865 *	0.00542154
Ethane	4.97232	1.91 *	0 *	4.981 *	0.00150134
Propane	4.54709	2.04 *	0 *	4.56091 *	0.00498394
i-Butane	1.36955	0.76 *	0 *	1.38028 *	0.00435118
n-Butane	2.59103	1.68 *	0 *	2.62052 *	0.0124759
i-Pentane	0.918342	1 *	0 *	0.95019 *	0.0132645
n-Pentane	0.896726	1.23 *	0 *	0.940188 *	0.0181899
Hexane	0.58836	2.18 *	0 *	0.720144 *	0.0508687
Methylcyclopentane	0.153464	0.84 *	0 *	0.180036 *	0.0127508
Benzene	0.0332733	0.22 *	0 *	0.040008 *	0.00329272
Cyclohexane	0.0999252	0.96 *	0 *	0.120024 *	0.0117858
Heptane	0.130993	2.23 *	0 *	0.230046 *	0.042893
Methylcyclohexane	0.0733744	1.6 *	0 *	0.120024 *	0.0237219
Toluene	0.0251708	0.85 *	0 *	0.040008 *	0.00974419
Octane	0.0303667	2.93 *	0 *	0.10002 *	0.0391284
Ethylbenzene	0.00136688	0.37 *	0 *	0 *	0.00198933
m-Xylene	0.0045721	0.9 *	0 *	0.010002 *	0.00738412
o-Xylene	0.000952794	0.32 *	0 *	0 *	0.00178789
Nonane	0.00446829	2.3 *	0 *	0.030006 *	0.0222846
Decane	0.00111127	3.19 *	0 *	0 *	0.020287
Undecane	0.000237847	2.63 *	0 *	0 *	0.016925
C12	6.73683E-05	2.6 *	0 *	0 *	0.0167812
C13	1.81837E-05	2.52 *	0 *	0 *	0.0162787
C14	5.04341E-06	2.38 *	0 *	0 *	0.0153779
C15	1.49436E-06	2.29 *	0 *	0 *	0.0147974
C16	4.19352E-07	2.04 *	0 *	0 *	0.0131822
C17	1.33678E-07	1.86 *	0 *	0 *	0.0120191
C18	3.72677E-08	1.55 *	0 *	0 *	0.010016
C19	1.13921E-08	1.56 *	0 *	0 *	0.0100806
C20	1.99585E-09	1.38 *	0 *	0 *	0.00891745
C21	7.23351E-10	1.26 *	0 *	0 *	0.00814202
C22	2.42589E-10	1.13 *	0 *	0 *	0.00730197
C23	4.95016E-11	1.02 *	0 *	0 *	0.00659116
C24	1.36197E-11	0.99 *	0 *	0 *	0.0063973
C25	3.65644E-12	0.81 *	0 *	0 *	0.00523416
C26	9.82364E-13	0.83 *	0 *	0 *	0.00536339
C27	1.57903E-13	0.68 *	0 *	0 *	0.00439411
C28	7.63836E-14	0.73 *	0 *	0 *	0.0047172
C29	3.51037E-14	0.85 *	0 *	0 *	0.00549263
Water	0.657121	0 *	100 *	0 *	99.4295
c30+	8.24849E-09	11.49 *	0 *	0 *	0.0742475

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Molar Flow	Combined Oil & Water Tank Flash Emissions lbmol/h	Flowback Crude lbmol/h	Flowback Water lbmol/h	Gas Lift lbmol/h	Produced Water lbmol/h
Carbon Dioxide	8.20456E-05	8.03965E-07 *	0 *	8.15076E-05 *	2.66044E-07
Nitrogen	0.00018272	1.60793E-06 *	0 *	0.000181128 *	1.62898E-08
Methane	0.075491	0.000638549 *	0 *	0.0748693 *	1.68631E-05
Ethane	0.00454381	3.83893E-05 *	0 *	0.00451009 *	4.66975E-06
Propane	0.00415522	4.10022E-05 *	0 *	0.00412972 *	1.5502E-05
i-Butane	0.00125153	1.52753E-05 *	0 *	0.00124978 *	1.35339E-05
n-Butane	0.00236774	3.37665E-05 *	0 *	0.00237278 *	3.88051E-05
i-Pentane	0.0008392	2.00991E-05 *	0 *	0.000860358 *	4.12579E-05
n-Pentane	0.000819446	2.47219E-05 *	0 *	0.000851302 *	5.65777E-05
Hexane	0.000537656	4.38161E-05 *	0 *	0.000652061 *	0.000158222
Methylcyclopentane	0.000140238	1.68833E-05 *	0 *	0.000163015 *	3.96601E-05
Benzene	3.04058E-05	4.42181E-06 *	0 *	3.62256E-05 *	1.02417E-05
Cyclohexane	9.13136E-05	1.92952E-05 *	0 *	0.000108677 *	3.66584E-05
Heptane	0.000119704	4.48211E-05 *	0 *	0.000208297 *	0.000133414
Methylcyclohexane	6.7051E-05	3.21586E-05 *	0 *	0.000108677 *	7.37844E-05
Toluene	2.30016E-05	1.70843E-05 *	0 *	3.62256E-05 *	3.03083E-05
Octane	2.77497E-05	5.88904E-05 *	0 *	9.05641E-05 *	0.000121705
Ethylbenzene	1.24908E-06	7.43668E-06 *	0 *	0 *	6.18759E-06
m-Xylene	4.17808E-06	1.80892E-05 *	0 *	9.05641E-06 *	2.29675E-05
o-Xylene	8.70682E-07	6.43172E-06 *	0 *	0 *	5.56104E-06
Nonane	4.08322E-06	4.6228E-05 *	0 *	2.71692E-05 *	6.9314E-05
Decane	1.0155E-06	6.41162E-05 *	0 *	0 *	6.31007E-05
Undecane	2.17349E-07	5.28607E-05 *	0 *	0 *	5.26434E-05
C12	6.15625E-08	5.22577E-05 *	0 *	0 *	5.21962E-05
C13	1.66166E-08	5.06498E-05 *	0 *	0 *	5.06332E-05
C14	4.60876E-09	4.78359E-05 *	0 *	0 *	4.78313E-05
C15	1.36558E-09	4.6027E-05 *	0 *	0 *	4.60256E-05
C16	3.83212E-10	4.10022E-05 *	0 *	0 *	4.10018E-05
C17	1.22157E-10	3.73844E-05 *	0 *	0 *	3.73843E-05
C18	3.40559E-11	3.11536E-05 *	0 *	0 *	3.11536E-05
C19	1.04103E-11	3.13546E-05 *	0 *	0 *	3.13546E-05
C20	1.82385E-12	2.77368E-05 *	0 *	0 *	2.77368E-05
C21	6.61012E-13	2.53249E-05 *	0 *	0 *	2.53249E-05
C22	2.21683E-13	2.2712E-05 *	0 *	0 *	2.2712E-05
C23	4.52356E-14	2.05011E-05 *	0 *	0 *	2.05011E-05
C24	1.2446E-14	1.98981E-05 *	0 *	0 *	1.98981E-05
C25	3.34133E-15	1.62803E-05 *	0 *	0 *	1.62803E-05
C26	8.97704E-16	1.66823E-05 *	0 *	0 *	1.66823E-05
C27	1.44295E-16	1.36674E-05 *	0 *	0 *	1.36674E-05
C28	6.98009E-17	1.46724E-05 *	0 *	0 *	1.46724E-05
C29	3.20785E-17	1.70843E-05 *	0 *	0 *	1.70843E-05
Water	0.00060049	0 *	0.309866 *	0 *	0.309265
c30+	7.53764E-12	0.000230939 *	0 *	0 *	0.000230939

Mass Fraction	Combined Oil & Water Tank Flash Emissions %	Flowback Crude %	Flowback Water %	Gas Lift %	Produced Water %
Carbon Dioxide	0.182923	0.00979463 *	0 *	0.179979 *	0.000196362
Nitrogen	0.259309	0.0124692 *	0 *	0.254583 *	7.65315E-06
Methane	61.3525	2.83576 *	0 *	60.2632 *	0.00453698
Ethane	6.92159	0.319547 *	0 *	6.80428 *	0.00235489
Propane	9.2823	0.500504 *	0 *	9.13679 *	0.0114642
i-Butane	3.68509	0.245775 *	0 *	3.64464 *	0.0131924
n-Butane	6.97175	0.543292 *	0 *	6.91953 *	0.0378258
i-Pentane	3.06733	0.401431 *	0 *	3.11448 *	0.0499223
n-Pentane	2.99513	0.49376 *	0 *	3.0817 *	0.0684593

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Mass Fraction	Combined Oil & Water Tank Flash Emissions %	Flowback Crude %	Flowback Water %	Gas Lift %	Produced Water %
Hexane	2.34722	1.04525 *	0 *	2.81935 *	0.228669
Methylcyclopentane	0.597911	0.393336 *	0 *	0.68835 *	0.0559777
Benzene	0.12032	0.0956139 *	0 *	0.141975 *	0.0134167
Cyclohexane	0.389318	0.449527 *	0 *	0.4589 *	0.051741
Heptane	0.607647	1.24326 *	0 *	1.04722 *	0.224201
Methylcyclohexane	0.333519	0.874081 *	0 *	0.535383 *	0.121499
Toluene	0.107365	0.435754 *	0 *	0.167469 *	0.0468339
Octane	0.160583	1.86219 *	0 *	0.519049 *	0.233153
Ethylbenzene	0.00671798	0.218557 *	0 *	0 *	0.0110169
m-Xylene	0.0224711	0.531625 *	0 *	0.0482408 *	0.0408935
o-Xylene	0.00468282	0.189022 *	0 *	0 *	0.00990137
Nonane	0.0265304	1.64129 *	0 *	0.174835 *	0.149092
Decane	0.00731972	2.52535 *	0 *	0 *	0.150571
Undecane	0.0017211	2.28728 *	0 *	0 *	0.138001
C12	0.000531234	2.4641 *	0 *	0 *	0.149108
C13	0.000155195	2.58495 *	0 *	0 *	0.156554
C14	4.63197E-05	2.62708 *	0 *	0 *	0.159142
C15	1.46949E-05	2.70646 *	0 *	0 *	0.163962
C16	4.39603E-06	2.5702 *	0 *	0 *	0.15571
C17	1.48814E-06	2.48858 *	0 *	0 *	0.150766
C18	4.39073E-07	2.19478 *	0 *	0 *	0.132967
C19	1.41614E-07	2.33069 *	0 *	0 *	0.141201
C20	2.61064E-08	2.16946 *	0 *	0 *	0.131433
C21	9.93136E-09	2.07915 *	0 *	0 *	0.125962
C22	3.48819E-09	1.95282 *	0 *	0 *	0.118309
C23	7.43928E-10	1.84233 *	0 *	0 *	0.111614
C24	2.13526E-10	1.8654 *	0 *	0 *	0.113013
C25	5.9699E-11	1.58945 *	0 *	0 *	0.0962945
C26	1.6677E-11	1.69348 *	0 *	0 *	0.102597
C27	2.78316E-12	1.44049 *	0 *	0 *	0.0872701
C28	1.39592E-12	1.60338 *	0 *	0 *	0.0971385
C29	6.64319E-13	1.93329 *	0 *	0 *	0.117125
Water	0.548041	0 *	100 *	0 *	93.4394
c30+	2.55107E-07	42.7094 *	0 *	0 *	2.58748

Mass Flow	Combined Oil & Water Tank Flash Emissions lb/h	Flowback Crude lb/h	Flowback Water lb/h	Gas Lift lb/h	Produced Water lb/h
Carbon Dioxide	0.00361078	3.53821E-05 *	0 *	0.00358711 *	1.17085E-05
Nitrogen	0.0051186	4.50436E-05 *	0 *	0.00507401 *	4.56333E-07
Methane	1.21106	0.0102439 *	0 *	1.20109 *	0.000270526
Ethane	0.136628	0.00115433 *	0 *	0.135614 *	0.000140415
Propane	0.183227	0.00180802 *	0 *	0.182103 *	0.000683572
i-Butane	0.0727414	0.000887836 *	0 *	0.0726402 *	0.000786619
n-Butane	0.137618	0.00196259 *	0 *	0.137911 *	0.00225544
i-Pentane	0.0605472	0.00145013 *	0 *	0.0620738 *	0.00297671
n-Pentane	0.0591221	0.00178366 *	0 *	0.0614204 *	0.00408201
Hexane	0.0463327	0.00377587 *	0 *	0.0561916 *	0.0136348
Methylcyclopentane	0.0118024	0.00142089 *	0 *	0.0137193 *	0.00333777
Benzene	0.00237505	0.000345396 *	0 *	0.00282965 *	0.000799995
Cyclohexane	0.00768491	0.00162387 *	0 *	0.00914619 *	0.00308515
Heptane	0.0119946	0.00449116 *	0 *	0.0208718 *	0.0133684
Methylcyclohexane	0.00658347	0.00315753 *	0 *	0.0106706 *	0.0072446
Toluene	0.00211933	0.00157412 *	0 *	0.00333777 *	0.00279256
Octane	0.00316981	0.00672697 *	0 *	0.010345 *	0.0139022
Ethylbenzene	0.000132609	0.000789515 *	0 *	0 *	0.000656906

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Mass Flow	Combined Oil & Water Tank Flash Emissions lb/h	Flowback Crude lb/h	Flowback Water lb/h	Gas Lift lb/h	Produced Water lb/h
m-Xylene	0.000443566	0.00192044 *	0 *	0.000961473 *	0.00243835
o-Xylene	9.2436E-05	0.000682824 *	0 *	0 *	0.000590388
Nonane	0.000523693	0.00592898 *	0 *	0.00348459 *	0.00888987
Decane	0.000144487	0.00912256 *	0 *	0 *	0.00897808
Undecane	3.39735E-05	0.00826256 *	0 *	0 *	0.00822859
C12	1.04862E-05	0.00890131 *	0 *	0 *	0.00889083
C13	3.06346E-06	0.00933787 *	0 *	0 *	0.0093348
C14	9.14324E-07	0.00949007 *	0 *	0 *	0.00948916
C15	2.90068E-07	0.00977681 *	0 *	0 *	0.00977652
C16	8.6775E-08	0.00928459 *	0 *	0 *	0.0092845
C17	2.93749E-08	0.00898974 *	0 *	0 *	0.00898971
C18	8.66704E-09	0.00792843 *	0 *	0 *	0.00792842
C19	2.79538E-09	0.00841938 *	0 *	0 *	0.00841937
C20	5.15324E-10	0.00783696 *	0 *	0 *	0.00783696
C21	1.96039E-10	0.00751071 *	0 *	0 *	0.00751071
C22	6.88548E-11	0.00705437 *	0 *	0 *	0.00705437
C23	1.46847E-11	0.00665522 *	0 *	0 *	0.00665522
C24	4.21488E-12	0.00673858 *	0 *	0 *	0.00673858
C25	1.17842E-12	0.00574174 *	0 *	0 *	0.00574174
C26	3.29194E-13	0.00611751 *	0 *	0 *	0.00611751
C27	5.49379E-14	0.00520364 *	0 *	0 *	0.00520364
C28	2.75546E-14	0.00579206 *	0 *	0 *	0.00579206
C29	1.31133E-14	0.00698382 *	0 *	0 *	0.00698382
Water	0.010818	0 *	5.58232 *	0 *	5.5715
c30+	5.03567E-09	0.154283 *	0 *	0 *	0.154283

Stream Properties

Property	Units	Combined Oil & Water Tank Flash Emissions	Flowback Crude	Flowback Water	Gas Lift	Produced Water
Temperature	°F	33.9763	49 *	49 *	49 *	33.9763
Pressure	psia	14.6959	589.696 *	589.696 *	589.696 *	14.6959
Mole Fraction Vapor	%	100	17.7535	0	92.1888	0
Mole Fraction Light Liquid	%	0	82.2465	100	7.81121	0.567402
Mole Fraction Heavy Liquid	%	0	0	0	0	99.4326
Molecular Weight	lb/lbmol	21.601	179.729	18.0153	22.0117	19.1702
Mass Density	lb/ft^3	0.0602264	38.9522	62.4829	2.96626	62.0272
Molar Flow	lbmol/h	0.091382	0.00200991	0.309866	0.0905459	0.311039
Mass Flow	lb/h	1.97394	0.36124	5.58232	1.99307	5.96268
Vapor Volumetric Flow	ft^3/h	32.7753	0.00927393	0.0893416	0.671914	0.0961302
Liquid Volumetric Flow	gpm	4.08627	0.00115623	0.0111387	0.083771	0.0119851
Std Vapor Volumetric Flow	MMSCFD	0.000832272	1.83055E-05	0.00282214	0.000824658 *	0.00283283
Std Liquid Volumetric Flow	sgpm	0.0109809	0.000874869 *	0.0111595 *	0.0110026	0.012056
Compressibility		0.994958	0.498443	0.0311465	0.801628	0.000857359
Specific Gravity		0.745823		1.00183		0.994519
API Gravity				9.92925		11.278
Enthalpy	Btu/h	-3263.11 ?	-288.601 ?	-38222.7	-3298.2	-38546.4 ?
Mass Enthalpy	Btu/lb	-1653.09 ?	-798.919 ?	-6847.11	-1654.84	-6464.61 ?
Mass Cp	Btu/(lb*°F)	0.464364 ?	0.400976 ?	0.983499	0.584922	0.947972 ?
Ideal Gas CpCv Ratio		1.24824	1.0352	1.32685	1.24035	1.30962
Dynamic Viscosity	cP	0.00977238		1.33069		1.73627
Kinematic Viscosity	cSt	10.1296		1.32952		1.74749
Thermal Conductivity	Btu/(h*ft*°F)	0.0157222 ?		0.336786		0.310536 ?
Surface Tension	lbf/ft			0.00519079		0.00509691 ?
Net Ideal Gas Heating Value	Btu/ft^3	1174.89	8622.07	0	1201.74	60.3735
Net Liquid Heating Value	Btu/lb	20574.9	18077.1	-1059.76	20655.8	196.071

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Stream Properties

Property	Units	Combined Oil & Water Tank Flash Emissions	Flowback Crude	Flowback Water	Gas Lift	Produced Water
Gross Ideal Gas Heating Value	Btu/ft^3	1294.31	9200.76	50.3101	1322.93	114.426
Gross Liquid Heating Value	Btu/lb	22672.9	19298.9	0	22745.1	1266.08

Warnings

ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Combined Oil & Water Tank Flash Emissions
Warning: The temperature of 33.9763 °F is within 10 °F of ice formation.
ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!Produced Water
Warning: The temperature of 33.9763 °F is within 10 °F of ice formation.

Remarks

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Connections

	2	4			
From Block	MIX-101	VLVE-101			
To Block	VLVE-101	VSSL-103			

Stream Composition

Mole Fraction	2 %	4 %			
Carbon Dioxide	0.0204541	0.0204541			
Nitrogen	0.0454091	0.0454091			
Methane	18.7634	18.7634			
Ethane	1.13028	1.13028			
Propane	1.03641	1.03641			
i-Butane	0.314362	0.314362			
n-Butane	0.598016	0.598016			
i-Pentane	0.21879	0.21879			
n-Pentane	0.217688	0.217688			
Hexane	0.172922	0.172922			
Methylcyclopentane	0.044704	0.044704			
Benzene	0.0101007	0.0101007			
Cyclohexane	0.0318005	0.0318005			
Heptane	0.0628988	0.0628988			
Methylcyclohexane	0.034997	0.034997			
Toluene	0.0132473	0.0132473			
Octane	0.0371388	0.0371388			
Ethylbenzene	0.00184798	0.00184798			
m-Xylene	0.00674557	0.00674557			
o-Xylene	0.00159825	0.00159825			
Nonane	0.0182389	0.0182389			
Decane	0.0159326	0.0159326			
Undecane	0.0131357	0.0131357			
C12	0.0129858	0.0129858			
C13	0.0125863	0.0125863			
C14	0.011887	0.011887			
C15	0.0114375	0.0114375			
C16	0.0101889	0.0101889			
C17	0.00928986	0.00928986			
C18	0.00774155	0.00774155			
C19	0.00779149	0.00779149			
C20	0.00689247	0.00689247			
C21	0.00629313	0.00629313			
C22	0.00564384	0.00564384			
C23	0.00509444	0.00509444			
C24	0.0049446	0.0049446			
C25	0.00404558	0.00404558			
C26	0.00414547	0.00414547			
C27	0.00339629	0.00339629			
C28	0.00364602	0.00364602			
C29	0.00424536	0.00424536			
Water	77.0003	77.0003			
c30+	0.0573873	0.0573873			

Molar Flow	2 lbmol/h	4 lbmol/h			
Carbon Dioxide	8.23116E-05	8.23116E-05			
Nitrogen	0.000182736	0.000182736			
Methane	0.0755078	0.0755078			
Ethane	0.00454848	0.00454848			
Propane	0.00417072	0.00417072			
i-Butane	0.00126506	0.00126506			
n-Butane	0.00240654	0.00240654			
i-Pentane	0.000880458	0.000880458			

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Molar Flow	2 lbmol/h	4 lbmol/h			
n-Pentane	0.000876024	0.000876024			
Hexane	0.000695877	0.000695877			
Methylcyclopentane	0.000179899	0.000179899			
Benzene	4.06474E-05	4.06474E-05			
Cyclohexane	0.000127972	0.000127972			
Heptane	0.000253118	0.000253118			
Methylcyclohexane	0.000140835	0.000140835			
Toluene	5.33099E-05	5.33099E-05			
Octane	0.000149454	0.000149454			
Ethylbenzene	7.43668E-06	7.43668E-06			
m-Xylene	2.71456E-05	2.71456E-05			
o-Xylene	6.43172E-06	6.43172E-06			
Nonane	7.33972E-05	7.33972E-05			
Decane	6.41162E-05	6.41162E-05			
Undecane	5.28607E-05	5.28607E-05			
C12	5.22577E-05	5.22577E-05			
C13	5.06498E-05	5.06498E-05			
C14	4.78359E-05	4.78359E-05			
C15	4.6027E-05	4.6027E-05			
C16	4.10022E-05	4.10022E-05			
C17	3.73844E-05	3.73844E-05			
C18	3.11536E-05	3.11536E-05			
C19	3.13546E-05	3.13546E-05			
C20	2.77368E-05	2.77368E-05			
C21	2.53249E-05	2.53249E-05			
C22	2.2712E-05	2.2712E-05			
C23	2.05011E-05	2.05011E-05			
C24	1.98981E-05	1.98981E-05			
C25	1.62803E-05	1.62803E-05			
C26	1.66823E-05	1.66823E-05			
C27	1.36674E-05	1.36674E-05			
C28	1.46724E-05	1.46724E-05			
C29	1.70843E-05	1.70843E-05			
Water	0.309866	0.309866			
c30+	0.000230939	0.000230939			

Mass Fraction	2 %	4 %			
Carbon Dioxide	0.0456427	0.0456427			
Nitrogen	0.0644992	0.0644992			
Methane	15.2626	15.2626			
Ethane	1.72326	1.72326			
Propane	2.31724	2.31724			
i-Butane	0.926439	0.926439			
n-Butane	1.76238	1.76238			
i-Pentane	0.80039	0.80039			
n-Pentane	0.796359	0.796359			
Hexane	0.755579	0.755579			
Methylcyclopentane	0.190763	0.190763			
Benzene	0.040005	0.040005			
Cyclohexane	0.135701	0.135701			
Heptane	0.319568	0.319568			
Methylcyclohexane	0.174231	0.174231			
Toluene	0.0618889	0.0618889			
Octane	0.215104	0.215104			
Ethylbenzene	0.00994774	0.00994774			
m-Xylene	0.0363116	0.0363116			
o-Xylene	0.00860345	0.00860345			
Nonane	0.118609	0.118609			
Decane	0.114943	0.114943			
Undecane	0.104107	0.104107			

* User Specified Values
? Extrapolated or Approximate Values

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Mass Fraction	2 %	4 %			
C12	0.112155	0.112155			
C13	0.117655	0.117655			
C14	0.119573	0.119573			
C15	0.123186	0.123186			
C16	0.116984	0.116984			
C17	0.113269	0.113269			
C18	0.0998967	0.0998967			
C19	0.106083	0.106083			
C20	0.0987443	0.0987443			
C21	0.0946335	0.0946335			
C22	0.0888837	0.0888837			
C23	0.0838545	0.0838545			
C24	0.0849048	0.0849048			
C25	0.0723449	0.0723449			
C26	0.0770794	0.0770794			
C27	0.0655649	0.0655649			
C28	0.0729789	0.0729789			
C29	0.0879948	0.0879948			
Water	70.3361	70.3361			
c30+	1.94394	1.94394			

Mass Flow	2 lb/h	4 lb/h			
Carbon Dioxide	0.00362249	0.00362249			
Nitrogen	0.00511906	0.00511906			
Methane	1.21133	1.21133			
Ethane	0.136768	0.136768			
Propane	0.183911	0.183911			
i-Butane	0.073528	0.073528			
n-Butane	0.139874	0.139874			
i-Pentane	0.0635239	0.0635239			
n-Pentane	0.0632041	0.0632041			
Hexane	0.0599675	0.0599675			
Methylcyclopentane	0.0151402	0.0151402			
Benzene	0.00317505	0.00317505			
Cyclohexane	0.0107701	0.0107701			
Heptane	0.025363	0.025363			
Methylcyclohexane	0.0138281	0.0138281			
Toluene	0.00491189	0.00491189			
Octane	0.017072	0.017072			
Ethylbenzene	0.000789515	0.000789515			
m-Xylene	0.00288191	0.00288191			
o-Xylene	0.000682824	0.000682824			
Nonane	0.00941357	0.00941357			
Decane	0.00912256	0.00912256			
Undecane	0.00826256	0.00826256			
C12	0.00890131	0.00890131			
C13	0.00933787	0.00933787			
C14	0.00949007	0.00949007			
C15	0.00977681	0.00977681			
C16	0.00928459	0.00928459			
C17	0.00898974	0.00898974			
C18	0.00792843	0.00792843			
C19	0.00841938	0.00841938			
C20	0.00783696	0.00783696			
C21	0.00751071	0.00751071			
C22	0.00705437	0.00705437			
C23	0.00665522	0.00665522			
C24	0.00673858	0.00673858			
C25	0.00574174	0.00574174			
C26	0.00611751	0.00611751			

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Process Streams Report
All Streams
Tabulated by Total Phase

Client Name:	ConocoPhilips Alaska Inc.	Job: Flowback Tank Emissions Estimate
Location:	1J-135 CPAI Flowback Emission Estimate (9-29-2018)	
Flowsheet:	Flowsheet1	

Mass Flow	2 lb/h	4 lb/h			
C27	0.00520364	0.00520364			
C28	0.00579206	0.00579206			
C29	0.00698382	0.00698382			
Water	5.58232	5.58232			
c30+	0.154283	0.154283			

Stream Properties

Property	Units	2	4			
Temperature	°F	49.6082	33.9763			
Pressure	psia	589.696	14.6959 *			
Mole Fraction Vapor	%	20.6238	22.708			
Mole Fraction Light Liquid	%	2.30415	0.438556			
Mole Fraction Heavy Liquid	%	77.0721	76.8534			
Molecular Weight	lb/lbmol	19.7222	19.7222			
Mass Density	lb/ft^3	10.3241	0.241444			
Molar Flow	lbmol/h	0.402421	0.402421			
Mass Flow	lb/h	7.93662	7.93662			
Vapor Volumetric Flow	ft^3/h	0.768745	32.8715			
Liquid Volumetric Flow	gpm	0.0958436	4.09826			
Std Vapor Volumetric Flow	MMSCFD	0.0036651	0.0036651			
Std Liquid Volumetric Flow	sgpm	0.0230369	0.0230369			
Compressibility		0.206116	0.226598			
Specific Gravity						
API Gravity						
Enthalpy	Btu/h	-41809.6	-41809.6			
Mass Enthalpy	Btu/lb	-5267.93	-5267.93			
Mass Cp	Btu/(lb*°F)	0.856858 ?	0.827692 ?			
Ideal Gas CpCv Ratio		1.29114	1.29316			
Dynamic Viscosity	cP					
Kinematic Viscosity	cSt					
Thermal Conductivity	Btu/(h*ft*°F)					
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	313.459	313.459			
Net Liquid Heating Value	Btu/lb	5264.54	5264.54			
Gross Ideal Gas Heating Value	Btu/ft^3	382.355	382.355			
Gross Liquid Heating Value	Btu/lb	6590.22	6590.22			

Warnings

ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!2
Warning: The temperature of 49.6082 °F is below hydrate formation.
ProMax:ProMax!Project!Flowsheets!Flowsheet1!PStreams!4
Warning: The temperature of 33.9763 °F is within 10 °F of ice formation.

Remarks

* User Specified Values
? Extrapolated or Approximate Values

ProMax 4.0.16071.0
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Air Quality Control Operating Permit No. AQ0267TVP01, Rev. 2
(issued August 8, 2007)

Fourth Quarter 2018 Operating Report

ED_004016I_00012170-00099

Condition Number	Requirement	Compliance Documentation
54.3	For any of EU IDs 19-28 that have exceeded the IEU threshold of 18 AAC 50.326(e), or any of EU IDs 61-63 that have exceeded the IEU threshold of 18 AAC 50.326(f)(85), or any EU at the stationary source that has actual emissions greater than the IEU emissions thresholds, include documentation of the emission unit emissions in the OR.	This condition was not triggered in this reporting period.
Section 11. Generally Applicable Requirements		
61.5	Include summary information regarding any exclusion zone violations in the OR.	This provision was not triggered in this reporting period.
70.5	Include a summary report about emissions complaints with the OR which includes: 1. Number of complaints received; 2. Number of times COPA or ADEC found corrective action necessary; 3. Number of times corrective action was taken within 24 hours; and 4. Status of corrective action COPA or ADEC found necessary that were not taken within 24 hours.	No complaints were received in this reporting period.
Section 13. General Recordkeeping, Reporting, and Compliance Certification Requirements		
87.1	Attach a copy of any NSPS and NESHAPs reports submitted to EPA Region 10 with the OR unless copies have already been provided to ADEC at time of submittal.	All reports submitted to EPA were provided to ADEC at the time they were submitted to EPA.
88.2a	If excess emissions or permit deviations occurred during the reporting period and were not yet reported, identify: 1. Date of the deviation; 2. Equipment involved; 3. The permit condition affected; 4. A description of excess emissions or permit deviation; and 5. Any corrective action or preventive measures taken and the date	One permit deviation occurred during the reporting period that has not yet been reported to ADEC. The date of the deviation was 10/29/18 when copies of the NSPS Subparts J and GGG reports submitted to EPA on 7/27/18 were not attached to the 3Q 2018 Operating Report that was submitted on 10/29/18. See Attachment 4 for a copy of the report documenting the remaining elements of the permit deviation required by this condition.
Section 16. Visible Emissions and PM Monitoring, Recordkeeping and Reporting		
98.2	If EU IDs 4-9, 12, 13, 15, 18, 19-28, 60, 35 or 36 trigger Condition 98.1, include a summary of the results of all Method 9 readings conducted during the reporting period in the OR.	This condition was not triggered in this reporting period.
99.2	For EU IDs 4-9, 12, 13, 15, 18, 19-28, 60, 35 if Method 9 readings require corrective actions, submit a written record showing the starting date, completion date, and description of any actions taken to reduce visible emissions with each OR.	This condition was not triggered in this reporting period.

ED_004016I_00012170-00100

Attachment 4

Copies of Excess Emission/Permit Deviation Reports Not Previously Submitted to ADEC during the reporting period

(To replace previously submitted Attachment 4)

ED_004016I_00012170-00101

Section 20. ADEC Notification Form

Fax this form to: (907) 451-2187 Telephone: (907) 451-5173

ConocoPhillips Alaska, Inc.
Company Name

Kuparuk Central Production Facility #1
Facility Name

Reason for notification:

☐ **Excess Emissions**
If you checked this box
Fill out section 1

☒ **Other Deviation from Permit Condition**
If you checked this box
fill out section 2

When did the Excess Emissions or Other Deviation occur:
Date: 10/29/2018

When did you discover the Excess Emissions or Other Deviation:
Date: 1/25/2019 Time: 06:30

Section 1. Excess Emissions

(a) Event Information (Use 24-hour clock):

START Time: **END Time:** **Duration** (hr:min):

Total:

(b) Cause of Event (Check all that apply):

☐ START UP ☐ UPSET CONDITION ☐ CONTROL EQUIPMENT
☐ SHUT DOWN ☐ SCHEDULED MAINTENANCE ☐ OTHER

Attach a detailed description of what happened, including the parameters or operating conditions exceeded.

(c) Sources Involved:

Identify each emission source involved in the event, using the same identification number and name as in the permit. List any control device or monitoring system affected by the event. Attach additional sheets as necessary.

Source ID No.	Source Name	Description	Control Device

(d) Emission Limit Potentially Exceeded

Identify each emission standard potentially exceeded during the event. Attach a list of ALL known or suspected injuries or health impacts. Identify what observation or data prompted this report. Attach additional sheets as necessary.

Permit Condition	Limit	Emissions Observed

(e) Excess Emission Reduction:

Attach a description of the measures taken to minimize and/or control emissions during the event.

(f) Corrective Actions:

Attach a description of corrective actions taken to restore the system to normal operation and to minimize or eliminate chances of a recurrence.

(g) Unavoidable Emissions:

Do you intend to assert that these excess emissions were unavoidable?

YES NO

Do you intend to assert the affirmative defense of 18 AAC 50.235?

YES NO

Section 2. Other Permit Deviations

(a) Sources Involved:

Identify each emission source involved in the event, using the same identification number and name as in the permit. List any control device or monitoring system affected by the event. Attach additional sheets as necessary.

Source ID No.	Source Name	Description	Control Device
16	G1-14-01	Born Crude Heater (KUTP)	N/A
30	H-KF01	Kaldair I-58-VS Emergency Flare	N/A
57	-	Kuparuk Unit Topping Plant (KUTP)	N/A

(b) Permit Condition Deviation:

Identify each permit condition deviation or potential deviation. Attach additional sheets as necessary.

Permit Condition	Potential Deviation
24 Except as provided for in condition 25, the Permittee shall submit to the Department and to EPA a written "excess emissions and monitoring systems performance report" (EEMSP) as described in this condition for EU IDs 1 through 14, 16, and 30. Except as provided for in condition 32.9, the Permittee shall submit the EEMSP reports to EPA semi-annually, postmarked by the 30th day following the end of each six-month period.	The Permittee did not submit the Jan – Jun 2018 semi-annual report for NSPS Subpart J to the Deparment for EU IDs 16 and 30.
25 Except as provided for in condition 32.9, the Permittee shall submit to the Department and EPA a "summary report form" semi-annually, postmarked by the 30th day following the end of each six-month period, in the format shown in Figure 1 of 40 C.F.R. 60.7 for each pollutant monitored for EU IDs 1 through 14, 16, and 30.	The Permittee did not submit the report for NSPS Subpart J to the Deparment for EU IDs 16 and 30.
33.3 Record and report according to condtions 24 and 25.	The Permittee did not submit the report for NSPS Subpart J to the Deparment for EU IDs 16 and 30.
34.11 The Permttee shall submit to EPA and the Department semiannual reports.	The Permittee did not submit the Jan – Jun 2018 semi-annual report for NSPS Subpart GGG to the Department for EU ID 57.
87.1 Atttach to the operating report required by condition 88, copies of any NSPS and NESHAPs reports submitted to the U.S. Environmental Protection Agency (EPA) Region 10 as required by conditions 24, 25, 26, 32.6, 32.7, 32.9. 34.11, 45.2. 46.3, 47.2, 63, and 64, unless copies have already been provided to the Department at the time submitted to EPA.	The Permittee did not submit the reports to the Department with the operating report, and the reports were not provided to the Department at the time submitted to EPA.
90 The Permittee must comply with each permit term and condition.	The Permittee did not comply with each permit term and condition.

(c) Corrective Actions:

Attach a description of actions taken to correct the deviation or potential deviation and to prevent recurrence.

Reports were submitted to the Department upon discovery of the deviation.

Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete.

Dennis Melton	Dennis E. Melton	3/12/2019
Printed Name:	Signature:	Date:

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