Commonwealth of Pennsylvania
Department of Environmental Protection
Southcentral Regional Office
September 21, 2017

Subject: Sunoco Pipeline LP/Middletown Station/Mariner East
Addendum Memo
Londonderry Township, Dauphin County
Permit No. 22-03094

To: William Weaver WRW 9/21/17
Regional Manager
Air Quality Program

Thru: Thomas Hanlon, Chief TJH 9/21/17
East Permitting Section
Air Quality Program

From: Darrell Hartline DH 9/21/17
East Permitting Section
Air Quality Program

Comment Period

Copies of the proposed permit were submitted to Mr. Matthew Kraus of Tetra Tech Inc. representing Sunoco Pipeline LP (SPLP) on December 18, 2014. Mr. Kraus did not have any comments other than to provide updated pump station location coordinates.

Notice of the Department's intent to issue the operating permit was published in the Pennsylvania Bulletin on 1/3/15. In response to the posting, DEP received, during the comment period until 2/2/15, 439 form letter emails. 11 similar emails were also received after the end of the comment period, some of them from persons who had earlier commented.

The emails generally addressed the following items:

Comment 1: *requested that DEP reject the Sunoco applications for Shirley Township (Huntingdon County), Londonderry Township (Dauphin County), and Toboyne Township (Perry County) as they would increase local air emissions and set a dangerous precedent for NGL transport through the corridor.*

DEP Response: The air emissions from this facility were determined by DEP to be de minimis, and as such are not expected to result in any measurable health or environmental issues. Furthermore, the permit action under consideration is for an air quality permit for the new pump station, and does not concern the pipeline that runs between the stations.

Comment 2: *requested that DEP hold public hearings on each of these three applications.*

DEP Response: In March of 2015, DEP informed the commenters that "*After considering the public hearing requests received, DEP has concluded that there is not sufficient local interest in any of the three applications to merit holding public hearings. Nevertheless, we are in receipt of your emailed comments, and will consider them prior to taking final action on the affected permits.*"

Comment 3: *requested that DEP conduct a cumulative air quality impact and public safety analysis of the entire Sunoco Mariner East NGL pipeline project, including emissions from the 18 proposed pumping stations, the hydraulically fractured wells at the point of extraction, the MarkWest gas processing facility, the Marcus Hook fractionation and shipping facility, and the fugitive emissions from the entire 350-mile pipeline route.*

DEP Response: DEP believes that it is contrary to law and to recent court decisions, to aggregate, for air permitting purposes, this pump station with other pump stations or facilities on, or connected with the Mariner East pipeline. This facility is neither contiguous with nor adjacent to the other pump stations. Furthermore, the aggregation of this facility with the other pump stations would not meet the common sense notion of a plant.

Copies of a representative example of the form letters received, plus a list of commenters, are included as attachments to this memo. A complete collection of the form letters received can be found in the DEP permit file for the Sunoco Doylesburg permit in Toboyne Township, Perry County.

Addendum Submittal

A permit application addendum was submitted by SPLP on August 29, 2016 (and revised on September 9, 2016) because the emissions associated with the Middletown Station were recalculated based on:

- Updated equipment information including flare pilot gas flow rate,
- More detailed information regarding maintenance activities,
- As-built Piping and Instrumentation Diagrams (P&IDs),
- Current equipment specific emission factors, and
- A more conservative flare emission estimate utilizing the manufacturer's guaranteed design destruction and removal efficiency of 98%.

Also on December 14, 2016, the Environmental Protection Agency issued minor revisions to AP-42 Section 13.5: Industrial Flares. As a result, the VOC emissions from the flare pilot gas increased by 0.02 tpy.

The revised potential emissions estimates based on the summer 2016 submissions and the 12/14/16 AP-42 change were 0.06 tpy of NOx, 0.26 tpy of CO, 0.91 tpy of VOCs, 0.01 tpy of Methane and 116 tpy of GHGs.

On August 31, 2016 the Department received a Request for Determination (RFD) for the additional equipment and modifications required for the installation of the Mariner East II pipeline. The equipment includes a 30 mmbtu/hr enclosed flare, two (2) mainline booster pumps, pig launcher and receiver, prover, two (2) filters and flare knockout tank. The 30 mmbtu/hr enclosed flare replaces a 10 mmbtu/hr enclosed flare. On March 22, 2017 the Department approved an exemption from plan approval for the RFD. The potential to emit from the Mariner II modifications is 0.03 tpy NOx, 0.15 tpy CO, 0.93 tpy VOCs, 0.05 tpy HAPs, 0.01 tpy Methane and 71 tpy GHGs.

The total site potential to emit (Mariner I plus Mariner II) is 0.09 tpy NOx, 0.41 tpy CO, 1.84 tpy VOCs, 0.05 tpy HAPs, 0.02 tpy Methane and 187 tpy of GHGs.

It should be noted that, per an email from Sunoco dated 9/20/17, all of the Mariner II equipment at the affected pump stations *"is installed, but will not be in service until the MEII system is put in service. The only source that is currently in service is the 30 MMBtu/hr Enclosed Flare at Middletown."*

As part of the ongoing review of this permit, the Department has looked further into the issue of aggregation of the facility with other nearby sources owned by SPLP. They provided supplemental information to their aggregation analysis on 2/16/16. The closest facilities identified were the Middletown Junction EFRD Valve located approximately 1.1 miles away and the Susquehanna River East Block Valve located approximately 3.6 miles away. There is no interdependence between operation of the EFRD Valve and the Middletown Station and there is no interdependence between operation of the Block Valve and the Middletown Station. As a result the Department has determined that no emissions need to be aggregated with those of the Middletown Station. Sunoco also included an aggregation analysis in the 8/29/16 application update. This was identical to the 2/16/16 submission.

There is no confidential documentation in the updated application and supporting emails.

Revisions to Draft Permit:

In order to promote regional consistency and consistent permit conditions between the various similar Sunoco sites, the permit conditions for Middletown have been revised to be like those for the recently issued Sunoco West Cornwall permit. The West Cornwall permit was re-drafted for consistency with two Sunoco permits in DEP's Southeast Region. Please refer to the attached addendum memo for West Cornwall, which describes the changes.

Also, the West Cornwall permit was revised to include a minor significance determination for fugitive emissions under 25 Pa. Code Section 123.1. Please refer to the attached second addendum memo for West Cornwall, which describes this determination. Consistent with that action, DEP is also formalizing its determination that the air emissions expected from the Middletown Station, including both stack and fugitive emissions are of minor significance with regard to causing air pollution, and will not, on their own merits, prevent or interfere with the attainment or maintenance of an ambient air quality standard. A condition will be placed in the

operating permit to this effect. DEP makes this determination because the post-control emissions from the site:

1.) do not meet the criteria for needing an air quality permit and
2.) are much smaller than the emissions from many other legally operating sources in the Commonwealth.
3.) have not been shown to cause any environmental problems during normal operation.

Dauphin County is currently designated as attainment for the 2008 ozone NAAQS. Also, since Dauphin County is located within the Ozone Transport Region, it is treated as moderate nonattainment for emission offset purposes. The current certified 2016 ozone design value for Dauphin County shows attainment with the 2015 ozone NAAQS. With regard to particulate pollution, Dauphin County is currently designated as attainment for the 2012 annual PM2.5 NAAQS. As a minor source with post-control emissions below air permit thresholds, the Sunoco Middletown facility is not expected to meaningfully affect local or regional compliance with ambient air quality standards.

The following condition will be placed in Section C of the permit, "The potential fugitive plus stack emissions from this facility, after appropriate control as prescribed in this permit, have been estimated as follows: 0.09 tpy of NOx, 0.41 tpy of CO, 1.84 tpy of VOCs, 0.05 tpy HAPs, 0.02 tpy of Methane and 187 tpy of GHGs. The Department has determined these emissions remaining after appropriate control are of minor significance with regard to causing air pollution, and will not prevent or interfere with the attainment or maintenance of an ambient air quality standard."

The Responsible Official and Permit Contact Person were updated per an email received on August 9, 2017.

Conclusions and Recommendations

I recommend that the revised draft Permit No. 22-03094 be redistributed for comments.

Attachments

cc: Permits/SC Region 22-03094, B3

Table of Contents for Attachments to DEP's Sunoco Middletown Addendum Memo

[1]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
1	Grillo	John	3 Marsh Ln Apt 21	Orono NE 04473	john.grillo@maine.edu	207-949-7323
2	C	Joe	@($)()@)	Collegeville PA 19426	ilraptoro@yahoo.com	800-968-5673
3	Feil	Marvin	69-75 Sparta Ave Apt 112	Newton NJ 78602	mfeil@writeme.com	201-450-8481
4	Frank	Henry & Elaine	2763 Island Rd	Philadelphia PA 19153	henrynco@comcast.net	215-365-6085
5	Foster	Tracy	290 Steelmanville Rd	Egg Habor Township NJ 08234	tarzafeen@yahoo.com	
6	Clemson	G	10151 Dorrell Ln	Las Vegas NV 89166	sclemens@adsrm.org	
7	Kronheim	David	113 Wilson Rd	King of Prussia PA 19406	dkronheim@yahoo.com	484-213-1315
8	C	Amanda	58	Washington PA 15301	campbell soup715@yahoo.com	
9	Maurer	Marilyn & Alan	538 Ballytore Rd	Wynnewood PA 19096	merberm55@hotmail.com	610-649-3393
10	Kagan	David	885 Torbert Ln	Jersey Shore PA 17740	dbkagan@comcast.net	570-753-5547
11	Mclure	Kim	704 Skyline Dr	Lancaster PA 17601	kimrm64@gmail.com	717-283-6991
12	Murray	Linda	49 Prospect St	Mansfield PA 16933	springard@epix.net	
13	Eakin	Tracey	1011 Sheriffs Ct	McMurray PA 15317	traceyeakin@gmail.com	111-985-9666
14	Richardson	David	197 Longford Rd	West Chester PA 19380	Davidmrichardson168@gmail.com	
15	Grossman	Stacy	2745 Allegheny Ave	Bexley OH 43209	stacygandadamg@gmail.com	
16	Henich	Dr. Alexander	Burgwedeltwiete 17	Hamburg ot 22457	alexander.henrich@gmail.com	
17	Henich	Dr. Alexander	Burgwedeltwiete 17	Hamburg ot 22457	alexander.henrich@gmail.com	
18	Danowski	K	15 Bower Hill Rd #801	Pittsburgh PA 15228	silver kd@yahoo.com	412-555-1212
19	Babrick	Carla	1311 N 3rd St	Saint Charles MO 63301	carlajeanbabrick@outlook.com	636-724-4301
20	Essel	Laura	46 Sugar Camp Rd	Scenery Hill PA 15360	lauraessel@fairpoint.net	412-997-2293
21	Leitch	Mary Ann	526 Reed St	Philadelphia PA 19147	maleitch@live.com	215-271-7878
22	Leitch	Mary Ann	526 Reed St	Philadelphia PA 19147	maleitch@live.com	215-271-7878
23	Buchanan	Jo Anne	4935 Hatfield St	Pittsburgh PA 15201	jo anne buchanan@yahoo.com	412-683-2602
24	Allen	Russ & Linda	1510 Grove Ave	Jenkintown PA 19046	rallen@writersstudio.com	215-887-6301
25	Bellas	Jessica	321 Hallock St	Pittsburgh PA 15211	jbellas@usa.net	412-995-8419
26	Leiden	Charles	306 Coleridge	Altoona PA 16602	cleiden@atlanticbb.net	
27	Swartz	Lily	7 Arden Way	New Hope PA 18938	catbird888@yahoo.com	215-862-8031
28	Williams	JoAnn	198 Judith Ln	Media PA 19063	jwsewn@gmail.com	610-565-3365
29	Dalton	Alexander	16059 St Peters Church Rd	Montpelier VA 23192	alexander.dalton@live.longwood.edu	804-513-4516
30	Quick	Jennifer	Box 163	Hummelstown PA 17036	soindebt@hotmail.com	
31	Magee	William	144 W King St	Waynesboro PA 17268	william magee@msn.com	
32	Jernquist	Harriet	195 Main St Apt 5C	Millburn NJ 07041	hjernquist@yahoo.com	
33	Longsworth	Jon		Aptos CA 95001	jon@longsworth.com	
34	Van Eck	Dona	1723 Rialto St	Pittsburgh PA 15212	tycosamspo@aol.com	412-321-5740
35	Leicher	Dorothea	2303 Delancey St	Philadelphia PA 19103	dleicher@dleicher.com	215-732-6283
36		Concerned Citizen	1425 S Lindsay Rd	Mesa AZ 85204	digitalwav@gmail.com	4800000000
37	Matlick	Deven	24 Matlick Ln	Moatsville WV 26405	cmcinfo@rocketmail.com	
38	Marcus	Martin	5015 Greenbriar Ave	San Diego CA 921210	abba eama@yahoo.com	
39	Edgar	Julie	534 North Circle	Bethlehem PA 18018	wldrose71@yahoo.com	484-557-4182
40	Husk	Laurel	77 Church Rd Fl 1	Telford PA 18969	shadowpong@hotmail.com	610-698-7016
41	MacInnes	Diane	11064 Plainview Ave	Tujunga CA 91042	storyscapes@verizon.net	
42	Dietterich	Lee	4529 Spruce St Apt 112	Philadelphia PA 19139	lee.dietterich@gmail.com	

[2]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
43	Dodel	Mark	584 Hickory Valley Rd	Stroudsburg PA 18360	madodel@ptd.net	570-420-9688
44	Marge	Debra	15 North Shamokin St	Shamokin PA 17872	deb7570@hotmail.com	
45	Weeks	Ruby	211 Echo Road	Carlisle PA 17015	rdwesq@embarqmail.com	717-243-3164
46	Weeks	Ruby	211 Echo Road	Carlisle PA 17015	rdwesq@embarqmail.com	717-243-3164
47	Weeks	Ruby	211 Echo Road	Carlisle PA 17015	rdwesq@embarqmail.com	717-243-3164
48	Clair	Paula	162 Gallows Hill Rd	Garrison NY 10524	pclair3@aol.com	845-739-2141
49	Krebs	Kathleen	4146 Gittens St	Pittsburgh PA 15212	krebskutcher@icloud.com	412-761-1593
50	Gottfried	Susan	619 Cricklewood	State College PA 16803	suepurr@lookoutnow.com	
51	Nierenberg	Susan	365 Edgewood Ave	Teaneck NJ 07666	qnbear@aol.com	201-999-9999
52	Pitt	Marla	110 Pennsylvania Ave	Mount Gretna PA 17064	marlalpitt@aol.com	717-964-3786
53	Smith	Catherine F.	246 Brush Mtn Rd PO Box 132	Spring Mills PA 16875	smithcath@ecu.edu	814-422-8486
54	Flanagan-Cato	Lori	525 Prescott Rd	Merion Station PA 19066	flanagan@psych.upenn.edu	215-898-4085
55	Dieter	Kim	2 Beaumont Ln	Devon PA 19333	kimelon1010@yahoo.com	610-585-2571
56	Holden	Linda	1476 Morstein Rd	West Chester PA 19380	holdendubc@gmail.com	
57	Bogue	Renee	204 Willow Ave NE	Massillon OH 44646	boguerri@gmail.com	330-833-7753
58	McAndrew	Shane	911 E Park Sq	Prospect Park PA 19076	lillianmace21@hotmail.com	610-715-1179
59	Westheimer	Eva	2741 Voelkel Ave	Pittsburgh PA 15216	eva.westheimer@gmail.com	513-600-0580
60	Ficara	Suzanne	109 Cooper St	Haddon Township NJ 08108	spf109@yahoo.com	
61	Liskoski	Sonia	7 Mary St	Kennedy Township PA 15108	soniamsl@comcast.net	412-331-5425
62	Richardson	Shannon	197 Longford Rd	West Chester PA 19380	shannond719@gmail.com	
63	Keesler	Kimberly	105 Winston Dr	Mechanicsburg PA 17055	kimberlykeesler@gmail.com	
64	Weinberg	S	111 W Mount Airy Ave	Philadelphia PA 19119	stevwei@oal.com	215-753-6788
65	Bonk	Denise	2608 E Vanango St	Philadelphia PA 19134	dmbonk10@aol.com	215-423-1481
66	Ferrucci	Al	5720 Friendship	Pittsburgh PA 15206	albert.ferrucci@gmail.com	
67	Max	Judith	644 S 54th St	Philadelphia PA 19143	judithmax@gmail.com	215-908-1690
68	Van Eck	Dona	1723 Rialto St	Pittsburgh PA 15212	tycosamspo@aol.com	412-321-5740
69	Henry	Jean	266 Butler Rd	Lebanon PA 17042	jhenry266@aol.com	717-228-9728
70	Cort	John	7426 Singing Hills Dr	Boulder CO 80301	gilamonster@care2.com	
71	Andrews	Claude	PO Box 478	Altantic Beach NC 28512	tweetymedic@ec.rr.com	252-903-6666
72	Koch	R	205 Gaul Rd	Sinking Spring PA 19608	robinfkoch@aol.com	610-678-6020
73	Suarez	Mariu	4429 Stepping Stone Dr	Fort Worth TX 76123	mariusita@aol.com	817-423-0980
74	Bonk	Marliese	1335 Commercial St	Pittsburgh PA 15218	marliese@cs.cmu.edu	412-268-3078
75	Swenson	Jean	600 W Mount Airy Ave	Philadelphia PA 19119	jmacswenson@comcast.net	215-247-5530
76	Hawkins	Don	515 52nd St	Pittsburgh PA 15201	hawk6977@yahoo.com	
77	Rushlau	Mary Anne	447 Cedar St	Jenkintown PA 19046	mary510381@netzero.net	215-886-7294
78	Popko	Jane	142 School House Rd	Palmyra PA 17078	jpopko1@verizon.net	717-838-3291
79	Deutschlander	Wilma	7 Solar Dr	New Providence PA 17560	sugardeut@gmail.com	717-786-0730
80	Deutschlander	Bill	7 Solar Dr	New Providence PA 17560	billastt@gmail.com	717-786-0830
81	Nuss	Julie	3274 Susquehanna Rd	Dresher PA 19025	jrn688@gmail.com	215-555-5555
82	Jenkins	Victoria	405 W Mount Pleasant Ave	Philadelphia PA 19119	vmjdoglove@yahoo.com	215-753-7003
83	Gaal	Tiffany	7911 Heather Rd	Elkins Park PA 19027	tiffanygaal@gmail.com	
84	Popoff	Dave	2510 Alexis Rd	Colville WA 99114	douks77@yahoo.ca	

[3]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
85	Bishop	Pamela	503 First St PO Box 275	Mt Gretna PA 17064	pambishop503@gmail.com	717-574-6453
86	Bremner	Steve	3209 Baring St	Philadelphia PA 19104	stevebremner@fastmail.fm	267-539-1384
87	Bremner	Steve	3209 Baring St	Philadelphia PA 19104	stevebremner@fastmail.fm	267-539-1384
88	Bremner	Steve	3209 Baring St	Philadelphia PA 19104	stevebremner@fastmail.fm	267-539-1384
89	Bremner	Steve	3209 Baring St	Philadelphia PA 19104	stevebremner@fastmail.fm	267-539-1384
90	Bremner	Steve	3209 Baring St	Philadelphia PA 19104	stevebremner@fastmail.fm	267-539-1384
91	Bremner	Steve	3209 Baring St	Philadelphia PA 19104	stevebremner@fastmail.fm	267-539-1384
92	Bremner	Steve	3209 Baring St	Philadelphia PA 19104	stevebremner@fastmail.fm	267-539-1384
93	Burstein	Mimi	27 East Central	Paoli PA 19301	punkin5170@gmail.com	
94	Nicolai	Nicola	2400 Cooper Creek Rd	Chester Springs PA 19425	nicola.6@comcast.net	484-881-1928
95	Marvin	Judith	1075 Hardscrabble Ln	Lewisburg PA 17837	judithmarvin@gmail.com	570-524-5479
96	U Family	The	bethwp	Easton PA 18020	polishprincesspolishprincess@yahoo.com	
97	U Family	The	bethwp	Easton PA 18020	polishprincesspolishprincess@yahoo.com	
98	Albar	Mike	251 Gemini Dr	Hillsborough NJ 08844	malbar2001@hushmail.com	
99	O	Chris	823 Dover Rd	Wynnewood PA 19096	tigger34@mac.com	610-642-5531
100	Thorpe	Emily	1891 Esther Dr	Carlisle PA 17013	emilygthorpe@gmail.com	301-787-4597
101	Cooper	Carolyn	7175 Uber St	Philadelphia PA 19138	cooperlasalle@aol.com	215-224-2535
102	Mooney	Brian	607 Pennsylvania Ave	Palmyra NJ 08065	searching4rinoa@gmail.com	
103	Tompkins	Walker	1245 Victoria Ln	West Chester PA 19380	wctompkins@verizon.net	610-431-1565
104	Mannarelli-Agostine	Gina	510 W 31	Erie PA 16508	ginajagger@hotmail.com	
105	Coulson	Valerie	102 Frogtown Rd	Pequea PA 17565	vcoulson@comcast.net	717-284-5097
106	Foster	Beverly	364 Conestoga Rd	Wayne PA 19087	hwlyfstr@aol.com	
107	Evans	Sherlene	1945 Olive St	Reading PA 19604	sherlene317@comcast.net	
108	DeLuca	Patricia	123 Inleta Blvd	Nokomis FL 34275	rickscustompainting@comcast.net	941-223-1176
109	Schmidt	Diana	274 Thomastown Rd	Tyrone PA 16686	schmidtfit@earthlink.net	814-684-5334
110	Wenzel	Joseph	33 Larpenteur Ave E	Maplewood MN 55117	josephwenzel@msn.com	
111	Behl	Dan	18 James Hayward Rd	Glen Mills PA 19342	dmb193@hotmail.com	858-336-4533
112	Hofmann	Merle	906 Country Club Heights #103	Quincy IL 62301	merlehofmann@yahoo.com	217-960-1021
113	Kostis	Steven	261 W 28th St Apt 2C	New York NY 10001	steventhechipmunk@mac.com	212-643-1525
114	Libbey	Patricia	379 Ripka St Apt 3B	Philadelphia PA 19128	patricia.libbey@verizon.net	215-983-4451
115	Bove	Roger	325 Holly Rd	West Chester PA 19380	rebove@post.harvard.edu	610-692-2742
116	Myers	Linda	9075 Playhouse Rd	Petersburg PA 16669	horsefarm85@gmail.com	
117	Moore	Susan	210 Brown St	Philadelphia PA 19123	msusan@temple.edu	
118	Anderson	Carl	907 Bullock Ave	Yeadon PA 19050	carl907anderson@yahoo.com	
119	Sullenberger	Nathan	185 Winfield Circle	Greensburg PA 15601	acount652140@gmail.com	
120	Sullenberger	Nathan	185 Winfield Circle	Greensburg PA 15601	acount652140@gmail.com	
121	Jackson	Anne	PO Box 516	Morgantown PA 19543	buggarden@dejazzd.com	610-286-9676
122	Nelson	Thomas	105 Drexel Ave	Lansdowne PA 19050	twnelson@erols.com	610-626-2577
123	Snyder	Lori	962 Centennial Rd	New Oxford PA 17350	secretfilly@gmail.com	717-870-6919
124	Cuda	John	7716 Brashear St	Pittsburgh PA 15221	jrstar237@yahoo.com	
125	Goodman	Margaret	51 Broomall Lane	Glen Mills PA 19342	messgwg@gmail.com	610-455-3896
126	Roseberry	Bill	823 Cathill Rd PO Box 496	Sellersville PA 18960	wlroseberry@yahoo.com	215-431-0460

[4]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
127	Clemson	G	10151 Dorrell Lane	Las Vegas NV 89166	sclemson@adsrm.org	
128	Heiland	William	4511 Old Lincoln Hwy	Oakford PA 19053	14hei@gmx.com	215-322-1016
129	Walker	Roger II	3805 University Dr	Pittsburgh PA 32806	delta shadow1@yahoo.com	407-924-5886
130	El-Dehaibi	Fayten	4264 Minnesota St	Pittsburgh PA 15217	trustyhawk@gmail.com	
131	Garescher	Marie	96 Main St	Tarrytown NY 10591	marfogar@gmail.com	914-631-3590
132	Hunt	Catherine	309 Rivercrest Dr	Piscataway NJ 8854	cchunt205@yahoo.com	205-821-1209
133	Glatz	James	121 Southerton Ln	Greentown PA 18426	jimsjams0329@riseup.net	
134	Buhowsky	Joe	83 Tahoe Court	San Ramon CA 94582	jbuhowsky@sbcglobal.net	
135	Lehrbach	Otto	282 Treichler Rd	Alburtis PA 18011	ojay@ojlehrbach.com	610-845-3857
136	Martin	Marilyn	6020 Loganwood Dr	Rockville MD 20852	marilynlmartin@msn.com	301-881-8519
137	Koelle	Spencer	210 Idlewild Ln	Media PA 19063	42sbkoelle@gmail.com	484-751-7555
138	Noll	Rachel	1673 Louser Rd	Annville (South) PA 17003	rrnoll@comcast.net	
139	Gilman	Cynthia	9 Chestnut Ave	Narberth PA 19072	cyngilman@comcast.net	610-506-1177
140	Schade	Tania	309 Sunset Ave Apt 102	Asbury Park NJ 07712	coreyschade@hotmail.com	
141	Asturino	Frank	5679 Steubenville Pike	McKees Rocks PA 15136	tt.id70@yahoo.com	412-788-4017
142	Fake	Laura	443 W High St	Womelsdorf PA 19567	lfake456@gmail.com	
143	Van Velson	Nathan	410 Alden Dr	Lancaster PA 17601	nathan.vanvelson@huskers.unl.edu	402-270-0163
144	Cornell	Lila	338 Norman Dr	Cranberry Twp PA 16066	ginkgo@zoominternet.net	724-776-8246
145	Parker	Paul	60 Morrow Rd	Avella PA 15312	pparker@cobweb.net	724-344-3676
146	Parker	Paul	60 Morrow Rd	Avella PA 15312	pparker@cobweb.net	724-344-3676
147	Ramos	Joann	64 Fiume St	Iselin NJ 08830	joannspa@yahoo.com	
148	Moyer	Bruce	602 Halteman Rd	Souderton PA 18964	bhmoyer@yahoo.com	215-723-6329
149	Shelton	Susan	221 Oxford Rd	West Chester PA 19380	skemp321@aol.com	
150	Morris	Chrys	3259 Burgettstown Rd	Imperial PA 15126	chrysmorris@yahoo.com	724-899-3620
151	Metas	Nicole	71308 Delaire Landing Rd	Philadelphia PA 19114	nickym5@aol.com	215-637-0486
152	Sciabarrasi	Rachel	S 5th St	Philadelphia PA 19147	raeannes@gmail.com	
153	Margerum	John	3232 W Penn St	Philadelphia PA 19129	jmargerum1@gmail.com	215-849-3936
154	Hoenigswald	Frances	4625 Pine St F505	Philadelphia PA 19143	fhoenigs@pobox.upenn.edu	215-727-1973
155	Witkus	Karen	7 Belvidere St	Pittsburgh PA 15205	karwi06@hotmail.com	412-921-3646
156	Och	Evelyn	803 S Negley Ave	Pittsburgh PA 15232	evie.och@gmail.com	412-302-9022
157	Horowitz	Laura	6544 Darlington Rd	Pittsburgh PA 15217	12newmoons@gmail.com	
158	Bookheimer	Donna	31B Douglass House	Douglassville PA 19518	vampire524@yahoo.com	484-553-4783
159	Schacht	Timothy	1330 Whittier Rd	Grosse Pointe Park MI 48230	drtim@speakeasy.net	313-884-0263
160	Kagan	David	885 Torbert Ln	Jersey Shore PA 17740	dbkagan@comcast.net	570-753-5547
161	Lawrence	Michael	10 Saxony Dr	Harrison City PA 15636	meekel82@gmail.com	412-848-7552
162	Wilson	William	32 S 19th St	Allentown PA 18104	bbill481959@yahoo.com	610-393-0942
163	Schmid	Linda	109 Whitby Pl	Gibsonia PA 15044	leschmidt@gmail.com	724-443-0169
164	Miller	Jack	130 Delong Rd	Middleburg PA 17842	jmiller1018@yahoo.com	570-837-6546
165	Underwood	Todd	424 Fairview Dr	Kutztown PA 19530	tjunderwood@gmail.com	
166	Shuben	Jeffrey	46204 Delaire Landing Rd	Philadelphia PA 19114	jeffreyshuben@yahoo.com	215-632-2933
167	Shuben	Jeffrey	46204 Delaire Landing Rd	Philadelphia PA 19114	jeffreyshuben@yahoo.com	215-632-2933
168	Bush	Marie	7 Ashlawn Rd	Malvern PA 19355	jbush7@hotmail.com	

[5]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
169	Boone	Merrill	528 N Oxford St	Arlington VA 22203	merrillboone@yahoo.com	703-527-5030
170	Dzwil	Beth	8106 Hull Dr	Wyndmoor PA 19038	dbzwil@aol.com	215-920-1526
171	Kinslow	Janis	514 Schick Rd	Aston PA 19014	kinslowja@comcast.net	610-361-3490
172	Kinslow	Janis	514 Schick Rd	Aston PA 19014	kinslowja@comcast.net	610-361-3490
173	Boyne	Jonathan	Kakela Dr	Honolulu HI 96822	boyne@hawaii.edu	
174	Clemens	Kim	439 S Wyomissing Ave	Shillington PA 19607	kimberlyclemens@aim.com	
175	Salvador	Dr. Patricia	7601 NW 13th Ct	Plantation FL 33322	doctora2salvador@gmail.com	954-840-5759
176	Parker	Patricia	211 N 2nd St	Lewisburg PA 17837	pparker2112@gmail.com	570-523-6416
177	Tucker	Jeffrey & Miriam	41 Solebury Mtn Rd	New Hope PA 18938	jefftucker@comcast.net	215-862-2498
178	Geiger	Melinda	74 Seldom Seen Rd	Bradford Woods PA 15015	imgeiger@mac.com	724-799-2142
179	Davey	Robert	539 Willow Ave	Scotch Plains NJ 07076	robertedavey@gmail.com	
180	Fishkin	Lana	171 Gramercy Rd	Bala Cynwyd PA 19004	lanafishkinmd@gmail.com	610-667-3789
181	Schumacher	M. A.	2704 Mohican Ave	Independence MO 64057	mas2704mo@yahoo.com	795-1945
182	Walker	Christopher	2910 Breckenridge	Benton AR 72015	amrak63@outlook.com	
183	Menasian	Stephen	1724 Independent Rd	Breinigsville PA 18031	scm@menasians.com	610-285-6116
184	Brinker	Mary Jo	161 Leonhardt Lane	Ellwood City PA 16117	naacmail@yahoo.com	724-674-0471
185	Lowans	Jennifer	219 Wilkson Ln	Fayetteville PA 17222	ezrawey@gmail.com	717-352-3842
186	Mullen	Charles	6100 Ronald St NW	Canton OH 44718	c.b.mullen@sbcglobal.net	330-280-6727
187	Scriptunas	Judy	3434 Camp Robin Hood Rd	Chambersburg PA 17202	script@embarqmail.com	717-263-8751
188	Ali	Salim	209 Prospect St Apt 405	East Orange NJ 07017	salsunali@gmail.com	
189	Wiilliams	Rebecca	499 Schubert Rd	Bethel PA 19507	bwilliamstaxi@yahoo.com	
190	D.R.	Alice	492C Heritage Hills	Somers NY 10589	alice drosenfeld@gmail.com	111-11-1111
191	Wiilliams	Rebecca	499 Schubert Rd	Bethel PA 19507	bwilliamstaxi@yahoo.com	
192	Weeks	Constance	191 Echo	Chambersburg PA 17202	cweeks191@comcast.net	
193	Guttenberg	Marta	226 W Rittenhouse Sq	Philadelphia PA 19103	martaguttenberg@comcast.net	215-545-2997
194	Prudente	Vincent	1826 Fitzwater St	Philadelphia PA 19146	pruv9@verizon.net	
195	Mayes	Peter	418 Anthwyn Rd	Narberth PA 19072	prmayes@gmail.com	610-660-8299
196	Saberi	Poun	1504 Montrose St	Philadelphia PA 19146	pounesaberi@yahoo.com	215-686-2018
197	Saberi	Poun	1504 Montrose St	Philadelphia PA 19146	pounesaberi@yahoo.com	215-686-2018
198	Kreiner	Dennis	2307 Arrow St	Carpentersville IL 60110	djkreiner2@comcast.net	847-426-0418
199	Smolenski	Chet	3818 Windover Rd	Murrysville PA 15668	cpsmolenski@windstream.net	724-327-6935
200	Damewood	Robert	312 Belonda St	Pittsburgh PA 15211	bob siewhui@comcast.net	
201	Goodstone	Sandra	24 Steeplechase Rd	Millstone NJ 08535	sgoodstone@optonline.net	
202	Hall	Dinorah	PO Box 71288	Albany GA 31708	deh5400@bellsouth.net	
203	Criste-Troutman	Neil	139 Trinity Hill Rd	Mount Pocono PA 18344	revorg4@ptd.net	
204	Colon	Victor	2401 Berkley Rd	Reading PA 19605	boegyvic1@aol.com	
205	Gregory	Probyn	10877 Deliban St	Tujunga CA 91042	probyngregory@gmail.com	818-273-9301
206	Snyder	Brad	8887 Dallas Lane N	Maple Grove MN 55369	bksnyder1@hotmail.com	
207	Gregory	Probyn	10877 Deliban St	Tujunga CA 91042	probyngregory@gmail.com	818-273-9301
208	Caolo	Rosemary	1512 E Gibson St	Scranton PA 18510	rosemary.caolo@verizon.net	570-347-6665
209	Gallagher	Janet	1214 75th St W	Bradenton FL 34209	janet gallagher@verizon.net	941-567-7159
210	Hill	Ginger	PO Box 226	Lyman SC 29365	glhendersonville@yahoo.com	123456789

[6]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
211	Soso	Michael	409 Todd St	Pittsburgh PA 15221	mikesoso@aol.com	412-527-2168
212	Soso	Michael	409 Todd St	Pittsburgh PA 15221	mikesoso@aol.com	412-527-2168
213	March	Robert	1455 Maplewood St	Warren OH 44483	obobmike79@yahoo.com	330-394-5687
214	Williams	JoAnn	108 Judith Ln	Media PA 19063	jwsewn@gmail.com	610-565-3365
215	Minich	Christopher	313 Roberts Rd	Lewis Run PA 16738	mystryman7@yahoo.com	814-558-7537
216	Gajate	Ming	1305 Mary Jane Ln	West Chester PA 19380	minggpa@aol.com	
217	Driscoll	Joseph	1329 Dunsinane Dr	West Chester PA 19380	gweezpie@yahoo.com	
218	Krow	Jessica & Grant	3118 W Penn St	Philadelphia PA 19129	jbkrow@gmail.com	215-843-0628
219	Dunleavy	Tim	537 Cricklewood Dr	State College PA 16803	duntim77@yahoo.com	412-225-5562
220	O'Donnell	Richard	29 Middleton Rd	Wolfeboro NH 03894	elderwolfe@hotmail.com	
221	Brownfield	Harry & Jill	74 Acker Rd	Newport PA 17074	hbrown6905@aol.com	
222	GanMoryn	Croitiene	6211 SE 24th Ave	Ocala FL 34480	adanto@jps.net	
223	Scott	Patti	5092 Buss Dr	Emmaus PA 18049	patriciabscott@gmail.com	610-966-2622
224	Jacobel	Richard	PO Box 781	Oakhurst CA 93644	bmccc2001@yahoo.com	
225	Gurschke	Barbara	La Loma Dr PO Box 4134	Medford OR 97501	barbaragurschke@yahoo.com	
226	Armon	Chara	309 Dogwood Ln	Wallingford PA 19086	chara.armon@gmail.com	610-565-2248
227	Bensetler	Shirley	333 Brookside Ave	Cresskill NJ 07626	ammi333@yahoo.com	201-999-9999
228	Herman	Joan	1127 Nottingham Dr	West Chester PA 19380	djerman@verizon.net	484-432-7450
229	Bensetler	Shirley	333 Brookside Ave	Cresskill NJ 07626	ammi333@yahoo.com	201-999-9999
230	Carney	KC	S Evaline St	Pittsburgh PA 15224	zimakc@aol.com	
231	Hartley	Mary	1319 Woodlawn St	Pittsburgh PA 15221	harpar1130@comcast.net	412-731-3377
232	Reidy	Mykie	99 Parkridge Ln	Pittsburgh PA 15228	mykiereidy@gmail.com	412-952-1129
233	Reiter	Margaret	151 View Court	Saylorsburg PA 18353	mreiter@ptd.net	
234	Miller Jr	Michael	1512 Spruce St Apt 809	Philadelphia PA 19102	michamille@comcast.net	267-235-7490
235	McNeil	Sherry	170 Royal Oak Dr	Butler PA 16002	smcneil@zoominternet.net	724-481-1818
236	Belknap	Robert	900 Hillsborough St	Raleigh NC 27603	rebelknap@sms.edu	
237	Ferry	Tom	7 Justin Ln	Coatesville PA 19320	tom-ferry@excite.com	484-368-9748
238	Pinto	Lou	4438 Pennypack St	Philadelphia PA 19136	julianne.pinto@comcast.net	215-338-0352
239	Goff	Bert	65 Legion Rd	New Milford CT 06776	bert@tristoe.net	123-456-9876
240	Pinto	Lou	4438 Pennypack St	Philadelphia PA 19136	julianne.pinto@comcast.net	215-338-0352
241	Erceg	George	3079 Donnellville Rd	Natrona Heights PA 15065	rubot@comcast.net	724-681-1513
242	Yuen	Andrew	PO Box 42	Mount Pocono PA 18344	bgyuen@hotmail.com	570-894-0972
243	Rohrer	John	220 Loring Ct	New Cumberland PA 17070	john.rohrer4@icloud.com	
244	Frymoyer	Allison	600 Allenby Ave #1	Pittsburgh PA 15218	afrymoyer@gmail.com	5555555555
245	Cross	Robert	800 Diamond St	Williamsport PA 17701	rcross@equinoxltd.com	570-326-4657
246	Koppel	Evelyn	125 Valley	Mt Gretna PA 17064	koppelonpencoyd@yahoo.com	
247	Nakonecznyj	Dave	129 Shire Ln	Wernersville PA 19565	nokwurst@hotmail.com	
248	Foran	Judith	1614 W 6th St	North Platte NE 69101	ja forn@yahoo.com	
249	Petersen	Elsa	264 Colonial Heritage Pk	Doylestown PA 18901	tracksnrhythm@aol.com	267-243-4091
250	Jenkins	Jeffrey	210 Gunsmoke Dr	Diamond Bar CA 91765	jjenkin3@gmail.com	909-867-5309
251	Winnay	Patricia	5658 S Deer Run Rd	Doylestown PA 18902	mstottie@comcast.net	215-794-3647
252	Bross	CT	Adak Ct	Walnut Creek CA 94597	ctbis@sbcglobal.net	

[7]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
253	Mullis	Rita	9830 Hanging Moss Trl	Mint Hill NC 28227	ritamullis@gmail.com	
254	Edelman	William	529 Simms St	Philadelphia PA 19116	edelbill713@gmail.com	267-344-8475
255	Revesz	Mr & Mrs Bruce	103 The Fairway	Cedar Grove NJ 07009	nogbrutrpt@gmail.com	
256	Molsen	Elizabeth	3100 Princeton Pl	Lawrenceville NJ 8648	emolsen@ispor.org	
257	Harkins	Fran	3700 Venango Ave	Munhall PA 15120	franceseh@aol.com	412-461-0178
258	Rowe	Kenneth	4253 Promontory Ct	Loveland CO 80537	electfry@yahoo.com	970-619-8580
259	Rolston	Pat	PO Box 120	Mount Tabor NJ 07878	patrolston@optonline.net	
260	Jaeger	Inga	1019 2nd Ave	Iowa City IA 52240	ingerbell84@yahoo.com	319-471-0085
261	Meade	D	1804 Jefferson Ave	Lewisburg PA 17837	dmeade2@gmail.com	
262	Moisset	Beatriz	28 Twin Brooks Dr	Willow Grove PA 19090	bmoisset@aol.com	
263	Talbot	J	305 W Milton	Austin TX 78704	talbot@talbotworld.com	
264	Cohen	Al	142 Hoernerstown Rd	Hummelstown PA 17036	ajc142@verizon.net	717-756-1372
265	Hayes	David	6 Hersey St #2	Salem MA 19704	brzrkr99@yahoo.com	978-744-3376
266	Claus	Carol	651 Foxcroft Circle SE	Marietta GA 30067	cdclaus@mindspring.com	770-955-5119
267	Claus	Carol	651 Foxcroft Circle SE	Marietta GA 30067	cdclaus@mindspring.com	770-955-5119
268	Hardy	Herman	1601 Penn Ave	Pittsburgh PA 15221	hermanhardypgh@yahoo.com	
269	Keeney	Ron	101 Russell St	Warren PA 16365	roadroverk@aol.com	
270	Dempsey	Stephen	503 Glenville Rd	Cochranville PA 19330	chairman@epix.net	610-593-7371
271	Nathan	Janice	633 Hastings St	Pittsburgh PA 15206	janaz5@aol.com	412-363-8388
272	Bauer	Bruce	PO Box 1604	Medford OR 97501	bbauer1942@yahoo.com	
273	Brinton	Jasper	1044 Western Rd	Phoenixville PA 19460	jasperbrinton@mac.com	610-935-2851
274	McShane	Mari	333 Lucille St	Pittsburgh PA 15218	mcshane@stat.cmu.edu	412-247-0754
275	Cavallo	Janet	1276 Providence Rd	Secane PA 19018	squirrelbuddy@aol.com	610-328-1621
276	MacDougall	Scott	125 Mercer St #1	Jersey City NJ 07302	turasior@gmail.com	973-997-8452
277	Zazow	Jamie	733 Marine St	Santa Monica CA 90405	jzazow@roadrunner.com	310-699-6950
278	MacDougall	Scott	125 Mercer St #1	Jersey City NJ 07302	turasior@gmail.com	973-997-8452
279	Zazow	Bernice	2401 Pennsylvania Ave Apt 2C41	Philadelphia PA 19130	jzazow@adelphia.net	215-235-4349
280	Bible	Lee	155 Cherry Ln	Abbottstown PA 17301	acadiahigh@yahoo.com	717-855-0282
281	Cush	Dan	206 10th St	Aspinwall PA 15215	naha1111marti@comcast.net	412-781-6978
282	Showers	Sterling	619 N Hartley St	York PA 17404	srs7837@yahoo.com	717-848-1265
283	Meltzer	Gwenn	1847 Constitution Ave 506	Woodlyn PA 19094	gween2006@hotmail.com	610-499-5095
284	Kohn	Frank	6655 McCallum St	Philadelphia PA 19119	frank.j.kohn@gmail.com	215-843-8681
285	Bianco	Dominica Lo	609 Convent Rd	Aston PA 19014	lobianco12@yahoo.com	610-558-7742
286	Kettell	Meg	114 India St	Brooklyn NY 11222	megkettell@gmail.com	
287	Shaak	Susan	3440 Stoner Ave	Reading PA 19606	mgsatmsc@gmail.com	610-779-5360
288	Mathews	Arthur	Fay Place	Summit NJ 07901	artmathews@verizon.net	
289	Jankus	Murray	One Makefield Rd Apt J-381	Morrisville PA 19067	mjankus@comcast.net	215-208-7378
290	Smith	Catherine	383 Olde House Ln	Media PA 19063	catheris@mindspring.com	215-988-2700
291	Dabrowski	Damien	633 Tasker St	Philadelphia PA 19148	damien.dabrowski@gmail.com	
292	Bertonaschi	Michael	6404 Ten Point Cir	Trafford PA 15085	michaelbertonaschi@comcast.net	
293	Barve	Purnima	427 Dorothy Dr	King of Prussia PA 19406	purnima.barve@gmail.com	610-724-9398
294	Todd	Steve	629 Bullfrog Valley Rd	Hummelstown PA 17036	steventodd@hotmail.com	

[8]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
295	Schreiber	John	4471 Nottingham Way	Hamilton NJ 08690	jfschreib@gmail.com	
296	Roessler	Leslie	1942 Sycamore St	Bethlehem PA 18017	kuykens@ptd.net	610-814-0715
297	Mattison	Priscilla	138 Montrose Ave Apt 28	Bryn Mawr PA 19010	sallymattison@gmail.com	610-527-3102
298	Stamm	Karen	366 Broadway 11B	New York NY 10013	oks.cdm@gmail.com	
299	Becker	Elaine	2514 Sharmar Rd	Roanoke VA 24018	elainebecker@yahoo.com	
300	Deason	Bartley	PO Box 1060	Darby MT 59829	iambart@q.com	
301	Schatz	Vivian & Albert	6907 Sherman St	Philadelphia PA 19119	vivianschatz@earthlink.net	215-843-2051
302	Schatz	Vivian & Albert	6907 Sherman St	Philadelphia PA 19119	vivianschatz@earthlink.net	215-843-2051
303	Mariani	Louis	403 Virginia Ave	Whitehall PA 18052	sybersyk@yahoo.com	610-435-4042
304	Lombardi	Michael	19 Morning Glory Ln	Levittown PA 19054	mike.lombardi@rcn.com	215-547-7096
305	Sokol	Marianna	1317 Elk Grove Rd	Benton PA 17814	madrona@epix.net	570-925-5266
306	Lombardi	Michael	19 Morning Glory Ln	Levittown PA 19054	mike.lombardi@rcn.com	215-547-7096
307	Yarter	E C	7725 Blanco Wash Trail	Marana AZ 85653	ecyarter@mindspring.com	520-444-2514
308	Berardi	Lawrence	239 N Marshall St	Lancaster PA 17602	l.berardi22@gmail.com	
309	Hamburg	Bob	532 Georgian Rd	Glenside PA 19038	bhanomalous7@gmail.com	
310	Bonn	Anne	201 W Evergreen Ave	Philadelphia PA 19118	chanib1@verizon.net	215-849-3478
311	Miller	Tim	4601 Flat Rock Rd	Philadelphia PA 19127	timmiller203@gmail.com	330-280-1573
312	Bonn	Anne	201 W Evergreen Ave	Philadelphia PA 19118	chanib1@verizon.net	215-849-3478
313	Riley	Kelly	1343 Needham Cir	Hatfield PA 19440	khanlon74@yahoo.com	215-534-3972
314	Carty	Susan	1507 Von Steuben Dr	West Chester PA 19380	sc51446@aol.com	610-692-2139
315	DeMillion	Frances	713 Arbor Ln	Kennett Square PA 19348	fran@demillion.com	610-444-3644
316	Spiegelberg	Barbara J	240 Steinman Farm Rd	Pequea PA 17565	mediate@epix.net	717-284-2485
317	Wood	Hannah	615 Bethlehem Pike	Erdenheim PA 19038	ascabcoruja@gmail.com	610-762-7384
318	Canright	Rebecca	8 Deboer Farm Ln	Asbury NJ 08802	rebeccagroovypeace@gmail.com	
319	DeMillion	Frances	713 Arbor Ln	Kennett Square PA 19348	fran@demillion.com	610-444-3644
320	Rawling	Doug	709 Swarthmore Dr	Newark DE 19711	adrawling@gmail.com	
321	Canright	Rebecca	8 Deboer Farm Ln	Asbury NJ 08802	rebeccagroovypeace@gmail.com	
322	Snell	Barbara	PO Box 473	Gallatin TN 37066	bj.snell@comcast.net	615-555-1212
323	Dunlap	Dorothy	4041 Murray Ave	Pittsburgh PA 15217	weednbead@aol.com	724-538-3656
324	Snavely	Marie	445 S Cedar St	Lititz PA 17543	fatmainecat@yahoo.com	717-626-5195
325	Sadowskas	Bruce	472 Pennsylvania Ave	Reading PA 19606	besad@ptd.net	610-779-9698
326	Sharlock	Clark	4782 Havana Dr	Pittsburgh PA 15239	getyoursharkware@aol.com	
327	Cohen MD	Robert M	2401 Pennsylvania Ave	Philadelphia PA 19130	folkdoc@comcast.net	215-732-2448
328	Miller	Jack	130 Delong Rd	Middleburg PA 17842	jmiller1018@yahoo.com	570-837-6546
329	Sharlock	Lois	1121 McCauley Dr	Pittsburgh PA 15235	loiss1121@verizon.net	724-372-2188
330	Amory	James	228 Squires Ave #R1	Endicott NY 13760	cheeseresource@me.com	
331	Vogelsong	Patrick	443 W Penn St	Carlisle PA 17013	pvoge73@zoho.com	717-574-3847
332	Cutler	Barry	115 Wyndmoor Rd	Springfield PA 19064	bcutler529@gmail.com	610-715-0556
333	Vasko	Terri	128 W Liberty Rd	Slippery Rock PA 16057	rockhopperztl@aol.com	
334	Dunlap	Tess	258 Needle Point Rd	Evans City PA 16057	treehug999@aol.com	724-538-3656
335	Wolferman	Sondra	112 Buckhill Rd	Albrightsville PA 18210	jperrin21@hotmail.com	570-722-0627
336	Landau	Doug	150 73 St S	St Petersburg FL 33707	popcomic@tampabay.rr.com	9999999999

[9]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
337	Snyder	Lori	962 Centennial Rd	New Oxford PA 17350	secretfilly@gmail.com	717-870-6919
338	Sharlock	Gary	1121 McCauley Dr	Pittsburgh PA 16057	luvbiketrials@aol.com	412-372-2188
339	Craig	Larry	128 W Liberty Rd	Slippery Rock PA 16057	getsharkware@aol.com	724-504-1047
340	Adams	Peter	2728 Shelly St	Pittsburgh PA 15203	padams89@gmail.com	610-416-5844
341	Craig	Bonnie	128 W Liberty Rd	Slippery Rock PA 16057	getsharkware@aol.com	724-504-1047
342	Young	John	5 Park Ln	Pocono Manor PA 18349	jyoung333@gmail.com	
343	Sharlock	Leslie	128 W Liberty Rd	Slippery Rock PA 16057	getsharkware@aol.com	724-504-1047
344	Eichelberger	Gary	1713 Spruce St 4th Fl	Philadelphia PA 19103	gleichelberger@msn.com	215-893-9859
345	Oropeza	Carlos	106 Ava Ave	Somerdale NJ 08083	carlos oropeza1@yahoo.com	
346	Hildebrand	Virginia	1445 S Main Rd	Mountain Top PA 18707	nespass@frontiernet.net	
347	Loser	Elizabeth	1876 Deerfield Dr	Dover PA 17315	lloser11411@comcast.net	717-887-6633
348	Gibb	Robert	5036 Revenue St	Homestead PA 15120	rngibb@earthlink.net	412-461-4483
349	Barron	Mikail	110 Arrow Ln	Felton CA 95018	icebear@cruzio.com	
350	Heller	Michael	30 E Jefferson St	Media PA 19063	mheller01@hamline.edu	215-519-5279
351	Poulson	Judi	1881 Knollwood Dr	Fairmont MN 56031	judpeace@gmail.com	507-235-5288
352	Solomon II	M	Rauch	Harrisburg PA 17109	msolomll@gmail.com	
353	Herrington	George	1679 Washington Rd	Pittsburgh PA 15216	g.r.herrington.realestate@gmail.com	412-283-0160
354	White	Beulah	2605 El Camino Dr	Middletown OH 45044	bswhite@att.net	000 000 0000
355	Melton	John & Karen	3232 W Penn St	Philadelphia PA 19129	karen.melton59@gmail.com	215-844-4612
356	Steininger	Bob	100 Westridge Place S	Phoenixville PA 19460	steininger.bob@gmail.com	
357	Fiedler	David	5188 Judson Dr	Bensalem PA 19020	davefiedler@comcast.net	215-244-1101
358	Saltzman	Susan	1420 Locust St #23M	Philadelphia PA 19102	scsaltzman@aol.com	215-732-9769
359	Baker-Smith	Gerritt & Elizabeth	338 Braeside Ave	East Stroudsburg PA 18301	egbakersmith@gmail.com	570-369-4485
360	Greene	David	283 Carpenter Ln	North Huntingdon PA 15642	david.greene5@comcast.net	412-673-0504
361	Greene	David	283 Carpenter Ln	North Huntingdon PA 15642	david.greene5@comcast.net	412-673-0504
362	Fox	Kathy	1513 Elm St	Bethlehem PA 18017	kathyafox@yahoo.com	908-319-8418
363	Girvin	Curtis	312 N 39th St	Harrisburg PA 17109	curtis.girvin@verizon.net	717-587-8018
364	Oerke Jr	Carl	264 Lexington Dr	River Edge NJ 07661	carl oerke@yahoo.com	201-489-0867
365	Hart	Kathy	12 Summit Ln	Succasunna NJ 07876	kathyyhart@gmail.com	
366	Kline	Debra	Bolivar	Bradford PA 16701	dkline8989@yahoo.com	
367	Radell	Peter	508 5th St	Mt Gretna PA 17064	s.putnik@verizon.net	717-503-6771
368	Comella	John	1900 JF Kennedy Blvd Apt 1624	Philadelphia PA 19103	john.comella1@gmail.com	267-687-2288
369	Koplinka-Loehr	Sam	135 S 19th St 300	Philadelphia PA 19103	skl@cleanair.org	215-567-4004
370	Borres	Kathleen	6371 Kemerer Hollow Rd	Export PA 15632	contini-borres@juno.com	
371	Bedard	Mark	29900 Gloria St	St Clair Shores MI 48082	mbedard5150@gmail.com	808-343-1471
372	Stewart	Kathy	6510 Union Deposit Rd	Harrisburg PA 17111	gram-s@comcast.net	
373	Ober	Jamie	1833 Upper Rd	Shamokin PA 17872	dennisober@hotmail.com	8888888888
374	Struble	Mitch	2006 Naudain St	Philadelphia PA 19146	elburtsm@yahoo.com	215-732-5868
375	Giulieri	Jason	5160 Cypress St	Pittsburgh PA 15224	jasongiulieri@gmail.com	412-760-8507
376	Dorn	Valerie	812 Bennington Rd	Folcroft PA 19032	vrdorn@yahoo.com	610-532-3513
377	Friday	Jean	5127 Cedar Hills Blvd	Belle Vernon PA 15012	ejfriday@atlanticbb.net	724-930-9848
378	Comella	John	1900 JF Kennedy Blvd Apt 1624	Philadelphia PA 19103	john.comella1@gmail.com	267-687-2288

[10]

Email Commenters in 2015
Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036
for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
379	Sonin	John S	329 5th St	Juneau AK 99801	sojohn61@hotmail.com	907-586-8212
380	Steinberg	Ruth	103 Knollwood Dr	Tinton Falls NJ 07724	ruthsteinberg71@gmail.com	
381	Grimley	Chris	52 Shannon Rd	North Wales PA 19454	grimleycj@live.com	
382	Greinke	Pamyile	PO Box 456	Peconic NY 11958	pamylle1@gmail.com	
383	Friday	Jean	5127 Cedar Hills Blvd	Belle Vernon PA 15012	ejfriday@atlanticbb.net	724-930-9848
384	Kashner	Dale	313 Claremont Dr	Seven Valleys PA 17360	drkashner@comcast.net	
385	Gulla	Ronald	302 Linden Creek Rd	Canonsburg PA 15317	fight11@verizon.net	724-745-3962
386	Gulla	Ronald	302 Linden Creek Rd	Canonsburg PA 15317	fight11@verizon.net	724-745-3962
387	Papandrea	John	110 W 90 St	New York NY 10024	jpap100@aol.com	
388	Stober	Phil	80 N Cornwall Rd	Lebanon PA 17042	pstober80@comcast.net	717-277-5461
389	Parowski	Paul	361 Eaglebrook Ln	Richfield PA 17086	paulparowski1@verizon.net	570-539-4283
390	Pendleton	Shannon	815 Fetters Mill	Bryn Athyn PA 19009	sandersondesign@gmail.com	609-933-4872
391	Richard	Bryn	552 Holmes Rd	Morton PA 19070	bryn r@ecologyfund.net	2150000000
392	Leitch	Mary Ann	526 Reed St	Philadelphia PA 19147	maleitch@live.com	215-271-7878
393	Goldstein	Libby J	331 Queen St	Philadelphia PA 19147	gorbehfarsi@verizon.net	215-465-8878
394	Goldstein	Libby J	331 Queen St	Philadelphia PA 19147	gorbehfarsi@verizon.net	215-465-8878
395	Swimley	Thomas	9808 State Highway 249	Knoxville PA 16928	tswimley@gmail.com	814-326-4096
396	Seger	Kimberly	11373 US Rte 422	Kittanning PA 16201	kimmiland@hotmail.com	724-354-4657
397	Reddig	Joyce	509 Singer Dr	Madison TN 37115	joycereddig@gmail.com	
398	Kosowicz	Aleks	12876 N Balsam Rd	Hayward WI 54843	guerillawordfare@yahoo.com	
399	Kite	Richard	Brown St	Colne NY 12345	coloneledamvc@aol.com	
400	Hudgings	Margaret	409 W Union St	West Chester PA 19382	mhudgings@gmail.com	610-692-3849
401	Nash	Nora	609 S Convent Rd	Aston PA 19014	nnash@osfphila@org	610-558-7661
402	Glazer	Gertrude	68 E Prospect St	Hopewell NJ 08525	freerangemusic@yahoo.com	609-466-2818
403	Herren	Doug	2132 N Hancock St	Philadelphia PA 19112	dougherren@me.com	
404	Wolfgang	Ken	541 W Ellet St	Philadelphia PA 19119	kenwolfgang@gmail.com	267-252-6717
405	Riddle	Carolyn		Austin TX 78758	riddlegame@gmail.com	
406	Vaughn	Bob	3016 W Harbor View Ave	Tampa FL 33611	vaughanbob@ymail.com	
407	Koplinka-Loehr	Michael	118 Ross Rd	Lansing NY 14882	mak11@cornell.edu	607-592-8437
408	Payan	Maria	9 Aubel Rd	Delta PA 17314	payans@zoominternet.net	717-456-5800
409	Harralson	David	3629 Lankershim Blvd	Hollywood CA 90068	davidharralson@hotmail.com	
410	Tine	Tina	414 N Forest Park Blvd #725	Knoxville TN 37919	tina.m.tine@gmail.com	865-307-3566
411	Henry	William	117 Harshaville Rd	Clinton PA 15026	wfh@zoominternet.net	724-899-3271
412	Armm	Edward	15 Tennis Rd	Lake Hopatcong NJ 07849	edarmm@hotmail.com	973-663-4291
413	Hochheiser	Harry	5742 Woodmont St	Pittsburgh PA 15217	hshoch@gmail.com	
414	Everett	William	1055 W 27th Ave	Anchorage AK 99503	aestevalis 0@yahoo.com	666-420-6969
415	Born	Bernice	612 Avery St	Pittsburgh PA 15212	edward.born@verizon.net	
416	Armm	Edward	15 Tennis Rd	Lake Hopatcong NJ 07849	edarmm@hotmail.com	973-663-4291
417	Hartleben	Christian	732 Spring Ln	Philadelphia PA 19128	prophit1970@gmail.com	215-482-1012
418	Leavy	William	2031 Placita de Vida	Sante Fe NM 87505	quatermass5@hotmail.com	000-000-0000
419	Perron	Andrew	7227 Penn Ave	Pittsburgh PA 15208	pwerdna@gmail.com	412-657-2084
420	Safer	Daniel	3305 Hamilton St	Philadelphia PA 19104	saferdan@hotmail.com	000-000-0000

[11]

Email Commenters in 2015

Re: Draft Air Quality Operating Permit Nos. 50-03006, 22-03094 and 31-03036

for the Sunoco Pipeline LP facilities in Toboyne Twp., Perry Co.; Londonderry Twp., Dauphin Co.; and Shirley Twp., Huntingdon Co.

#	LAST NAME	FIRST NAME	ADDRESS	CITY, STATE ZIP	EMAIL ADDRESS	PHONE #
421	Grimley	Chris	52 Shannon Rd	North Wales PA 19454	grimleycj@live.com	
422	Focht	Linda	50 Glen Oley Dr	Reading PA 19606	ljfocht@hotmail.com	
423	Moore	Barbara	4652 Cheryl Dr	Bethlehem PA 18017	msgemstone@att.net	
424	Hochheiser	Harry	5742 Woodmont St	Pittsburgh PA 15217	hshoch@gmail.com	
425	Guzman	Joseph	87-39 98th St	Woodhaven NY 11421	joeguzzyy@aol.com	718-704-7023
426	Lyons	Jonathan	196 Mountainview Rd	Lewisburg PA 17837	jonathan.lyons@bucknell.edu	570-577-8124
427	White	Chuck	1233 Victoria Ln	West Chester PA 19380	cpw048@gmail.com	610-220-2036
428	Sugarman	Steven	PO Box 923	Malibu CA 90265	wrathchild62@gmail.com	310-963-6536
429	Janusko	Robert & Donna	1329 Eaton Ave	Bethlehem PA 18018	482b71e1@opayq.com	610-849-2212
430	Binder	Caroline	1140 Union Church Rd	McConnellsburg PA 17233	ms.c.binder@gmail.com	
431	LaVerne	David	844 Lincoln St	Dickson City PA 18519	backpack2@comcast.net	570-489-8409
432	Gelfand	Carol	478 Byrlee Dr	Pittsburgh PA 15237	carolgelfand@mac.com	412-367-1921
433	Morelli	Erin	1322 Mary Jane Ln	West Chester PA 19380	erinmorelli@hotmail.com	484-614-6783
434	Neill	Johnn	1254 Longford Rd	West Chester PA 19380	johnkb24@verizon.net	
435	Rapp	Susan	1239 Victoria Ln	West Chester PA 19380	sr19380@yahoo.com	
436	Miller	Michael	102 Lynn Circle	West Chester PA 19380	msmillerjr@gmail.com	
437	Feridun	Karen	260 E Main St	Kutztown PA 19530	berksgastruth@gmail.com	610-678-7726
438	Miller	Scott	916 N 23rd St	Allentown PA 18104	pianoscott@yahoo.com	
439	Flynn	John	88 Dillon Way	Washington Crossing PA 18977	jmflynn33@comcast.net	215-321-3280
440	Smeltzer	M	7356 Gun Club Rd	New Tripoli, PA 18066	msmeltzr@ptd.net	
441	Meade	D	Jefferson Ave	Lewisburg PA 17837	dmeade2@gmail.com	
442	Bence	Jeff	1066 Washington Ave PO Box 97	Wycombe PA 18980	jeffbence@aol.com	215-860-0360
443	Boring	Sharon	531 Center Grange Rd	Monaca PA 15061	tuppyjeremiah@aol.com	724-378-0808
444	Bence	Jeff	1066 Washington Ave PO Box 97	Wycombe PA 18980	jeffbence@aol.com	215-860-0360
445	Durante	Eric	241 Goss Hollow Ln	Port Matilda PA 16870	ericdurante@gmail.com	814-692-7152
446	Vogelsong	Patrick	443 W Penn St	Carlisle PA 17013	pvoge73@zoho.com	717-574-3847
447	Smeltzer	M	7356 Gun Club Rd	New Tripoli, PA 18066	msmeltzr@ptd.net	
448	Critser	Jackie	19747 SW Sweet Gum Ct	Beaverton OR 97078	jackiecritzer@gmail.com	503-880-0292
449	DiRenzo	Jennifer	4997 Watson Rd	Elk Creek MO 65464	foxescreek@aol.com	
450	Spina	Mark	1517 S Stanley St	Philadelphia PA 19146	nbtw12@yahoo.com	

Wilkes, Dawne

From: John Grillo <john.grillo@maine.edu>
Sent: Monday, January 26, 2015 8:41 PM
To: Hanlon, Thomas
Subject: [Reject the Proposed Sunoco Logistics Pumping Stations in Huntingdon County, Dauphin County, and Perry County! #31-03036, #22-03094, #50-03006]

Dear DEP Facility Permitting Chief Hanlon,

I respectfully submit this public comment and the following requests pertaining to the proposed Sunoco Logistics natural gas liquids (NGL) pumping stations in Shirley Township, Londonderry Township, and Toboyne Township, PA. The Pennsylvania Department of Environmental Protection (DEP) is responsible for ensuring that residents of [the Commonwealth of] Pennsylvania have clean water and pure air. In order to protect these constitutional rights to the greatest extent possible, I formally request the following:

1) PA DEP reject Sunoco Logistics' application to operate NGL pumping stations in Shirley Township, Londonderry Township, and Toboyne Township, PA as they would increase local air pollution and set a dangerous precedent for NGL transport through this corridor.

2) PA DEP at the very least hold public hearings and meetings with time for questions and answer[s] regarding each of these proposed NGL pumping stations[:] [P]ermit [N]umbers[ ] 31-03036, 22-03094, and 50-03006.

3) PA DEP conduct a cumulative air quality impact and public safety analysis of the entire Sunoco Logistics Mariner East NGL pipeline project[,] including emissions from the 18 proposed pumping stations; the hydraulically-fractured wells at the point of extraction; the MarkWest gas processing facility (63-00936); the fractionation and shipping facility at the Marcus Hook [I]ndustrial [C]omplex (23-0119); and the fugitive emissions from the entire 350-mile pipeline route that is over 80 years old.

Sincerely,

John Grillo
3 Marsh Lane Apt. 21
Orono, ME 04473
(207) 949-7323

Commonwealth Of Pennsylvania
Department of Environmental Protection
Southcentral Regional Office
May 12, 2017

Subject: Sunoco Pipeline LP/Cornwall Station/Mariner East 1
Addendum Memo
West Cornwall Township, Lebanon County
Permit No. 38-03062

To: William Weaver WW 5/19/17
Regional Manager
Air Quality Program

Thru: Thomas Hanlon, Chief TJH 5/12/17
East Permitting Section
Air Quality Program

From: Darrell Hartline DH 5/12/17
East Permitting Section
Air Quality Program

Comment Period

Copies of the proposed permit were submitted to Mr. Matthew Kraus of Tetra Tech Inc. representing Sunoco Pipeline LP (SPLP) and to DEP Reading District inspection staff.

Mr. Kraus responded with an email dated 10/3/14, indicating that the SIC Code listed on the cover sheet of the permit was incorrect. DEP concurs with this change.

Notice of the Department's intent to issue the operating permit was published in the Pennsylvania Bulletin on September 20, 2014. In response to requests from the public, DEP held a public hearing on this draft permit on 2/17/15, at the Quentin Volunteer Fire Company. During the public comment period on the draft permit, DEP has received numerous public comments both in favor of, and in opposition to the application, including close to 500 form letter emails, as well as a protest letter from an environmental advocacy group called the Clean Air Council. Copies of these comment items, a list of commenters, and DEP's Comment and Response Document, are included as attachments to this memo.

Addendum Submittal

A permit application addendum was submitted by SPLP on 9/12/16 because the emissions associated with the Cornwall Station have been recalculated based on:

- Updated equipment information including flare pilot gas flow rate,
- More detailed information regarding maintenance activities,

- As-built Piping and Instrumentation Diagrams (P&IDs),
- Current equipment specific emission factors, and
- A more conservative flare emission estimate utilizing the manufacturer's guaranteed design destruction and removal efficiency of 98%.

The revised potential emissions estimates are 0.06 tpy of NOx, 0.24 tpy of CO, 0.76 tpy of VOCs, 0.01 tpy of Methane and 108 tpy of GHGs.

Note: On December 14, 2016, the Environmental Protection Agency issued minor revisions to AP-42 Section 13.5: Industrial Flares. As a result, the VOC emissions from the flare pilot gas increased by 0.02 tpy.

As part of the ongoing review of this permit, the Department has looked further into the issue of aggregation of the facility with other nearby sources owned by SPLP. They provided supplemental information to their aggregation analysis on 2/16/16. The closest facility identified was the Rexmont Road Block Valve located approximately 6.2 miles away. There is no interdependence between operation of the Block Valve and the Cornwall Station. As a result the Department has determined that no emissions need to be aggregated with those of the Cornwall Station. Sunoco also included an aggregation analysis in the 9/12/16 application update. This was identical to the 2/16/16 submission.

There is no confidential documentation in the updated application and supporting emails.

Revisions to Draft Permit:

1. On March 10, 2017 Mr. Jed Werner of SPLP indicated the Cornwall Station does not have pigging equipment. I removed the reference to "pigging" in the Section A, Source ID 103 description. Attached is a copy of the information provided by Mr. Werner concerning pigging equipment.
2. C 001 (now 002): updated to the same fugitive emission language used in recent similar SERO permits
3. C 005 (now 006): updated to the same visible emission language used in recent similar SERO permits
4. C 007 (now 008): changed to reflect stack testing language used in recent similar SERO permits
5. C 008: deleted stack test language for consistency with similar SERO permits; testing issues are already adequately addressed in B 019
6. C 009: deleted stack test language for consistency with similar SERO permits; testing issues are already adequately addressed in B 019
7. C 011 (now 010): changed to reflect weekly periphery inspection language used in recent similar SERO permits and to add fugitive emission leak monitoring and repair language related to the response to Comment 53.
8. C 012: changed to reflect weekly periphery inspection recordkeeping language used in recent similar SERO permits
9. C 013: deleted 5-year recordkeeping provision for consistency with recent similar SERO permits; this issue is already adequately addressed in B 020(b)

10. C 014: deleted requirement to provide records provision for consistency with recent similar SERO permits; this issue already adequately addressed in B 020(b)
11. C 015: changed to reflect malfunction reporting language used in recent similar SERO permits
12. C (new 011): added new condition regarding monitoring of VOC thruput for consistency with language used in recent similar SERO permits
13. C (new 014): added new condition regarding recordkeeping of emission increases for consistency with language used in recent similar SERO permits
14. C 014 (now 013): changed to reflect VOC recordkeeping language used in recent similar SERO permits
15. C (new 016): added new condition regarding accidental release reporting for consistency with language used in recent similar SERO permits.
16. C (new 017): added new condition regarding Chapter 135 reporting for consistency with language used in recent similar SERO permits.
17. C (new 019): added new condition regarding corrective measures for consistency with language used in recent similar SERO permits.
18. C 021 (new): added condition regarding local ordinances; see Response to Comment 19.
19. E 01 006: added the word "immediately" to reflect stack testing language used in recent similar SERO permits
20. Also, the numbering of Section C conditions was affected be revising the condition type classification of certain conditions, unrelated to their content.

Conclusions and Recommendations

I recommend that the revised draft Permit No. 38-03062 be redistributed for comments.

Enclosures

cc: Permits/Lancaster District Office/SC Region 38-03062, B3

Commonwealth Of Pennsylvania
Department of Environmental Protection
Southcentral Regional Office
September 15, 2017

Subject: Sunoco Pipeline LP/Cornwall Station/Mariner East
Addendum Memo
West Cornwall Township, Lebanon County
Permit No. 38-03062

To: William Weaver WRW 9/15/17
Regional Manager
Air Quality Program

Thru: Thomas Hanlon, Chief TJH 9/15/17
East Permitting Section
Air Quality Program

From: Darrell Hartline DH 9/15/17
East Permitting Section
Air Quality Program

Comment Period

A copy of the proposed permit was submitted to Mr. Jed Werner, Sunoco Logistics Manager – Air Permitting.

Mr. Werner provided the following comments, via email with an attachment, on June 16, 2017:

Page 1 identifies Matthew Gordon as the responsible official. The responsible official for the Cornwall Pump Station is Mark Martin, Operations Supervisor.

Response: The requested change has been made.

Section C Condition #009 visible emissions are to be measured using either a Department approved device or trained opacity observers. Similar to issued SOOP's for other Pump Stations, Sunoco Pipeline requests condition #009 (b). state "Observers, trained and qualified to measure plume opacity with the naked eye or with the aid of any devices approved by the Department.

Response: The requested change has been made.

Section C Condition #010 (b) (5) requires investigation of any observed problems and a first attempt of repair within 15 days and notification to DEP if the repair is not complete within 30 days. Sunoco Pipeline requests removal of this condition.

Response: The Department believes it is appropriate to retain this condition.

Section C Condition #014 requires the maintenance of a log for all fugitive monitoring, visible emissions and odors, including those that deviate from the conditions found in the permit. The method used to determine non-compliance is sight, sound and smell. This log is a monthly sight, sound, and smell log.

Response: I called Mr. Werner and he indicated to me he made a mistake. He was referencing Condition #012 instead of Condition #014. He also indicated Condition #012 as written is acceptable and no change is requested. On June 27, 2017 Mr. Werner sent, via email, a message indicating the condition is acceptable as written.

Notice of the Department's intent to issue the permit was published in the Pennsylvania Bulletin on June 3, 2017. DEP received public comments on the revised draft permit. Copies of these comment items, a list of commenters, and DEP's Comment and Response Document, are included as attachments to his memo.

Revisions to Draft Permit:

As part of finalizing this permit, DEP is formalizing its determination that the air emissions expected from the West Cornwall Station, including both stack and fugitive emissions are of minor significance with regard to causing air pollution, and will not, on their own merits, prevent or interfere with the attainment or maintenance of an ambient air quality standard. A condition will be placed in the operating permit to this effect. DEP makes this determination because the post-control emissions from the site:

1.) do not meet the criteria for needing an air quality permit and
2.) do not exceed the criteria for a de minimis emission increase under 25 Pa. Code Section 127.449.
3.) are much smaller than the emissions from many other legally operating sources in the Commonwealth.
4.) have not been shown to cause any environmental problems during normal operation.

Lebanon County is currently designated as attainment for the 2008 ozone NAAQS. Also, since Lebanon County is located within the Ozone Transport Region, it is treated as moderate nonattainment for emission offset purposes. The current certified 2016 ozone design value for Lebanon County marginally exceeds the 2015 ozone NAAQS. With regard to particulate pollution, Lebanon County is currently designated as moderate nonattainment for the 2012 annual PM2.5 NAAQS. As a minor source with post-control emissions below air permit thresholds, the Sunoco West Cornwall facility is not expected to meaningfully affect local or regional compliance with ambient air quality standards.

The following condition will be placed in Section C of the permit, *"The potential fugitive plus stack emissions from this facility, after appropriate control as prescribed in this permit, have been estimated as follows: 0.06 tpy of NOx, 0.24 tpy of CO, 0.76 tpy of VOCs, 0.01 tpy of Methane and 108 tpy of GHGs. The Department has determined these emissions remaining after*

appropriate control are of minor significance with regard to causing air pollution, and will not prevent or interfere with the attainment or maintenance of an ambient air quality standard."

On August 3, 2017, via email, Sunoco provided responses to DEP questions about the application. Sunoco's email is attached for reference.

On August 9, 2017, via email, Sunoco updated the Permit Contact Person.

On August 18, 2017, via email, Sunoco provided some additional responses to DEP questions about the application. Sunoco's email is attached for reference.

The following additional changes are being made to the permit:

1. Cover Sheet – updated the responsible official and permit contact person.
2. Section C, Condition 009(b) – replaced *"certified in EPA Method 9"* with *"qualified."*
3. Section C, Condition 011 – the condition was revised for clarity to read as follows: *"The permittee shall calculate the total emissions of VOCs for the entire facility on a 12-month rolling sum basis."*
4. Section C, Condition 015(c) – revised the telephone reports to the DEP Reading District Office.

Conclusions and Recommendations

I recommend Permit No. 38-03062 be issued.

Attachments

cc: Permits\Reading District\SC Region 38-03062, B3

Hartline, Darrell

From: Hanlon, Thomas
Sent: Thursday, February 18, 2016 1:53 PM
To: Duke, Alicia
Cc: Hartline, Darrell
Subject: FW: Draft ME RFD Supplemental Aggregation Language
Attachments: 01_HollidaysburgStation(20160215).pdf; 02_MarklesburgStation(20160215).pdf; 03_Mt.UnionStation(20160215).pdf; 04_DoylesburgStation(20160215).pdf; 05_PlainfieldStation(20160215).pdf; 06_MiddletownStation(20160215).pdf; 07_CornwallStation(20160215).pdf; 08_BlainsportStation(20160215).pdf; 09_BeckersvilleStation(20160215).pdf

---

From: WERNER, JED A [mailto:JAWERNER@sunocologistics.com]
Sent: Tuesday, February 16, 2016 9:25 AM
To: Hanlon, Thomas
Cc: STYLES, MONICA L
Subject: Draft ME RFD Supplemental Aggregation Language

Tom,

Here is the supplemental information for the nine requested pump stations in South Central Region which PADEP has requested supplemental aggregation language to what was already provided in the original RFD applications.

Please call me when you have a chance to review.

Thank you for your time.

Jed A. Werner
Manager - Environmental Compliance and Projects
525 Fritztown Road
Sinking Spring, PA 19608
p-610-670-3297
c-610-858-0802
f-866-599-4936

Insanity is doing the same thing over and over again and expecting different results – Albert Einstein

[20]

The purpose of this document is to supply supplemental information regarding the aggregation text for the Sunoco Pipeline L.P. (SPLP) Request for Determination (RFD) submittals to the Pennsylvania Department of Environmental Protection (PADEP) South Central Regional Office (SCRO) associated with the Mariner East (ME) Project (the Project).

SPLP understands that Pennsylvania is considered a "moderate" ozone nonattainment area for oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) because Pennsylvania is a jurisdiction in the Ozone Transport Region (Section 184 of the Clean Air Act). Therefore, an aggregation determination under New Source Review (NSR) would be determined on a case-by-case basis using the two-part test that considers whether the air contamination source or combination of sources are located on one or more contiguous or adjacent properties and whether the sources are owned or operated by the same person under common control. This case-by-case single source determination would apply to all sources irrespective of their separate status as "minor" or "major" air contamination sources. PADEP and the Pennsylvania Environmental Hearing Board have made clear that the terms "contiguous" and "adjacent" should be given their plain meaning. To that end, PADEP's guidance document has developed a common sense approach to determine if sources are located on adjacent or contiguous properties and considers sources located within a quarter-mile distance to be considered contiguous or adjacent (PADEP, 2012). Sources greater than a quarter-mile may be considered contiguous or adjacent on a case-by-case basis. Interdependence may be a factor in conducting a single source determination. That said, the plain meaning of the terms "contiguous" and "adjacent," and not interdependence, should be the dispositive factor in determining whether stationary sources are located on contiguous or adjacent properties.

To determine if the under common control test is met, ownership of each of the operations is just one aspect in determining if the facilities are under common control. If a contract for service relationship exists between the two companies and/or if a support/dependency relationship exists, then this would constitute indirect control. United States Environmental Protection Agency (USEPA) has historically interpreted that an evaluation of common control must consider whether the facilities are functionally interrelated or interdependent of each other. As discussed in the Federal Register (USEPA, 2009), USEPA states that "To be 'substantially related,' there should be an apparent interconnection–either technically or economically–between the physical and/or operational changes, or a complementary relationship whereby a change at a plant may exist and operate independently, however its benefit is significantly reduced without the other activity."

MIDDLETOWN PUMP STATION

In determining whether the Middletown Pump Station's emissions should be aggregated with any another sources for the purpose of evaluating the applicability of the nonattainment NSR and Title V programs, initially one facility was identified: the Susquehanna River East Block Valve. Based on PADEP SCRO's request for additional clarification and for the expansion of the radius

evaluated to approximately 5.0 miles, one additional facility, the Middletown Junction Emergency Flow Restricting Device (EFRD) Valve, was evaluated.

Susquehanna River East Block Valve

With this supplemental aggregation discussion, the distance between the Middletown Pump Station and the Susquehanna River East Block Valve is being updated to approximately 3.6 miles rather than the 3.4 miles presented in the Request for Determination (RFD) and referenced in the State Only Operating Permit (SOOP). This updated distance is based upon finalized Process Flow Diagrams (PFDs) mile markers for the pipeline. The distance of approximately 3.6 miles, which exceeds the ¼ mile rule of thumb in the PADEP guidance document (PADEP, 2012).

Furthermore, aggregation would not be appropriate because the two sites should not otherwise be considered "adjacent" or "contiguous" due to the lack of any interdependence between the Susquehanna River East Block Valve and the Middletown Pump Station. The Susquehanna River East Block Valve is an independently operated valve for isolating a section of pipeline for safety, environmental, or maintenance purposes, whereas the Middletown Pump Station is to maintain pipeline system pressure during the transportation of natural gas liquids (NGLs). Neither location is dependent upon the other to properly function. In fact, both locations could fully function even if the other is nonfunctional.

In short, the Middletown Pump Station's emissions should not be aggregated with those from the Susquehanna River East Block Valve because the two locations are not interdependent of each other and are not in close proximity of each other, and therefore are neither "contiguous" nor "adjacent" for the purposes of aggregating air emissions.

Middletown Junction EFRD Valve

The distance between the Middletown Pump Station and the Middletown Junction EFRD Valve is approximately 1.1 miles, which exceeds the ¼ mile rule of thumb in the PADEP guidance document (PADEP, 2012).

Furthermore, aggregation would not be appropriate because the two sites should not otherwise be considered "adjacent" or "contiguous" due to the lack of any interdependence between the Middletown Junction EFRD Valve and the Middletown Pump Station. The Middletown Junction EFRD Valve is an independently operated location for the public protection should the pipeline flow exceed predetermine maximum rates, that is, for the safety of the public and the environmental, whereas the Middletown Pump Station is to maintain pipeline system pressure during the transportation of natural gas liquids (NGLs). Neither location is dependent upon the other to properly function. In fact, both locations could fully function even if the other is nonfunctional.

In short, the Middletown Pump Station's emissions should not be aggregated with those from the Middletown Junction EFRD Valve because the two locations are not interdependent of each other and are not in close proximity of each other, and therefore are neither "contiguous" nor "adjacent" for the purposes of aggregating air emissions.

REFERENCES:

Pennsylvania Department of Environmental Protection (PADEP), 2012. Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries. Document No.: 270-0810-006, October 6, 2012.

United States Environmental Protection Agency (USEPA), 2009. Title 40 Code of Federal Regulations Parts 51 and 52, Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Aggregation and Project Netting. Federal Register Volume 74, No. 10, January 15, 2009, pages 2376-2383.

State-Only Operating Permit (SOOP) Addendum

Mariner East Project

Sunoco Pipeline L.P.

Middletown Station

Dauphin County, PA

August 2016

Sunoco Logistics

TETRA TECH

Sunoco Logistics

August 29, 2016

FedEx: 7771 1496 2149

Mr. William Weaver
Program Manager
Pennsylvania Department of Environmental Protection
Bureau of Air Quality
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, Pennsylvania 17110

Subject: Addendum

RE: Pending State Only Operating Permit (SOOP) 22-03094 Addendum
Facility ID: 776463
Sunoco Pipeline L.P. (SPLP) Middletown Station
Londonderry Township, Sauphin County, Pennsylvania
Tetra Tech, Inc. Project No. 112IC05958

Dear Mr. Weaver:

SPLP is submitting this Addendum to the subject facility SOOP application. Triplicate hardcopies of this letter and the impacted SOOP attachments are enclosed (one original and two copies).

There is no change in the status of Middletown Station and the physical operation remains as represented in the May 2014 SOOP Application. This addendum is being submitted because the emissions associated with the Middletown Station have been recalculated based on:

- Updated equipment information including flare pilot gas flow rate,
- More detailed information regarding maintenance activities,
- As-built Piping and Instrumentation Diagrams (P&IDs),
- Current equipment specific emission factors, and
- A more conservative flare emission estimate utilizing the manufacturer's guaranteed design destruction and removal efficiency (DRE) of 98%.

SPLP is replacing the following SOOP attachments with the enclosures of this letter as described in the bulleted list below. Modifications to the following only include those items impacted by this update.

- A revised State-Only Permit Application Form is enclosed and the following sections have been modified:
  - Section 1.1 – Application Type
  - Section 1.2 – Plant Information
  - Section 2.1 – Potential Emission Estimates for the Site
  - Section 3 – Site Inventory
  - Section 7 – General Source Information Subsections 7.1, 7.2, and 7.4
  - Section 8 – Control Device Information Subsections 8.1 and 8.2
- A revised Appendix B, Attachment 1 – Emission Calculations is enclosed.
  - Note that the worst-case emission rate per pollutant per product was utilized. The updated emission rates were estimated based on applying the physical properties of the products (i.e., heating value, gas density, etc.) that would result in the highest potential-to-emit estimates.
  - Additionally, note that fugitive pump seal emissions are included in overall facility fugitive emissions and are not considered a separate line item.

- A revised Appendix B, Attachment 2 – Aggregation Language is enclosed.

Additionally, per PADEP SCRO's request, SPLP has reviewed SOOP SECTION E language in regards to the current monitoring system for the pilot flame and other Pennsylvania SPLP SOOP SECTION E language. The current SPLP flare monitoring systems consist of a signal from the pilot flame detection device that is transmitted to the Supervisory Control and Data Acquisition (SCADA) system. In the event of a pilot flame malfunction, the flare auto re-ignition will be initiated. Although pilot flame failure information is manually logged, it is not collected in the SCADA system historian. Therefore, for consistency with the PADEP SCRO issued SOOPs for Marklesburg, Hollidaysburg, and Plainfield Stations and to reflect the current system operations, SPLP is suggesting the following language for SECTION E. Source Groups Restrictions. IV. RECORDKEEPING REQUIREMENTS:

> #004 [25 Pa. Code §127.441]: "When the enclosed flare is not operational, the permittee shall recorded the downtime and associated emissions."
>
> #005 [25 Pa. Code §127.441]: "The permittee shall maintain detailed records of all maintenance performed on the enclosed flare. The permittee shall retain these records for a minimum of five (5) years and shall make them available to the department upon its request."

Please contact Jed Werner at 610-670-3297 or by email (jawerner@sunocologistics.com) if you have any questions.

Sincerely,

Matthew L. Gordon
Principal Engineer

MLG:vjp

cc: Project file 112IC05958 (electronic)
Jed Werner, SPLP (email)
Christopher Embry, SPLP (email)
Megan Allison, Tetra Tech (email)

MLG:vjp
Enclosures: SOOP Addendum for SPLP Middletown Station
Form 2700-PM-AQ13

Appendix B:
Attachment 1 (Potential-to-Emit Calculations)
Attachment 2 (Aggregation Analysis)

State Only Permit Application Form

2700-PM-AQ0013 Rev. 8/2009

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

STATE-ONLY PERMIT APPLICATION

FOR OFFICIAL USE ONLY
State-Only OP Number:
Reviewed by:
Date:
Comments:

Section 1 - General Information

1.1 Application Type

Type of permit for which application is made: (Check one)

- ☐ Initial
- ☐ Renewal Operating Permit No. _____
- ☒ Application Revision

1.2 Plant Information

Federal Tax ID: 23-3102656 Firm Name: Sunoco Pipeline L.P.

Plant Code: _____ Plant Name: Middletown Station

NAICS Code: 493190 SIC Code: 4619

Description of NAICS Code: All Other Pipeline Transportation

Description of SIC Code: Pipelines, Not Elsewhere Classified

County: Dauphin Municipality Londonderry Township

Latitude: 40.221416 Longitude: -76.717469

Horizontal Reference Datum: NAD 1983 Horizontal Collection Method: NTDEP Reference Point: CNTAR

1.3 Contact Information

Name: Matt Gordon Title: Project Manager

Address: 525 Fritztown Road
Sinking Spring, PA 19608

Telephone Number: (610) 670-3284

Email Address: mlgordon@sunocologistics.com

1.4 Certification of Truth, Accuracy and Completeness

Note: This certification must be signed by a responsible official. Applications without a signed certification will be returned as incomplete.

I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained in this application are true, accurate, and complete.

(Signed) _____ Date: 8/29/2016

Name (Typed): Matt Gordon Title: Project Manager

Section 2 - Site Information

2.1 Potential Emission Estimates for the Site

Provide the estimated potential emission for the site BEFORE and AFTER utilizing the proposed restriction(s) and/or limitation(s).

Pollutant or CAS No.	Potential Emission BEFORE taking Limitations (TPY)	Potential Emission AFTER taking Limitations (TPY)
CO2e	0	116.50
CO2	0	115.90
N2O	0	<0.01
CH4	0	0.01
CO	0	0.26
Total VOCs	27.46	0.89
NOx	0	0.06
Total HAPs	0	<0.01
SOx	0	<0.01

*** Provide all supporting calculation methods as an attachment at the end of this application.**

2.2 Facility Type

Is this facility a Synthetic Minor Facility? Yes ☐ No ☒

If yes, go to Section 2.3, "Synthetic Minor Facility".

If no, go to Section 3, "Site Inventory".

IMPORTANT: Note that all Synthetic Minor Facilities must be able to meet the proposed restriction(s) and/or limitation(s) immediately upon the submission of this application. By signing the Certification of Compliance in Section 13 of this application, the facility for which a Synthetic Minor Status is proposed will be deemed a Synthetic Minor Facility according to the restriction(s) and/or limitation(s) proposed upon receipt of the application by the Department, unless the Department determines that the facility is unable to meet the Synthetic Minor requirements at a later date.

2.3 Synthetic Minor Facility Information (to be completed by all facilities seeking Synthetic Minor Status)

Synthetic Minor Status for this facility can be taken at the: Source Level ☐ AND/OR Site Level ☐

If limitation(s) and/or restriction(s) can be taken at the site level (for all sources within this facility), complete the following questions, otherwise please go on to Section 3, "Site Inventory".

Synthetic Minor Status for the Entire Site is achievable through the following restrictions: (Please check all that apply and describe in detail what is/are proposed):

☐	Hours of Operation	
☐	Production/Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitiations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor

Note: If Section 2.3 is completed and there are no additional restrictions proposed at the source level, the applicant can omit Subsections 5, 6, and 7 in Sections 5, 6, and 7 for all sources in this permit application.

2.4 Compliance Method for the Site (for Synthetic Minor Facilities only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 2.3.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s) listed in Section 2.3:

b. Describe what is to be reported in the compliance report:

c. Reporting start date:

d. Indicate the frequency for submitting compliance report as explained above:

Section 3 - Site Inventory

List all air pollution sources, control equipment, emission points and fuel material locations at this site. Duplicate this page as necessary. For renewals, only list sources not included in current permit.

Unit ID No.	Company Designation	Unit Type
101	*John Zink Enclosed Flare*	*4' by 30' Enclosed ZTOF Production Flare*
102	*Fugitive Emissions*	*various leaks from sealed surfaces*
103	*Maintenance Operating Scenarios*	*pipeline*

Section 4 - Source Group (Optional)

4.1 Source Group Definition

This section applies to new State-Only Operating Permit applications only.

Define groups of source(s) that are subject to one or more applicable requirements that apply to all source(s) in the group.

Group No.	Source ID (for source(s) in this group)

4.2 Applicable Requirements for Source Groups

For renewals, only list group level requirements not included in the current State-Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State-Only Operating Permit.

Describe and cite all applicable requirements pertaining to all source groups.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

Group Number	Citation Number	Citation Limitation	Limitation Used

Section 5 - Combustion Operational Inventory

(Complete this section for each combustion source in this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new combustion unit listed in Section 3 of this application.

5.1 General Source Information

a. Unit ID No.: _____ b. Company Designation: _____

c. Plan Approval or Operating Permit Number: _____

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: _____

g. Rated Heat Input/Thruput: _____ h. Installation Date: _____

i. Exhaust Temperature: _____ Units: _____ j. Exhaust % Moisture: _____ k. Exhaust Flow Volume: _____ SCFM

5.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow

5.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max Throughput Rate	Firing Sequence

5.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfer	% Ash	BTU Content (Units)

*FML = Fuel Material Loction

5.5 Limitations on Source Operation (optional)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

5.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 5.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

b. Describe what is to be reported in the compliance report:

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

5.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or proposed in Section 5.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

5.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Section 6 - Incinerator Operational Inventory

(Complete this section for each incinerator at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

6.1 General Source Information

a. Unit ID: _____ b. Company Designation: _____

c. Plan Approval or Operating Permit Number: _____

d. Manufacturer: _____ e. Model Number: _____

f. Source Description: _____

g. Rated Heat Input/Thruput: _____ h. Installation Date: _____

i. Exhaust Temperature: _____ Units: _____ j. Exhaust % Moisture: _____ k. Exhaust Flow Volume: _____ SCFM

l. Inc. Capacity: _____ Lbs/Hr m. Primary Burner Heat Input: Units:

n. Exhaust % CO_2: _____ o. Secondary Burner Heat Input: _____ Units: _____

p. Incinerator Class: _____

q. Waste Type: _____ r. Waste BTU/lb: _____

6.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow

6.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

6.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

6.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

6.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 6.5.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

b. Describe what is to be reported in the compliance report:

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

6.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 6.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

6.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Section 7 – Process Operational Inventory

(Complete this section for each process at this site. Duplicate this section as needed).

For renewals, review and correct any pre-printed information and add additional sections for any new incinerator listed in Section 3 of this application.

7.1 General Source Information

a. Unit ID: 101 b. Company Designation: John Zink - Enclosed Flare

c. Plan Approval or Operating Permit Number: S101

d. Manufacturer: John Zink Company LLC e. Model Number: ZTOF04X30PF

f. Source Description: Enclosed Flare

g. Rated Heat Input/Thruput: 10,000.000 BTU/Hour - Max h. Installation Date: TBD - Tenative August 2014

i. Exhaust Temperature: 1,660 Units: °F j. Exhaust % Moisture: 6.1 k. Exhaust Flow Volume: 4,848 SCFM

7.2 Exhaust System Components

Explain how the exhaust components are configured:

From Unit	Unit Description	To Unit	Unit Description	Percent Flow
101	Standard Operation Scenario	CD101	John Zink - Enclosed Flare	
102	Fugitive Emissions	atmosphere		
103	Maintenance Operating Scenario	CD101	John Zink - Enclosed Flare	

7.3 Source Classification Code (SCC) Listing for Standard Operation

Fuel/Material	Associated SCC	Max. Throughput Rate	Firing Sequence

7.4 Maximum Fuel Physical Characteristics

If taking limitations on Fuel Physical Characteristics, see instructions.

SCC/Fuel Burned	FML*	% Sulfur	% Ash	BTU Content (Units)

*FML = Fuel Material Location

7.5 Limitations on Source Operation (optional) (for Synthetic Minor Sources only)

Maximum amount of hours of source operation per year: _____

☐	Hours of Operation	
☐	Production Throughput Rate	
☐	Type of Fuel	
☐	Fuel Usage	
☐	Control Devices	
☐	Emissions Limitations	
☐	Other	

Describe how the elected restriction(s) will allow the facility to become a Synthetic Minor?

7.6 Compliance Method for this source (for Synthetic Minor Sources only)

Complete this section only if limitation(s) and/or restriction(s) were proposed in Section 7.6.

a. Explain how you would demonstrate compliance with the restriction(s) and/or limitation(s):

b. Describe what is to be reported in the compliance report:

c. Reporting start date: _____

d. Indicate the frequency for submitting compliance report as explained above: _____

7.7 Source Potential to Emit (for Synthetic Minor Sources only)

Give Potential Emission estimate for all air pollutants emitted at this source. Calculations for the Potential Emissions Estimate here should have included the restriction(s) and/or limitation(s) proposed in Section 7.5, if applicable.

Pollutant or CAS Number	Fuel/SCC	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

7.8 Source Applicable Requirements

Describe and cite all applicable requirements pertaining to this source.

Note: A Method of Compliance Worksheet (Addendum 1) must be completed for each requirement listed.

For renewals, only list group level requirements not included in the current State Only Operating Permit. If there are no changes, check the box to the right.

☐ No changes from current State Only Operating Permit.

Fuel/SCC	Citation Number	Citation Limitation	Limitation Used

Section 8 – Control Device Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new control device listed in Section 3 of this application.

8.1 General Control Device Information

a. Unit ID: CD101 b. Company Designation: John Zink Company - Enclosed Flare

c. Used by Sources: Mariner East Pipeline

d. Type: Enclosed Flare

e. Pressure Drop in H_2O: ~ 10 psig at max flow rate f. Capture Efficiency: 98.0

g. Scrubber Flow Rate (GPM): Not Applicable

h. Manufacturer: John Zink Company LLC i. Model Number: ZTOF04X30PF

j. Installation Date: TBD - Tenatively August 2014

8.2 Control Device Efficiencies for this Control Device:

Pollutant Name	CAS Number	Estimated Control Efficiency	Basis for Efficiency Estimate
Natural Gas Liquids (NGLs)	64741-48-6	98.0	Performance criteria of the Emission Control Device was assessed as provided by the manufacturer data

Section 9 – Stack/Flue Information (duplicate this section as needed)

For renewals, review and correct any pre-printed information and add additional sections for any new stack/flue listed in Section 3 of this application.

9.1 General Stack/Vent Information

a. Unit ID: S101 b. Company Designation: John Zink Company LLC Enclosed Flare

c. Discharge Type: Enclosed Flare

d. Diameter (ft): 4 Height (ft): 30 Base Elevation (ft): 4

e. Exhaust Temperature: 1,660 F Exhaust % Moisture: 6.1 Exhaust Velocity: 27.3 ft/sec

f. Exhaust Volume: 20,583 ACFM Exhaust Volume: 4,848 SCFM

g. Distance to Nearest Property Line (ft): ~ 180 feet

h. Weather Cap?: ☒ Yes ☐ No

i. Used by Sources:

j. Latitude: 40.221416 Longitude: -76.717469
Horizontal Reference Datum: NAD 1983 Horizontal Collection Method: NTDEP Reference Point: CNTAR

---

a. Unit ID: b. Company Designation:

c. Discharge Type:

d. Diameter (ft): Height (ft): Base Elevation (ft):

e. Exhaust Temperature: Exhaust % Moisture: Exhaust Velocity:

f. Exhaust Volume: ACFM Exhaust Volume: SCFM

g. Distance to Nearest Property Line (ft):

h. Weather Cap?: ☐ Yes ☐ No

i. Used by Sources:

j. Latitude: Longitude:
Horizontal Reference Datum: Horizontal Collection Method: Reference Point:

Section 10 – Fuel Material Location (FML) Information (Optional)

For renewals, review and correct any pre-printed information and add additional sections for any new FML listed in Section 3 of this application.

10.1 Fuel Material Location Information

a. FML ID Number: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: % Sulfur: BTU Content: Units:

f. Used by Source:

_____

a. FML ID Number: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: _____ % Sulfur: _____ BTU Content: _____ Units: _____

f. Used by Source:

_____

a. FML ID Number: _____ b. Name: _____

c. Capacity: _____ Units: _____ d. Fuel: _____

e. Maximum Fuel Characteristics: If fuel is coal, what is the moisture content? _____

% Ash: _____ % Sulfur: _____ BTU Content: _____ Units: _____

f. Used by Source:

_____

Section 11 – Alternative Operating Scenario (optional)

(Duplicate this section for each source participated in this alternative scenarios)

11.1 General Information

a. Alternative Operating Scenario Name or ID No.: _____

b. Source ID No.: _____ c. Source Name: _____

d. Source Type (check one): ☐ Combustion ☐ Incinerator ☐ Process

e. Give a brief description of this alternative scenario stating how it is different from the standard operation:

11.2 Operational Flexibility Request

Check all that apply.

☐ Alternative exhaust system component configuration.
If this box is checked, complete Sections 11.3 and 11.7

☐ Alternative type of fuel replacing or in addition to an existing fuel in standard operation.
If this box is checked, complete Sections 11.4 and/or 11.5 and 11.7

☐ Alternative process method replacing or in addition to a process SCC existing in standard operation.
If this box is checked, complete Sections 11.6 and 11.7

☐ Alternative lower limitations.

11.3 Exhaust System Components

Specify the complete exhaust system component configuration for this alternative operating scenario.

From Component Type	From Component Number	To Component Type	To Component Number	Percent Flow	Begin Date	End Date

11.4 Source Classification Code (SCC) Listing for Alternative Operation

Give a complete listing of all fuels burned, products produced by a process or waste incinerated for this alternative operating scenario.

Fuel	Associated SCC	Max. Throughput Rate	Firing Sequence

11.5 Alternative Fuel Physical Characteristics

Give a complete listing of all fuels physical characteristics for this alternative operating scenario.

SCC/Fuel Burned	FML	% Sulfur	% Ash	BTU Content (Units)

11.6 Alternative Process/Product Description

a. Briefly describe the change(s) in raw materials and/or process methods used in this operating scenario, if applicable:

b. Provide and briefly describe the process SCC associated with this alternative operating scenario:

Process SCC:		SCC Description:	

c. Alternative Product(s):

11.7 Source Potential to Emit

Give Potential Emission estimate for all air pollutants emitted at this source for this operating scenario.

Pollutant or CAS Number	Fuel	Emissions/Activity Allowable per Unit	Calc. Method	Max. Capacity	Total Hours	Emission in TPY

Section 12 – Compliance Plan for the Facility

		Yes	No
12.1	Will your facility be in compliance with all applicable requirements at the time of permit issuance and continue to comply with these requirements during the permit duration?	☒	☐
12.2	Will your facility be in compliance with all applicable requirements presently scheduled to take effect during the term of the permit?	☒	☐
12.3	Will these requirements be met by the regulatory required dates?	☒	☐

If you checked "NO" in part 12.1, 12.2 or 12.3, answer the following questions:

12.4 Identify applicable requirement(s) for which compliance is not or will not be achieved:

Source ID Number	Citation Number

12.4.1 Briefly describe how compliance with this/these applicable requirement(s) will be achieved:

12.4.2. Provide a detailed schedule of compliance for the non-complying sources or activities identified in this section of the application. Include an enforceable sequence of corrective actions with milestone and projected compliance dates.

Date	Action/Milestone

12.4.3. Indicate the submittal frequency for the progress report(s): _____

12.4.4. Starting date for the submittal of the progress report(s): _____

Section 13 – Certification of Compliance for Synthetic Minor Source

In order for this Synthetic Minor facility to avoid the State-Only Operating Permit requirements, the applicant must agree to be bound by the emissions limitation(s) and/or restriction(s) contained in this application. In addition, the applicant must agree that these emission limitation(s) are enforceable by the Department, the Environmental Protection Agency and the citizens.

13.1 Schedule for Compliance Certification Submission

a. Frequency of submittal: _____

b. Beginning date: _____

13.2 Certification of Compliance (for Synthetic Minor Facility only)

I certify under the penalty of 18 Pa. CS 4904 (b) (2) that the sources covered by this application will comply with the emission limitations and other requirements contained in this application and all previously issued plan approvals and operating permits. I further certify that, based on information and belief formed after reasonable inquiry, the statements and information in this application are true, accurate, and complete.

(Signed) _____ Date _____

Name (Typed) _____

Title: _____

Appendix B, Attachment 1: Emission Calculations

CLIENT: Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER: 112IC05958.20	
SUBJECT: Middletown Station -- Existing Equipment Overall Project Summary Table			
BASED ON: Emission Calculation Workbooks		DRAWING NUMBER: Not Applicable	
BY: VJPlachy	CHECKED BY: AMO'Bradovich		DATE: 8/16/2016

Objective: Summarize the controlled maximum hourly and annual emission rates.

1. **PRE-CONTROL EMISSION ESTIMATES***

Emissions Source	Pre-Control Maximum Hourly Emission Rate [pounds per hour (lb/hr)]									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2	CH_4	N_2O	CO_2e
Control Device (Flare):	0.004	0.02	608.62	N/C	0.0002	0.00004	7.67	0.001	0.0001	7.70
Fugitives:	N/C	N/C	0.05	N/C	N/C	N/C	N/C	N/C	N/C	N/C
TOTAL MAXIMUM HOURLY:	<0.01	0.02	608.67	N/C	<0.01	<0.01	7.67	<0.01	<0.01	7.70

Emissions Source	Pre-Control Annual Average Emission Rate [tons per year (tpy)]									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2	CH_4	N_2O	CO_2e
Control Device (Flare):	0.02	0.08	27.25	N/C	0.001	0.0002	33.60	0.002	0.0002	33.70
Fugitives:	N/C	N/C	0.21	N/C	N/C	N/C	N/C	N/C	N/C	N/C
TOTAL ANNUAL AVERAGE:	0.02	0.08	27.46	N/C	<0.01	<0.01	33.60	<0.01	<0.01	33.70

2. **POST-CONTROL EMISSION ESTIMATES**

Emission Source	Post-Controlled Maximum Hourly Emission Rate (lb/hr)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Control Device (Flare):	0.88	4.02	12.22	N/C	0.04	0.00004	1,852	0.13	0.01	1,862
Fugitives:	N/C	N/C	0.05	N/C	N/C	N/C	N/C	N/C	N/C	N/C
TOTAL MAXIMUM HOURLY:	0.88	4.02	12.27	N/C	0.04	<0.01	1,852	0.13	0.01	1,862

Emission Source	Post-Controlled Annual Average Emission Rate (tpy)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Control Device (Flare):	0.06	0.26	0.68	N/C	0.002	0.0002	115.90	0.01	0.001	116.50
Fugitives:	N/C	N/C	0.21	N/C	N/C	N/C	N/C	N/C	N/C	N/C
TOTAL ANNUAL AVERAGE:	0.06	0.26	0.89	N/C	<0.01	<0.01	115.90	0.01	<0.01	116.50

NOTE:

The emission estimate workbooks employ the "precision as displayed" option in Excel®; therefore, only the displayed significant figure are applied in the calculations. The minor impacts may occurred to emission estimates by utilizing this Excel® function/option.

*The Pre-Control Emission Estimates assume that the pilot gas is continuously supplied and combusted.

Terminology/Acronyms

CH_4 = methane
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
HAP = hazardous air pollutant
N/C = Not Calculated because it is not a pollutant associated with the source
N_2O = nitrogen dioxide
NOx = oxides of nitrogen
PM = particulate matter
$PM_{2.5}$ = particles with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10} = particles with an aerodynamic diameter less than or equal to 10 micrometers
SO_x = oxides of sulfur
VOC = volatile organic compound

CLIENT: Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER: 112IC05958.20	
SUBJECT: Middletown Station -- Existing Equipment Flare Summary Table			
BASED ON: Emission Calculation Workbooks		DRAWING NUMBER: Not Applicable	
BY: VJPlachy	CHECKED BY: AMO'Bradovich		DATE: 7/7/2016

Objective: Present the Maximum Short Term and Annual Emission Rates for the Updated emission estimates.

PRE-CONTROL EMISSION ESTIMATES*

Emission Scenario	Pre-Controlled Maximum Hourly Emission Rate (lb/hr)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Standard Operating Scenario	3.76E-03	1.72E-02	4.62E+00	N/C	1.53E-04	4.16E-05	7.67E+00	5.54E-04	5.54E-05	7.70E+00
Maintenance Operations Scenario	N/C	N/C	6.04E+02	N/C	N/C	N/C	N/C	N/C	N/C	N/C
TOTAL MAXIMUM HOURLY:	0.004	0.02	608.62	N/C	0.0002	0.00004	7.67	0.001	0.0001	7.70

Emission Scenario	Pre-Controlled Annual Emission Rate (tpy)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Standard Operating Scenario	1.65E-02	7.53E-02	2.02E+01	N/C	6.70E-04	1.82E-04	3.36E+01	2.43E-03	2.43E-04	3.37E+01
Maintenance Operations Scenario	N/C	N/C	7.05E+00	N/C	N/C	N/C	N/C	N/C	N/C	N/C
TOTAL ANNUAL AVERAGE:	0.02	0.08	27.25	N/C	0.001	0.0002	33.60	0.002	0.0002	33.70

POST-CONTROL EMISSION ESTIMATES

Emission Scenario	Post-Controlled Maximum Hourly Emission Rate (lb/hr)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Standard Operating Scenario	1.04E-02	4.74E-02	1.24E-01	N/C	4.28E-04	4.16E-05	2.16E+01	1.53E-03	1.53E-04	2.17E+01
Maintenance Operations Scenario	8.70E-01	3.97E+00	1.21E+01	N/C	4.00E-02	N/C	1.83E+03	1.30E-01	1.00E-02	1.84E+03
TOTAL MAXIMUM HOURLY:	0.88	4.02	12.22	N/C	0.04	0.00004	1,852	0.13	0.01	1,862

Emission Scenario	Post-Controlled Annual Emission Rate (tpy)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Standard Operating Scenario	4.55E-02	2.07E-01	5.41E-01	N/C	1.87E-03	1.82E-04	9.45E+01	6.69E-03	6.69E-04	9.50E+01
Maintenance Operations Scenario	1.00E-02	5.00E-02	1.40E-01	N/C	4.00E-04	N/C	2.14E+01	1.00E-03	1.00E-04	2.15E+01
TOTAL ANNUAL AVERAGE:	0.06	0.26	0.68	N/C	0.002	0.0002	115.90	0.01	0.001	116.50

NOTES:

*The Pre-Control Emission Estimates assume that the pilot gas is continuously supplied and combusted.

N/C = not calculated

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[54]
SUBJECT Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources			
BASED ON SPLP Equipment Data / Specifications		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/6/2016

Objective: Develop example calculations: Maximum Hourly, Maximum Daily, and Annual Average Emission Rates for the proposed Standard Operating Scenario Emission Streams.

Inputs and Assumptions:

1. Potential stream products to the enclosed flare consistent of butane, propane, and/or ethane.
2. Sources of standard operating scenario emission sources to the enclosed flare that were evaluated included: chromatographs (GC), relief valves (RV), and booster, injection, and feed pump seals (Pump).
3. Maintenance intermittent emission sources to the enclosed flare that were evaluated include: gas releases from filter cleaning, prover maintenance, pigging events, and miscellaneous maintenance activities. Maintenance activity emission estimates will be presented in another calculation sheet.
4. Stream physical properties that result in the highest potential emission rates have been used.
5. Hourly flow to flare from Standard Operating Scenario Emission Streams:

RV ($FR_{RV\text{-}scf/hr}$):	0.00	scf/hr	→	0 scf/yr	No RVs to flare for this station
GC ($FR_{GC\text{-}scf/hr}$):	0.00	scf/hr	→	0 scf/yr	No GCs to flare for this station.
Booster Pumps ($FR_{BostPmp\text{-}scf/hr}$)	30.00	scf/hr	→	262,800 scf/yr	
Injection Pumps ($FR_{InjPmp\text{-}scf/hr}$)	0.00	scf/hr	→	0 scf/yr	No Injection Pump Seals to flare for this station.
Feed Pumps ($FR_{FeedPmp\text{-}scf/hr}$)	0.00	scf/hr	→	0 scf/yr	No Feed Pump Seals to flare for this station.
Pump ($FR_{total\text{-}scf/hr}$):	30.00	scf/hr	→	262,800 scf/yr	

6. Because the enclosed flare is considered to be 100% smokeless, particulate matter (PM) emissions are assumed to be negligible.
7. The flare's destruction and removal efficiency (DRE) for VOCs and HAPs only: 98 percent (%)
   The flare does not reduce/control NO_X, CO, SO_X, CO, CH_4, N_2O, or CO_2e emissions, that is, pre-control emissions equal post-control emissions.
8. Flare Emission Factors (EFs)

NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2		CH_4	N_2O
						butane	propane		
(lb/MMBtu)				(ppmw)		(kg/MMBtu)			
0.068	0.310	0.570	0	30	TBD	64.77	62.87	0.003	0.0006

PROPERTIES, AND ABBREVIATIONS / ACRONYMS "Standard Inputs" WORKSHEET TAB.

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[55]
SUBJECT Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources			
BASED ON SPLP Equipment Data / Specifications		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/6/2016

Inputs and Assumptions (Continued):

9. Oxides of Sulfur (SO_X) emissions are:
   Based on the sulfur content of the stream.
   Assume SO_X as SO_2.
   Assumes that all the all fuel sulfur converts to SO_2.
10. CO_2e Global Warming Potential EFs (EF_{GWP})

CO_2	CH_4	N_2O
1	25	298

CO_2e emission estimates use the following carbon equivalence factors: 25 for CH_4, and 298 for N_2O from 40 CFR Part 98, Subpart A, Table A-1.

11. Maximum emission stream flow rates are achieved when assuming a stream composition of 100 weight percent (wt%) butane.
12. HAPs are generated from propane burned as pilot gas and are contained in the LPG stream.
13. LPG HAP content ($HAPs_{wt\%}$): 0 wt%
14. Operating service factor (OSF), that is, percent of the year the unit is operating: 100 %

Calculations:

STANDARD OPERATING SCENARIO EMISSION SOURCES

1. Calculate the SO_X Emission Factor (EF) in pounds per standard cubic feet (lb/scf) for butane.

$EF_{SOx(lb/scf)}$ = [(mole of the gas stream)] * [(concentration of sulfur in gas stream)] * [(molar ratio of SO_2 to S)]

= [(lb of gas stream) * (MW gas stream]
* [(concentration of sulfur in gas stream)] * [(molar ratio of SO_2 to S)]

= [(volume of gas stream as butane) * (MW butane)]
* [(concentration of sulfur ppmw) / ($CF_{ppmw-wt\%}$) / ($CF_{wt\%-DecEqui}$)] * [(MW SO_2) / (MW S)]

= [($CF_{lb\_mol-scf}$) * (MW_{butane})] * [(SO_{2-ppmw}) / ($CF_{ppmw-wt\%}$) / ($CF_{wt\%-DecEqui}$)] * [(MW SO_2) / (MW S)]

$$= \frac{1 \text{ ~~lb-mol~~}}{379.5 \text{ scf}} \left| \frac{58.12 \text{ ~~lb butane~~}}{1 \text{ ~~lb-mole~~}} \right| \frac{30 \text{ ~~ppmw~~ S}}{\text{~~gas stream (butane)~~}} \left| \frac{1 \text{ ~~\%~~}}{10{,}000 \text{ ~~ppmw~~}} \right| \frac{1 \text{ ~~DecEq~~}}{100 \text{ ~~\%~~}} \left| \frac{64.07 \text{ lb } SO_2\text{/~~lb-mol~~}}{32.07 \text{ ~~lb S/lb-mol~~}} \right.$$

= 9.18E-06 lb SO_2/cf of the gas stream = 9.18E-06 lb SO_X/cf of the gas stream

2. Calculate the total standard operating scenario flow to the flare in scf/hr ($Flow_{Std-scf/hr}$).

$Flow_{Std-scf/hr}$ = [∑ Standard Operating Scenario Flow Rates to the Flare]

= (Flow from the GCs) + (Flow from RVs) + (Flow from Pumps)

= 0.00 + 0.00 + 30.00 scf/hr = 30.00 scf/hr standard operating scenario flow

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[56]
SUBJECT Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources			
BASED ON SPLP Equipment Data / Specifications		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/6/2016

Calculations (Continued):

STANDARD OPERATING SCENARIO EMISSION SOURCES

3. Calculate the flow rate (FR) from the standard operating scenario sources to the flare in MMBtu/hr.
   For the RVs as an example:

$Flow_{Std\text{-}MMBtu/hr} = (FR_{Std\text{-}scf/hr}) * (HHV_{Butane}) / (CF_{Btu\text{-}MMBtu})$

$$= \frac{30.00\ \text{scf}}{\text{hr}} \left| \frac{3{,}244\ \text{Btu}}{1\ \text{scf}} \right| \frac{1\ \text{MMBtu}}{1\text{E+}06\ \text{Btu}} = 9.73\text{E-}02\ \text{MMBtu}_{Std}/\text{hr}$$

4. Convert emission factor from kg/MMBtu to lb/MMBtu.
   Using butane CO_2 as and example:

$EF_{CO2(lb/MMBtu)} = [EF_{CO2(kg/MMBtu)}] / (CF_{kg\text{-}lb})$

$$= \frac{64.77\ \text{kg}}{\text{MMBtu}} \left| \frac{1\ \text{lb}}{0.4536\ \text{kg}} \right. = 142.79\ \text{lb } CO_2/\text{MMBtu}$$

EF										EF_{GWP}		
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CO_2 propane	CH_4	N_2O	CO_2	CH_4	N_2O
(lb/MMBtu)				(lb/scf)	(lb/MMBtu)					N/A		
0.068	0.310	0.57	N/A	9.18E-06	N/A	142.79	138.60	0.01	0.001	1	25	298

NOTE:
Because the EF for butane CO_2 is greater than the EF for propane CO_2, the butane CO_2 emission factor will be applied to estimate the maximum hourly, maximum daily, and annual average emission rates.

STANDARD OPERATING SCENARIO EMISSION SOURCES: Pre-control Emission Estimate

5. Calculate the VOC flow rate from the standard operating scenario sources before controls ($F\text{-}pre_{VOC}$) in lb/hr.
   a. For the GCs, the RVs, the Booster pumps, the Injection pumps, and the Feed Pumps.

$F\text{-}pre_{VOC\text{-}lb/hr} = (Flow_{Std\text{-}scf/hr}) / (CF_{scf\text{-}lb\text{-}mol}) * (MW_{butane})$

$$= 30.00 \left| \frac{\text{scf}}{\text{hr}} \right| \frac{1\ \text{lb-mol}}{379.5\ \text{scf}} \left| \frac{58.12\ \text{lb}}{1\ \text{lb-mole}} \right. = 4.59\ \text{lb/hr}$$

6. Calculate the EF for HAPs in pounds per scf (lb/scf).

$EF_{HAPs(lb/scf)} = (HAPs_{wt\%}) / (CF_{wt\%\text{-}DecEqui}) * (MW_{butane}) / (CF_{scf\text{-}lb/mol})$

$$= \frac{0\ \text{wt\%}}{} \left| \frac{1\ \text{DecEq}}{100\ \text{wt\%}} \right| \frac{58.12\ \text{lb}}{\text{lb-mol}} \left| \frac{1\ \text{lb-mol}}{379.5\ \text{scf}} \right. = 0\ \text{lb HAPs/scf}$$

CLIENT Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER 112IC05958.20 [57]	
SUBJECT Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources		
BASED ON SPLP Equipment Data / Specifications	DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich	DATE 6/6/2016

STANDARD OPERATING SCENARIO EMISSION SOURCES: Pre-control Emission Estimate (Continued):

7. Calculate HAPs the flow rate from the standard operating scenario sources before controls ($ER\text{-}pre_{HAPS}$) in lb/hr.

$ER\text{-}pre_{HAPs\text{-}lb/hr} = (Flow_{Std\text{-}scf/hr}) * (ER_{HAPs\text{-}lb/scf})$

$= [(FR_{GC\text{-}scf/hr}) + (FR_{RV\text{-}scf/hr}) + (FR_{Pump\text{-}scf/hr})] * (ER_{HAPs\text{-}lb/scf})$

$= \left\| 30.00 \frac{\cancel{scf}}{hr} \right\| \frac{0 \text{ lb}}{1 \cancel{scf}} \| = 0.00E+00$ lb HAPs/hr

Pre-Control Maximum Hourly Emission Rate (ER) (lb/hr)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
N/C	N/C	4.59E+00	N/C	N/C	N/C	N/C	N/C	N/C	N/C

Pre-Control Annual Average ER (tpy)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
N/C	N/C	2.01E+01	N/C	N/C	N/C	N/C	N/C	N/C	N/C

POST CONTROLS

STANDARD OPERAING SCENARIO EMISSION SOURCES: Post-control Emission Estimate

8. Calculate the Maximum Hourly emission rate for SO_X $ER_{MaxHrlySOx}$.

$ER_{MaxHrlySOx} = (Flow_{Std\text{-}scf/hr}) * (EF_{NOx})$

$= \left\| 30.00 \frac{\cancel{scf}}{hr} \right\| 9.18E-06 \frac{lb}{\cancel{scf}} \| = 2.75E-04$ lb SO_X /hr

9. Calculate the pre-control Annual Average emission rate for the remaining pollutants in tons per year (tpy).

Using NO_X as an example:

$ER\text{-}pre_{AnnAvgNOx} = (ER_{MaxHrlyNOx}) * (CF_{hours\text{-}year}) * (OSF) / (CF_{\%\text{-}DecEq}) / (CF_{lb\text{-}tons})$

$= \left| \frac{6.62E-03 \cancel{lb}}{1 \cancel{hr}} \right| \left| \frac{8,760 \cancel{hr}}{1 \text{ year}} \right| \frac{100 \cancel{\%}}{100 \cancel{\%}} \left| \frac{1 \cancel{DecEq}}{1 \text{ ton}} \right| \left| \frac{1 \text{ ton}}{2,000 \cancel{lb}} \right| = 2.90E-02$ tpy of NO_X

10. Calculate the maximum hourly emission rate $ER_{MaxHrly}$.

Using NO_X as an example:

$ER_{MaxHrlyNOx} = (EF_{NOx}) * (Flow_{Std\text{-}MMBtuhr})$

$= \left| \frac{0.068 \text{ lb}}{\cancel{MMBtu}} \right| \left| \frac{9.73E-02 \cancel{MMBtu}}{hr} \right| = 6.62E-03$ lb NO_X /hr

11. Calculate the maximum hourly emission rate for CO_2e based on CO_2, CH_4, and N_2O emission rates.

$ER_{MaxHrlyCO2e} = \sum\{[(CO_{2\_lb/hr}) * (EF_{CO2\_GWP})] + [(CH_{4\_lb/hr}) * (EF_{CH4\_GWP})] + [(N_2O_{lb/hr}) * (EF_{N2O\_GWP})]\}$

$= \left\| 1.39E+01 \frac{lb}{hr} \right| 1 \left\| + \right\| 9.73E-04 \frac{lb}{hr} \left| 25 \right\| + \left\| 9.73E-05 \frac{lb}{hr} \right| 298 \| = 1.40E+01$ lb/hr

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20 [58]	
SUBJECT Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources			
BASED ON SPLP Equipment Data / Specifications		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/6/2016

POST CONTROLS

STANDARD OPERAING SCENARIO EMISSION SOURCES: Post-control Emission Estimate (Continued)

12. Calculate the maximum hourly VOC flow rate (FR) from the standard operating scenario sources in lb/hr.

$Flow_{VOC\text{-}lb/hr} = (Flow_{Std\text{-}scf/hr}) / (CF_{scf\text{-}lb\text{-}mol}) * (MW_{butane}) * [1 - (DRE / CF_{\%\text{-}DecEq})]$

$= \left| 30.00 \frac{scf}{hr} \right| \left| \frac{1\ lb\text{-}mol}{379.5\ scf} \right| \left| \frac{58.12\ lb}{lb\text{-}mole} \right| 1 - \left| 98\ \% \right| \left| \frac{1\ DecEq}{100\ \%} \right| = 9.19E\text{-}02$ lb VOC/hr

13. Calculate the maximum hourly HAPs flow rate (FR) from the standard operating scenario sources in lb/hr.

$Flow_{HAPs\text{-}lb/hr} = (Flow_{Std\text{-}scf/hr}) * (EF_{HAPs(lb/scf)}) * [1 - (DRE * CF_{\%\text{-}DecEq})]$

$= \left| \frac{30.00\ scf}{hr} \right| \left| \frac{0\ lb}{1\ scf} \right| 1 - \left| 98\ \% \right| \left| \frac{1\ DecEq}{100\ \%} \right| = 0.00E+00$ lb HAPs/hr

14. Calculate CO_2 the flow rate (FR) from the standard operating scenario sources in lb/hr.

$Flow_{CO2\_lb/hr} = (Flow_{Std\_MMBtu/hr}) * (EF_{CO2\_lb/MMBtu})$

$= \left| \frac{9.73E\text{-}02\ lb}{MMBtu} \right| \left| 142.79\ MMBtu \right| = 1.39E+01$ lb CO_2/hr

Post Control Maximum Short Term Hourly Emission Rate (lb/hr)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
6.62E-03	3.02E-02	9.19E-02	N/C	2.75E-04	N/C	1.39E+01	9.73E-04	9.73E-05	1.40E+01

15. Calculate the daily maximum emission rate $ER_{MaxDaily}$.

Using NO_X as an example:

$ER_{MaxDailyNOx} = (ER_{MaxStTmNOx}) * (CF_{hours\text{-}day})$

$= \left| \frac{6.62E\text{-}03\ lb}{1\ hr} \right| \left| \frac{24\ hr}{1\ day} \right| = 1.59E\text{-}01$ lb NO_X /day

Post Maximum Daily Emission Rate (lb/day)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
1.59E-01	7.25E-01	2.21E+00	N/C	6.60E-03	N/C	3.34E+02	2.34E-02	2.34E-03	3.36E+02

16. Calculate the annual average emission rate for the remaining pollutants in tons per year (tpy).

Using NO_X as an example:

$ER_{AnnNOx} = (ER_{MaxShtTmNOx}) * (CF_{hours\text{-}year}) * (OSF) / (CF_{\%\text{-}DecEq}) / (CF_{lb\text{-}tons})$

$= \left| \frac{6.62E\text{-}03\ lb}{1\ hr} \right| \left| \frac{8{,}760\ hr}{1\ year} \right| 100\ \% \left| \frac{1\ DecEq}{100\ \%} \right| \left| \frac{1\ ton}{2{,}000\ lb} \right| = 2.90E\text{-}02$ NO_X tpy

Annual Emission Rate (tpy)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
2.90E-02	1.32E-01	4.03E-01	N/C	1.20E-03	N/C	6.09E+01	4.26E-03	4.26E-04	6.13E+01

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[59]
SUBJECT Middletown Station -- Existing Equipment Standard Operating Scenario Sources: Total Flow from Booster Pump Seals			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated standard operating scenario		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/6/2016

Objective: Calculate the volume from the booster pumps that are sent to the enclosed flare.

Inputs and Assumptions:

1. The pump seal leaks will be captured and sent to the flare header as the volatile organic compound (VOC) and hazardous air pollutant (HAP) control device.
2. Worst case scenario is for the station to be at a sea level elevation. 0 ft
   Pressure at atmosphere: 1.00 atm
   Source for conversion: http://www.engineeringtoolbox.com/air-altitude-pressure-d_462.html
   Pressure at release point ($P_{act\text{-}release\text{-}atm}$) = Pressure at atmospheric = 1.00 atm
3. Operating service factor (OSF), that is, percent of the year the unit is operating: 100.00 %
4. Equipment Quantities:
   Booster Pumps (N_{BP}): 1
5. Equipment Volume:
6. Pump Seal Leak Rates:

Booster Pumps Inlet (LR_{BPin}):	0	grams per hour (g/hr) @ 60°	14.7	psi	1.00	atm
	30	scf/hr @ 60°F				
Booster Pumps Outlet (LR_{BPout}):	0	g/hr @ 60°F	0	psi	0.00	atm
	0	scf/hr @ 60°F				

   Source: Total pump seal leak rates provided by the Manufacturer (Flowserve):
7. The ideal gas law applies:
   $PV = nR_{specific}T$
8. System temperature: 60 degrees Fahrenheit (°F) = 520.67 degrees Rankine (°R)
9. Average release temperature: 60 °F = 520.67 °R
10. Propane physical properties result in the greatest release volumes, therefore, propane will be used to calculate the gas release volumes from the equipment.
11. Propane physical properties:.
    Density at pipe pressure (ρ_{pipe}): 33.74 pounds per cubic feet (lb/ft^3) at 40°F and 1,480 psig
    Density at atmospheric conditions ($\rho_{released}$): 0.12 pounds per standard cubic feet (lb/scf) at 60°F and 1 atm
    Density at Booster Pump Inlet (ρ_{BPin}): 0.12 lb/ft^3 at 60°F at 14 psi
    Density at Booster Pump Outlet (ρ_{BPout}): 0.00
    Source:
    a. The density of propane at atmospheric conditions taken from the National Institute of Standards and Technology website of isothermal properties for propane.
    http://webbook.nist.gov/cgi/fluid.cgi?ID=C74986&TUnit=F&PUnit=atm&DUnit=lbm%2Fft3&HUnit=Btu%2Flbm&WUnit=ft%2Fs&VisUnit=cP&STUnit=lb%2Fft&Type=IsoTherm&RefState=DEF&Action=Page
    b. The higher heating value (HHV) of Butane based on 40 CFR Part 98 Subpart C, Table C-1:
12. There are no hazardous air pollutants in butane, propane, or ethane.
13. Flare designed capacity (C_{flare}): 10 MMBtu/hr

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[60]
SUBJECT Middletown Station -- Existing Equipment Standard Operating Scenario Sources: Total Flow from Booster Pump Seals			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated standard operating scenario		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/6/2016

Calculations:

1. Calculate the leakage rate per pump seal in scf/hr at atmospheric pressure (LR_{atm}).

$$\frac{P_1V_1}{P_2V_2} = \frac{n_1RT_1}{n_1RT_2} \quad ; \quad \text{Where } n_1 = n_2 \text{ and } T_1 = T_2 \quad ; \quad \frac{P_1V_1}{P_2V_2} = 1$$

$$P_1V_1 = P_2V_2 \quad \text{==»} \quad V_2 = P_1V_1 / P_2$$

$$LR_{atmBPin\text{-}scf/hr} = [(P_{BPin}) / (CF_{psi\text{-}atm}) * (LR_{BPin\text{-}acf/hr})] / (P_{atm})$$

$$= \frac{14.7\ \text{psi}}{14.7\ \text{psi}} \cdot \frac{1\ \text{atm}}{\text{hr}} \cdot \frac{30\ \text{acf}}{1.00\ \text{atm}} \cdot \frac{1}{} = 30.00\ \text{scf/hr}$$

Pump Seal	Pressure (psig)	Leakage Rate (acf/hr)	Leakage Rate (scf/hr)
Booster Inlet	14.7	30	30
Booster Outlet	0	0	0

2. Calculate the total pump leakage rate in scf/hr ($LR_{totalBP\text{-}scf/hr}$).

$$LR_{totalBP\text{-}scf/hr} = [\sum(LR_{atmBPin\text{-}scf/hr} + LR_{atmBPout\text{-}scf/hr})] * (N_{BP}) * (OSF) / (CF_{\%\text{-}DecEq})$$

$$= \frac{30.00\ \text{scf}}{\text{hr}} + \frac{0.00\ \text{scf}}{\text{hr}} \cdot \frac{1\ \text{pumps}}{} \cdot 100.00\ \% \cdot \frac{1\ \text{DecEq}}{100\ \%}$$

$$= 30.00\ \text{scf/hr}$$

3. Calculate the total pump leakage rate in scf/yr ($LR_{totalBP\text{-}scf/yr}$)

$$LR_{totalBP\text{-}scf/yr} = (LR_{totalBP\text{-}scf/hr}) * (CF_{hr\text{-}yr}) * (OSF) / (CF_{\%\text{-}DecEq})$$

$$= \frac{30.00\ \text{scf}}{\text{hr}} \cdot \frac{8{,}760\ \text{hrs}}{1\ \text{yr}} \cdot 100.00\ \% \cdot \frac{1\ \text{DecEq}}{100\ \%} = 262{,}800\ \text{scf/yr}$$

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[61]
SUBJECT Middletown Station -- Existing Equipment Standard Operating Scenario Sources: Total Flow from Pilot Gas for the Enclosed Flare			
BASED ON SPLP Equipment Data / Specifications		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 8/29/2016

Objective: Develop example calculations for: Maximum Hourly, Maximum Daily, and Annual Average Emission Rate for the Enclosed Flare Propane Pilot Gas.

Inputs and Assumptions:

1. Pilot gas composition: 100.00 weight percent (wt%) propane
2. Pilot gas flow rate are based on the flare design specifications.
   flow rate ($FR_{Btu/hr}$): 50,000 British thermal units per hour (Btu/hr)
   flow rate ($FR_{scf/hr}$): 22 standard cubic feet per hour (scf/hr)
   Flow rate source: manufacturer's data.
3. higher heating value (HHV_{butane}): 3,244 British thermal units per standard cubic feet (Btu/scf)
4. Operating service factor (OF), that is, percent of the year the unit is operating: 100.00 %
5. The flare's destruction and removal efficiency (DRE) has been applied to the pilot gas VOC emissions: 98.0 percent (%)
6. Because the enclosed flare is considered to be 100% smokeless, particulate matter (PM) emissions are assumed to be negligible.
7. HAPs are generated from propane burned as pilot gas and are contained in the LPG stream.
8. Flare Emission Factors (EFs)

NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CO_2 propane	CH_4	N_2O
(lb/MMBtu)				(ppmw)	(lb/MMscf)	(kg/MMBtu)			
0.068	0.310	0.570	0	30	1.89	64.77	62.87	0.003	0.0006

INFORMATION REGARDING THE SOURCE OF INPUTS FOR THIS THIS TABLE ARE PRESENTED IN THE CONVERSION FACTORS, PHYSICAL PROPERTIES, AND ABBREVIATIONS / ACRONYMS WORKSHEET.

9. Oxides of Sulfur (SO_X) emissions are:
   Based on the sulfur content of the stream.
   Assumes SO_X as SO_2.
   Assumes that all the all fuel sulfur converts to SO_2.
10. CO_2e Global Warming Potential EFs (EF_{GWP})

CO_2	CH_4	N_2O
1	25	298

CO_2e emission estimates use the following carbon equivalence factors: 25 for CH_4, and 298 for N_2O from 40 CFR Part 98, Subpart A, Table A-1.

11. There are no hazardous air pollutants in propane. However, for a conservative estimate the pilot gas was assumed to have the same HAPs as natural gas, that is, AP-42, Section 1.4, Tables 1.4-3 (EFs for Speciated Organic Compounds from Natural Gas Combustion) and 1.4-4 (ER for metals from Natural Gas Combustion) applies.

    AP-42 Chapter 1.4; Table 1.4-2; footnote a: To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of specified heating values to this average heating value.

    https://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[62]
SUBJECT Middletown Station -- Existing Equipment Standard Operating Scenario Sources: Total Flow from Pilot Gas for the Enclosed Flare			
BASED ON SPLP Equipment Data / Specifications		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 8/29/2016

Calculations:

PILOT GAS EMISSIONS

1. Calculate the pilot gas flow rate in Btu/hr at 22 scf/hr.

$ER_{bt/hr} = (FR_{scf/hr}) * (HHV_{Propane\text{-}MMBtu/scf})$

$$= \frac{22\ \text{scf}}{\text{hr}} \left| \frac{2{,}516\ \text{Btu}}{\text{scf}} \right. = 55{,}352\ \text{Btu/hr estimated based on manufacturer's flow rate in scf/hr}$$

2. Calculate the SO_X emission factor in pounds per standard cubic feet (lb/scf).

$EF_{SOx(lb/scf)} = (EF_{SOx\text{-}ppmw}) / (CF_{ppm\text{-}\%}) / (CF_{\%\text{-}DecEq}) / (CF_{scf\text{-}lb\_mol}) * (MW_{propane}) * [(\text{molar ratio of } SO_2 \text{ to S})]$

$$= \frac{30\ \text{ppmw}}{1E{+}04\ \text{ppmw}} \left| \frac{1\ \%}{100\ \%} \right| \frac{1\ \text{DecEq}}{1\ \text{DecEq}} \left| \frac{1\ \text{lb-mol}}{379.5\ \text{scf}} \right| \frac{44.10\ \text{lb}}{\text{lb-mol}} \left| \frac{64.07\ \text{lb } SO_2\text{/lb-mol}}{32.07\ \text{lb S/lb-mol}} \right.$$

$= 6.96E\text{-}06$ lb SO_2/propane scf **=** $6.96E\text{-}06$ lb SO_X/propane scf

3. Convert emission factor from kg/MMBtu to lb/MMBtu.

Using propane CO_2 as an example:

$EF_{CO2(lb/MMBtu)} = [EF_{CO2(kg/MMBtu)}] / (CF_{kg\text{-}lb})$

$$= \frac{62.87\ \text{kg}}{\text{MMBtu}} \left| \frac{1\ \text{lb}}{0.4536\ \text{kg}} \right. = 138.60\ \text{lb } CO_2\text{/MMBtu}$$

EF									EF_{GWP}		
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 propane	CH_4	N_2O	CO_2	CH_4	N_2O
(lb/MMBtu)				(lb/scf)	(lb/MMscf)	(lb/MMBtu)			N/A		
0.068	0.310	0.570	0	6.96E-06	1.89	138.60	0.01	0.001	1	25	298

4. Calculate the maximum hourly emission rate $ER_{MaxShtTm}$.

Using NO_X as an example:

$ER_{MaxHrlyNOx} = (EF_{NOx}) * (Flow_{Btu/hr}) / (CF_{Btu\text{-}MMBtu})$

$$= \frac{0.068\ \text{lb}}{\text{MMBtu}} \left| \frac{55{,}352\ \text{Btu}}{\text{hr}} \right| \frac{1\ \text{MMBtu}}{1E{+}06\ \text{Btu}} = 3.76E\text{-}03\ \text{lb } NO_X\text{/hr}$$

5. Estimate the pilot gas flow rate and compared to the design value in scf/hr

$ER_{scf/hr} = (FR_{Btu/hr}) / (HHV_{MMBtu/scf})$

$$= \frac{55{,}352\ \text{Btu}}{\text{hr}} \left| \frac{\text{scf}}{3{,}244\ \text{Btu}} \right. = 17.1\ \text{pilot gas flow scf/hr}$$

The design flow rate of 22 scf/hr is greater than the estimated value. Therefore, the design flow rate of 22 scf/hr is presented in the application of Table 1-1 and used in the emission when scf is applied.

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[63]
SUBJECT Middletown Station -- Existing Equipment Standard Operating Scenario Sources: Total Flow from Pilot Gas for the Enclosed Flare			
BASED ON SPLP Equipment Data / Specifications		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 8/29/2016

Calculations (Continued):

PILOT GAS EMISSIONS

6. Calculate the maximum hourly emission rate for SO_X $ER_{MaxHrlySOx}$.

$ER_{MaxHrlySOx} = (EF_{SOx}) * (FR_{Btu/hr}) / (HHV_{propane})$

$$= \left| \frac{6.96E\text{-}06 \text{ lb}}{\cancel{\text{scf}}} \right| \left| \frac{55{,}352 \ \cancel{\text{Btu}}}{\text{hr}} \right| \left| \frac{\cancel{\text{scf}}}{2{,}516 \ \cancel{\text{Btu}}} \right| = 1.53E\text{-}04 \text{ lb/hr}$$

7. Calculate the maximum hourly emission rate based on the heat rate of the pilot gas for HAPs $ER_{MaxHrlyHAPs}$.

$ER_{MaxHrlyHAPs} = (FR_{scf/hr}) * (EF_{HAPs}) / (CF_{scf\text{-}MMscf})$

$$= \left| \frac{22 \ \cancel{\text{scf}}}{\text{hr}} \right| \left| \frac{1.89 \text{ lb}}{\cancel{\text{MMscf}}} \right| \left| \frac{1 \ \cancel{\text{MMscf}}}{1E{+}06 \ \cancel{\text{scf}}} \right| = 4.16E\text{-}05 \text{ lb HAPs /hr}$$

8. Calculate the maximum hourly emission rate for the other pollutants

Using CO as an example:

$ER_{MaxHrlyCO} = (FR_{Btu/hr}) * (EF_{CO}) / (CF_{Btu\text{-}MMBtu})$

$$= \left| \frac{55{,}352 \ \cancel{\text{Btu}}}{\text{hr}} \right| \left| \frac{0.31 \text{ lb}}{\cancel{\text{MMBtu}}} \right| \left| \frac{1 \ \cancel{\text{MMBtu}}}{1E{+}06 \ \cancel{\text{Btu}}} \right| = 1.72E\text{-}02 \text{ lb CO /hr}$$

9. Calculate the maximum hourly emission rate for CO_2e based on CO_2, CH_4, and N_2O emission rates.

$ER_{MaxHrlyCO2e} = \sum\{[(CO_{2\_lb/hr}) * (EF_{CO2\_GWP})] + [(CH_{4\_lb/hr}) * (EF_{CH4\_GWP})] + [(N_2O_{\_lb/hr}) * (EF_{N2O\_GWP})]\}$

$$= \left\| 7.67E{+}00 \ \frac{\text{lb}}{\text{hr}} \right\| 1 \left\| + \right\| 5.54E\text{-}04 \ \frac{\text{lb}}{\text{hr}} \left\| 25 \right\| + \left\| 5.54E\text{-}05 \ \frac{\text{lb}}{\text{hr}} \right\| 298 \left\| = 7.70E{+}00 \text{ lb/hr} \right.$$

Maximum Hourly Emission Rate (lb/hr)								
NO_x	CO	VOC	SO_x	HAPs	CO_2 propane	CH_4	N_2O	CO_2e
3.76E-03	1.72E-02	3.16E-02	1.53E-04	4.16E-05	7.67E+00	5.54E-04	5.54E-05	7.70E+00

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[64]
SUBJECT Middletown Station -- Existing Equipment Standard Operating Scenario Sources: Total Flow from Pilot Gas for the Enclosed Flare			
BASED ON SPLP Equipment Data / Specifications		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 8/29/2016

Calculations (Continued):

PILOT GAS EMISSIONS

10. Calculate the daily maximum emission rate $ER_{MaxDaily}$.

Using NO_X as an example:

$ER_{MaxDaily} = (ER_{MaxHrlyNOx}) / (CF_{hours\text{-}day})$

$$= \frac{3.76E\text{-}03 \text{ lb}}{1 \text{ hr}} \left| \frac{24 \text{ hr}}{1 \text{ day}} \right. = 9.02E\text{-}02 \text{ lb } NO_X \text{/day}$$

Maximum Daily Emission Rate (lb/day)								
NO_x	CO	VOC	SO_x	HAPs	CO_2 propane	CH_4	N_2O	CO_2e
9.02E-02	4.13E-01	7.58E-01	3.67E-03	9.98E-04	1.84E+02	1.33E-02	1.33E-03	1.85E+02

11. Calculate the annual average emission rate for ER_{AnnAvg}.

Using NO_X as an example:

$ER_{AnnAvgNOx} = (ER_{MaxHrlyNOx}) * (CF_{hours\text{-}year}) * (OSF) / (CF_{\%\text{-}DecEq}) / (CF_{lb\text{-}ton})$

$$= \frac{3.76E\text{-}03 \text{ lb}}{\text{hr}} \left| \frac{8{,}760 \text{ hr}}{1 \text{ yr}} \right. \left| \frac{100 \text{ \%}}{100 \text{ \%}} \right. \left| \frac{1 \text{ DecEq}}{1 \text{ t}} \right. \left| \frac{1 \text{ t}}{2{,}000 \text{ lb}} \right. = 1.65E\text{-}02 \text{ tpy } NO_X$$

Annual Emission Rate (tpy)								
NO_x	CO	VOC	SO_x	HAPs	CO_2 propane	CH_4	N_2O	CO_2e
1.65E-02	7.53E-02	1.38E-01	6.70E-04	1.82E-04	3.36E+01	2.43E-03	2.43E-04	3.37E+01

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [65]
SUBJECT	Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources		
BASED ON	SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios	DRAWING NUMBER	Not Applicable

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		5/23/2016

Objective: Develop example calculations for: Maximum Hourly, Maximum Daily, and Annual Average Emission Rate for the proposed Maintenance Activities.

Inputs and Assumptions:

1. Potential stream products to the enclosed flare consistent of butane, propane, and/or ethane.
2. Maintenance intermittent emission sources to the enclosed flare that were evaluated include: gas releases from filter cleaning, prover maintenance, pigging events, and miscellaneous maintenance activities.
3. The number of filter changes, prover maintenances, and pigging events has been developed to include miscellaneous maintenance activities.
4. Stream physical properties that result in the maximum potential emission rates have been used.
5. Example calculations for total annual volumes from filter changes, prover maintenances, and pigging events are presented in a separate example calculation sheet.
6. The flare's destruction and removal efficiency (DRE) for VOCs and HAPs only: 98.0 percent (%)
   The flare does not reduce/control NO_X, CO, SO_X, CO, CH_4, N_2O, or CO_2e emissions, that is, pre-control emissions equal post-control emissions.
7. Pilot gas is propane and is calculated in a separate workbook (Example calculations; Enclosed Flare Emission Calculations; Pilot Gas Emission Source).
8. Total annual flow to flare from:

Filter (F) ($FR_{F\text{-}acf/yr}$):	53,880	standard cubic feet per year (scf/yr)
Prover (F) ($FR_{Prover\text{-}acf/yr}$):	17,668	scf/yr
Pigging (F) ($FR_{pigging\text{-}acf/yr}$):	20,565	scf/yr
Total Maximum Annual Flow rate (FR_{MaxAnn}):	92,113	scf/yr

Flare designed capacity (C_{flare}): 10 MMBtu/hr

Maximum Pilot Gas Hourly Flow rate ($FR_{MaxHrlyPilot}$): 55,352 British thermal units per hour (Btu/hr)

Flow rate conversions to the units below are presented in the Example Calculations for Enclosed Flare Emission Calculations: Total Maintenance.

Maintenance activity emission estimates are presented in another calculation sheet.

9. Because the enclosed flare is considered to be 100% smokeless, particulate matter (PM) emissions are assumed to be negligible.
10. Maximum emission stream flow rates are achieved when assuming a stream composition 100 wt% butane
11. Flared Emission Factors (EFs)

NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CO_2 propane	CH_4	N_2O
(lb/MMBtu)				(ppmw)	(lb/MMBtu	(kg/MMBtu)			
0.068	0.310	0.570	0	30	1.89	64.77	62.87	0.003	0.0006

NOTES FOR THIS TABLE ARE PRESENTED IN THE CONVERSION FACTORS, PHYSICAL PROPERTIES, AND ABBREVIATIONS / ACRONYMS WORKSHEET.

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[66]
SUBJECT Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Inputs and Assumptions (Continued):

12. HAPs are generated from propane burned as pilot gas and are contained in the LPG stream.
13. LPG HAP content ($HAPs_{wt\%}$): 0 wt%
14. Oxides of Sulfur (SO_X) emissions are:
    Based on the sulfur content of the stream.
    Assume SO_X as SO_2.
    Assumes that all the all fuel sulfur converts to SO_2.
15. CO_2e Global Warming Potential EFs (EF_{GWP})

CO_2	CH_4	N_2O
1	25	298

CO_2e emission estimates use the following carbon equivalence factors: 25 for CH_4, and 298 for N_2O from 40 CFR Part 98, Subpart A, Table A-1.

Calculations:

MAINTENANCE ACTIVITIES EMISSION SOURCES

1. Calculate the maximum hourly flow to the flare for maintenance activities (scf/hr)

$Flow_{scf/hr} = [(FR_{Flare\text{-}MMBtu/hr}) / (HHV_{Propane}) * (CF_{Btu\text{-}MMBtu})] - (Flow_{Std\text{-}scf/hr})$

$$= \left\| \frac{10 \ \text{MMBtu}}{\text{hr}} \middle| \frac{\text{scf}}{2{,}516 \ \text{Btu}} \middle| \frac{1\text{E+06} \ \text{Btu}}{1 \ \text{MMBtu}} \right\| - \left| \frac{30.00 \ \text{scf}}{\text{hr}} \right| = 3{,}945 \ \text{scf/hr}$$

2. Calculate the SO_X emission factor in pounds per standard cubic feet (lb/scf).

$EF_{SOx(lb/scf)}$ = [(mole of the gas stream)] * [(concentration of sulfur in gas stream)] * [(molar ratio of SO_2 to S)]

= [(lb of gas stream) * (MW gas stream]
* [(concentration of sulfur in gas stream)] * [(molar ratio of SO_2 to S)]

= [(volume of gas stream as butane) * (MW_{butane})]
* [(concentration of sulfur ppmw) / ($CF_{ppmw\text{-}wt\%}$) / ($CF_{wt\%\text{-}DecEqui}$)] * [(MW SO_2) / (MW S)]

= [($CF_{lb\_mol\text{-}scf}$) * (MW_{butane})] * [($SO_{2\text{-}ppmw}$) / ($CF_{ppmw\text{-}wt\%}$) / ($CF_{wt\%\text{-}DecEqui}$)] * [(MW SO_2) / (MW S)]

$$= \left\| \frac{1 \ \text{lb-mol}}{379.5 \ \text{scf}} \middle| \frac{58.12 \ \text{lb butane}}{\text{lb-mol}} \middle| \frac{30 \ \text{ppmw S}}{\text{gas stream}} \middle| \frac{1 \ \text{wt\%}}{10000 \ \text{ppmw}} \middle| \frac{1 \ \text{DecEq}}{100 \ \text{wt\%}} \middle| \frac{64.07 \ \text{lb } SO_2\text{/lb-mol}}{32.07 \ \text{lb S/lb-mol}} \right\|$$

= 9.18E-06 lb SO_2/scf of the gas stream = 9.18E-06 lb SO_X/scf of the gas stream

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[67]
SUBJECT Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Calculations:

MAINTENANCE ACTIVITIES EMISSION SOURCES

3. Convert emission factor from kg/MMBtu to lb/MMBtu.

Using butane CO_2 as an example:

$EF_{CO2(lb/MMBtu)} = [EF_{CO2(kg/MMBtu)}] / (CF_{kg-lb})$

$$= \left| \frac{64.77 \ \text{kg}}{\text{MMBtu}} \right| \left| \frac{1 \ \text{lb}}{0.4536 \ \text{kg}} \right| = 142.79 \ \text{lb } CO_2/\text{MMBtu}$$

EF										EF_{GWP}		
						CO_2						
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	butane	propane	CH_4	N_2O	CO_2	CH_4	N_2O
(lb/MMBtu)				(lb/scf)	(lb/MMBtu)					N/A		
0.068	0.310	N/C	N/C	9.18E-06	TBD	142.79	138.6	0.01	0.001	1	25	298

NOTE:

Because the EF for butane CO_2 is greater than the EF for propane CO_2, the butane CO_2 emission factor will be applied to estimate the maximum short term, maximum daily, and annual average emission rates.

MAINTENANCE ACTIVITIES EMISSION SOURCES ANNUAL EMISSION ESTIMATE

Pre-controls

4. Calculate the annual heat input HI_{Annual} in MMBtu/hr

$HI_{MMBtu/yr} = (FR_{MaxAnn}) * (HHV_{Butane}) / (CF_{Btu-MMBtu})$

$$= \left| \frac{92{,}113 \ \text{scf}}{\text{yr}} \right| \left| \frac{3{,}244 \ \text{Btu}}{\text{scf}} \right| \left| \frac{1 \ \text{MMBtu}}{1\text{E+06 Btu}} \right| = 299 \ \text{MMBtu/yr}$$

5. Calculate the VOC flow rate (FR) from the pre-control maintenance sources in lb/hr ($Fpre_{VOC-lb/hr}$).

$FRpre_{VOC-lb/hr} = (FR_{MaxHrly-scf/hr}) * (MW_{butane}) / (CF_{scf\_lb-mol}) * (WT\%VOC) / (CF_{\%-DecEq})$

$$= \left| \frac{3{,}945 \ \text{scf}}{\text{hr}} \right| \left| \frac{58.12 \ \text{lb}}{\text{lb-mole}} \right| \left| \frac{1 \ \text{lb-mol}}{379.5 \ \text{scf}} \right| \ 100 \ \text{wt\%} \left| \frac{1 \ \text{DecEq}}{100 \ \text{wt\%}} \right|$$

$= 604.17$ lb VOC /hr

6. Calculate the EF for HAPs in pounds per scf (lb/scf).

$EF_{HAPs(lb/scf)} = (HAPs_{wt\%}) / (CF_{wt\%-DecEqui}) * (MW_{butane}) / (CF_{scf-lb\_mol})$

$$= \left| \frac{0 \ \text{wt\%}}{} \right| \left| \frac{1 \ \text{DecEqu}}{100 \ \text{wt\%}} \right| \left| \frac{58.12 \ \text{lb}}{\text{lb-mol}} \right| \left| \frac{1 \ \text{lb-mol}}{379.5 \ \text{scf}} \right| = 0 \ \text{lb HAPs/scf}$$

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20 [68]	
SUBJECT Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Calculations (Continued):

MAINTENANCE ACTIVITIES EMISSION SOURCES: Pre-control

7. Calculate HAPs the pre-control flow rate (FR) from the maintenance sources in lb/hr ($Fpre_{HAPs\text{-}lb/hr}$).

$FRpre_{HAPs\text{-}lb/hr} = (FR_{MaxHrly\text{-}scf/hr}) * (EF_{HAPs\text{-}lb/scf})$

$= \frac{3{,}945\ scf}{hr} \left| \frac{0\ lb}{1\ scf} \right| = 0.00\ lb\ HAPs/hr$

Pre-Control Maximum Hourly Emission Rate (lb/hr)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
N/C	N/C	604.17	N/C	N/C	N/C	N/C	N/C	N/C	N/C

8. Calculate the VOC pre-control annual emission rate from the maintenance sources in tpy.

$Fpre_{VOC(tpy)} = (FR_{MaxAnn}) * (MW_{butane}) / (CF_{lb\_mole\text{-}scf}) / (CF_{lb\text{-}ton})$

$= \frac{92{,}113\ scf}{yr} \left| \frac{58.12\ lb}{lb\text{-}mole} \right| \frac{1\ lb\text{-}mol}{379.5\ scf} \left| \frac{1\ ton}{2{,}000\ lb} \right| = 7.05\ tpy\ VOC$

9. Calculate the HAP pre-control annual emission rate from the maintenance sources in tpy.

$Fpre_{HAP(tpy)} = (Fpre_{VOC(tpy)}) * (HAPs_{wt\%}) / (CF_{\%\text{-}dec.eq.})$

$= \frac{7.05\ t}{yr} \left| 0\ wt\% \right| \frac{1\ DecEq}{100\ \%} = 0.00E{+}00\ tpy\ HAP$

Pre-Control Annual Average Emission Rate (tpy)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
N/C	N/C	7.05	N/C	N/C	N/C	N/C	N/C	N/C	N/C

10. Calculate the maximum hourly emission rate for SO_X $ER_{MaxStTmSOx}$.

$ER_{MaxStTmSOx} = (FR_{MaxHrly}) * (EF_{SOx})$

$= \frac{3{,}945\ scf}{hr} \left| \frac{9.18E\text{-}06\ lb}{scf} \right| = 3.62E\text{-}02\ lb\ SO_X/hr$

11. Calculate the maximum hourly emission rate for NO_x, CO, CO_2, CH_4, and N_2O $ER_{MaxStTm}$.

Using NO_X as an example:

$ER_{MaxStTmNOx} = (FR_{MaxHrly}) * (EF_{NOx}) * (HHV_{butane}) / (CF_{Btu\text{-}MMBtu})$

$= \frac{3{,}945\ scf}{hr} \left| \frac{6.80E\text{-}02\ lb}{MMBtu} \right| \frac{3{,}244\ Btu}{scf} \left| \frac{1\ MMBtu}{1E{+}06\ Btu} \right| = 8.70E\text{-}01\ lb\ NO_X/hr$

12. Calculate the maximum hourly emission rate for CO_2e based on CO_2, CH_4, and N_2O emission rates.

$ER_{MaxHrlyCO2e} = \sum\{[(CO_{2\text{-}lb/hr}) * (EF_{CO2\text{-}GWP})] + [(CH_{4\text{-}lb/hr}) * (EF_{CH4\text{-}GWP})] + [(N_2O_{\text{-}lb/hr}) * (EF_{N2O\text{-}GWP})]\}$

$= \left\| \frac{1.83E{+}03\ lb}{hr} \right\| 1 \left\| + \right\| \frac{1.30E\text{-}01\ lb}{hr} \left\| 25 \right\| + \left\| \frac{1.00E\text{-}02\ lb}{hr} \right\| 298 \left\| =$

$= \left\| \frac{1.83E{+}03\ lb}{hr} \right\| + \left\| \frac{3.25E{+}00\ lb}{hr} \right\| + \left\| \frac{2.98E{+}00\ lb}{hr} \right\| = 1.84E{+}03\ lb/hr$

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[69]
SUBJECT Middletown Station -- Existing Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Calculations (Continued):

MAINTENANCE ACTIVITIES EMISSION SOURCES: Post-control Emission Estimate (Continued)

13. Calculate the annual average emission rate for the CO_2e in tons per year (tpy).

$ER_{MaxStTmCO2e} = \sum\{[(CO_{2\text{-tpy}}) * (EF_{CO2\text{-GWP}})] + [(CH_{4\text{-tpy}}) * (EF_{CH4\text{-GWP}})] + [(N_2O_{\text{-tpy}}) * (EF_{N2O\text{-GWP}})]\}$

$$= \left\| \frac{2.14E{+}01\ t}{yr} \right\| 1 \left\| + \left| \frac{1.00E{-}03\ t}{yr} \right| 25 \right\| + \left\| \frac{1.00E{-}04\ t}{yr} \right\| 298 \Big\| = 2.15E{+}01\ \text{tpy}$$

14. Calculate the annual emission rate for the remaining pollutants in tons per year (tpy).
Using NO_X as an example:

$ER_{AnnualNOx} = (FR_{MMBtu/yr}) * (EF_{NOx}) / (CF_{lb\text{-}tons})$

$$= \left| \frac{299\ \cancel{MMBtu}}{yr} \right| \frac{0.068\ \cancel{lb}}{\cancel{MMBtu}} \Big| \frac{1\ t}{2{,}000\ \cancel{lb}} \Big| = 1.02E{-}02\ \text{tpy of } NO_X$$

15. Calculate the SO_X emission rate from the maintenance sources in tpy.

$ER_{MaxStTmSOx} = (FR_{MaxAnn}) * (EF_{SOx}) / (CF_{lb\text{-}ton})$

$$= \left| \frac{92{,}113\ \cancel{scf}}{yr} \right| \frac{9.18E{-}06\ \cancel{lb}}{\cancel{scf}} \Big| \frac{1\ t}{2{,}000\ \cancel{lb}} \Big| = 4.23E{-}04\ \text{tpy } SO_X$$

16. Calculate the post-control VOC and HAPs emission in lb/hr and tpy.
Using short term maximum VOCs as an example:

$Flow\text{-}post_{VOC\text{-}lb/hr} = (Flow_{VOCs\text{-}lb/hr}) * [1 - (DRE / CF_{\%\text{-}DecEq})]$

$$= \left\| \frac{604.17\ lb}{\cancel{hr}} \right\| 1 - \left| 98.0\ \cancel{\%} \right| \frac{1\ \cancel{DecEq}}{100\ \cancel{\%}} \Big\| = 12.08\ \text{lb VOCs/hr}$$

Post Control Maximum Hourly Emission Rate (lb/hr)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
0.87	3.97	12.08	N/C	0.04	N/C	1,827	0.13	0.01	1,840

Post-Control Annual Average Emission Rate (tpy)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
0.01	0.05	0.14	N/C	0.0004	N/C	21.35	0.001	0.0001	21.50

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[70]
SUBJECT Middletown Station -- Existing Equipment Maintenance Operations Scenario Sources: Total Flow from Prover			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Objective: Calculate the prover volume from maintenance activities that are sent to the enclosed flare.

Inputs and Assumptions:

1. Worst case scenario is for the station to be at a sea level elevation. 0 ft
   Pressure at atmosphere: 1.00 atm = 14.70 psi
   Source for conversion: http://www.engineeringtoolbox.com/air-altitude-pressure-d_462.html
2. Pipe pressure at release point ($P_{pipe\text{-}release\text{-}atm}$) = Pressure at atmospheric : 1.00 atm = 14.70 psi
3. Operating service factor (OSF), that is, percent of the year the unit is operating: 100.00 %
4. Propane physical properties result in the greatest release volumes, therefore, propane will be used to calculate the gas release volumes from the equipment.
5. Physical properties of propane were used to estimate volume because they yielded higher values.
6. Physical properties :
   Density at pipe pressure (ρ_{pipe}): 33.74 pounds per cubic feet (lb/ft^3) at 40°F and 1,480 psig
   Density at atmospheric conditions ($\rho_{released}$): 0.12 pounds per standard cubic feet (lb/scf) at 60°F and 1 atm
   NOTES:
   The density of propane at atmospheric conditions taken from the National Institute of Standards and Technology website of isothermal properties for propane.
   http://webbook.nist.gov/cgi/fluid.cgi?ID=C74986&TUnit=F&PUnit=atm&DUnit=lbm%2Fft3&HUnit=Btu%2Flbm&WUnit=ft%2Fs&VisUnit=cP&STUnit=lb%2Fft&Type=IsoTherm&RefState=DEF&Action=Page
7. Prover: Number of Provers ($N_{Provers}$): 1
   Max ann prover events (E_{Prover}): 2 events/yr
   Prover (V_{Prover}): 31.42 cubic feet (ft^3)
   Source: Equipment volume provided by the Manufacturer (FMD)
   NOTE:
   Prover maintenance volume release to flare calculations at atmospheric conditions are presented in Maintenance Activity Emission Sample Calculations .
8. Site maintenance will include evacuation of the provers.
9. The ideal gas law applies:
   $PV = nR_{specific}T$, where n is equivalent the number of moles multiplied by the molecular weight (MW) and divided by density (**ρ**).

Calculations:

1. Calculate the volume of gas released (V_{Prover}) in standard cubic feet (scf) at release temperature and pressure.

$$PV = nR_{specific}T$$

$$\frac{P_1V_1}{P_2V_2} = \frac{[n]RT_1}{[n]RT_2} = \frac{[(\cancel{MW_{lb/lb\text{-}mole}}) / \rho_1)] * (\cancel{R_{specific}}\cancel{T_1})}{[(\cancel{MW_{lb/lb\text{-}mole}}) / \rho_2)] * (\cancel{R_{specific}}\cancel{T_2})} = \frac{(\rho_2)}{(\rho_1)}$$

Solving for the release volume:

$$V_2 = \left\| \frac{\rho_1}{\rho_2} \right\| \left\| \frac{P_1}{P_2} \right\| V_1 \Big\|$$

$$= \left\| \frac{33.74 \ \cancel{lb}}{\cancel{ft^3}} \right\| \left\| \frac{\cancel{ft^3}}{0.12 \ \cancel{lb}} \right\| \left\| \frac{1 \ \cancel{atm}}{1 \ \cancel{atm}} \right\| \frac{31.42 \ ft^3}{\text{event-prover}} \Big\| = 8{,}834 \text{ scf/event-prover}$$

2. Determine the total annual volume from the provers ($V_{prover\text{-}scf/yr}$).

$$V_{Prover\text{-}scf/yr} = (V_{Prover}) * (N_{Prover}) * (E_{Prover}) * (OSF) / (CF_{\%\text{-}DecEq})$$

$$= \left| \frac{8{,}834 \ scf}{\cancel{event\text{-}prover}} \right| \left| \frac{1 \ \cancel{prover}}{} \right| \left| \frac{2 \ \cancel{events}}{1 \ year} \right| 100.00 \ \% \left| \frac{1 \ \cancel{DecEq}}{100 \ \cancel{\%}} \right| = 17{,}668 \text{ scf/yr}$$

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[71]
SUBJECT Middletown Station -- Existing Equipment Maintenance Operations Scenario Sources: Total Flow from Filter			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Objective: Calculate the filter volume from maintenance activities that are sent to the enclosed flare.

Inputs and Assumptions:

1. Worst case scenario is for the station to be at a sea level elevation. 0 ft
   Pressure at atmosphere: 1.00 atm
   Source for conversion: http://www.engineeringtoolbox.com/air-altitude-pressure-d_462.html
2. Pipe pressure at release point ($P_{pipe\text{-}release}$) = Pressure at atmospheric = 1.00 atm
3. Operating service factor (OSF), that is, percent of the year the unit is operating: 100.00 %
4. Propane physical properties result in the greatest release volumes, therefore, propane will be used to calculate the gas release volumes from the equipment.
5. Propane physical properties:.
   Density at pipe pressure (ρ_{pipe}): 33.74 pounds per cubic feet (lb/ft^3) at 40°F and 1,480 psig
   Density at atmospheric conditions ($\rho_{released}$): 0.12 pounds per standard cubic feet (lb/scf) at 60°F and 1 atm
   NOTES:
   The density of propane at atmospheric conditions taken from the National Institute of Standards and Technology website of isothermal properties for propane.
   http://webbook.nist.gov/cgi/fluid.cgi?ID=C74986&TUnit=F&PUnit=atm&DUnit=lbm%2Fft3&HUnit=Btu%2Flbm&WUnit=ft%2Fs&VisUnit=cP&STUnit=lb%2Fft&Type=IsoTherm&RefState=DEF&Action=Page
6. Filter: Filters ($N_{Filters}$): 1
   Max annual filter changing events (E_{Filter}): 6 event-filter/yr
   Filter ($V_{Filters}$): 31.94 cubic feet (ft^3)
7. The ideal gas law applies:
   $PV = nR_{specific}T$, where n is equivalent the number of moles multiplied by the molecular weight (MW) and divided by density (**ρ**).

Calculations:

1. Calculate the volume of gas released (V_{Filter}) in standard cubic feet (scf) at release temperature and pressure.

$$PV = nR_{specific}T$$

$$\frac{P_1V_1}{P_2V_2} = \frac{[n]RT_1}{[n]RT_2} = \frac{[(\cancel{MW_{lb/lb\text{-}mole}}) / \rho_1)] * (\cancel{R_{specific}T_1})}{[(\cancel{MW_{lb/lb\text{-}mole}}) / \rho_2)] * (\cancel{R_{specific}T_2})} = \frac{(\rho_2)}{(\rho_1)}$$

Solving for the release volume:

$$V_2 = \left\| \frac{\rho_1}{\rho_2} \right\| \left\| \frac{P_1}{P_2} \right\| V_1 \|$$

$$= \left\| \frac{33.74 \ \cancel{lb}}{\cancel{ft^3}} \right| \left| \frac{ft^3}{0.12 \ \cancel{lb}} \right| \left| \frac{1 \ \cancel{atm}}{1 \ \cancel{atm}} \right| \left| \frac{31.94 \ ft^3}{\text{filter-event}} \right\| = 8{,}980 \ \text{scf/filter-event}$$

2. Calculate the total annual volume released to the flare from filters cleanings in scf/yr ($V_{Filter\text{-}scf/yr}$).

$$V_{Filter\text{-}scf/yr} = (V_{Filter}) * (N_{Filter}) * (E_{Filter}) * (OSF) / (CF_{\%\text{-}DecEq})$$

$$= \left| \frac{8{,}980 \ scf}{\cancel{event\text{-}filter}} \right| \left| \frac{1 \ \cancel{filter}}{} \right| \left| \frac{6 \ \cancel{events}}{yr} \right| 100.00 \ \cancel{\%} \left| \frac{1 \ \cancel{DecEq}}{100 \ \cancel{\%}} \right| = 53{,}880 \ \text{scf/yr}$$

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[72]
SUBJECT Middletown Station -- Existing Equipment Maintenance Operations Scenario Sources: Total Flow from Pigging			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Objective: Calculate the pigging volume from maintenance activities that are sent to the enclosed flare.

Inputs and Assumptions:

1. Worst case scenario is for the station to be at a sea level elevation. 0 ft
   Pressure at atmosphere: 1.00 atm
   Source for conversion: http://www.engineeringtoolbox.com/air-altitude-pressure-d_462.html
2. Pipe pressure at release point ($P_{act\text{-}pipe\text{-}atm}$) = Pressure at atmospheric = 1.00 atm
   Density at pipe pressure (ρ_{pipe}): 33.74 pounds per cubic feet (lb/ft^3) at 40°F and 1,480 psig
   Density at atmospheric conditions ($\rho_{released}$): 0.12 pounds per standard cubic feet (lb/scf) at 60°F and 1 atm
3. Site maintenance will include evaculation of the pig launchers and receivers.
4. Equipment Quantities:
   - 20" Pig Launchers ($N_{20Launchers}$): 0
   - 20" Pig Receivers ($N_{20Receivers}$): 0
   - 12" Pig Launchers ($N_{12Launchers}$): 0
   - 12" Pig Receivers ($N_{12Receivers}$): 0
   - 10" Pig Receivers ($N_{10Receivers}$): 0
   - 8" Pig Launchers ($N_{8Launcher}$): 1
   - 8" Pig Receivers ($N_{8Receiver}$): 1
5. Equipment Volume:
   - Pig Launcher ($V_{20pig\text{-}Launcher}$): 65.70 cubic feet (ft^3)
   - Pig Receiver ($V_{20pig\text{-}Receiver}$): 61.51 ft^3
   - Pig Launcher ($V_{12pig\text{-}Launcher}$): 24.17 ft^3
   - Pig Receiver ($V_{12pig\text{-}Receiver}$): 22.56 ft^3
   - Pig Receiver ($V_{10pig\text{-}Receiver}$): 17.18 ft^3
   - Pig Launcher ($V_{8pig\text{-}Launcher}$): 13.11 ft^3
   - Pig Receiver ($V_{8pig\text{-}Receiver}$): 11.27 ft^3

   Source: Equipment volume provided by the Rooney Engineering (REI):
6. Pigging events:
   Max ann smart pigging events ($E_{SmartPigging}$): 1 event/yr
   Max ann clean pigging events ($E_{CleanPigging}$): 2 event/yr
7. The ideal gas law applies:
   $PV = nR_{specific}T$, where n is equivalent the number of moles multiplied by the molecular weight (MW) and divided by density (**ρ**).

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[73]
SUBJECT	Middletown Station -- Existing Equipment Maintenance Operations Scenario Sources: Total Flow from Pigging			
BASED ON	SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios	DRAWING NUMBER	Not Applicable	
BY	VJPlachy	CHECKED BY	AMO'Bradovich	DATE 5/23/2016

Calculations:

1. Calculate the volume of gas released (V_2) in standard cubic feet (scf) at release temperature and pressure.

Using 20" pig launcher as an example:

$$PV = nR_{specific}T$$

$$\frac{P_1V_1}{P_2V_2} = \frac{[n]RT_1}{[n]RT_2} = \frac{[(\cancel{MW_{lb/lb\text{-}mole}}) / \rho_1)] * (\cancel{R_{specific}}\cancel{T_1})}{[(\cancel{MW_{lb/lb\text{-}mole}}) / \rho_2)] * (\cancel{R_{specific}}\cancel{T_2})} = \frac{(\rho_2)}{(\rho_1)}$$

Solving for the release volume:

$$V_2 = \left\| \frac{\rho_1}{\rho_2} \right\| \left\| \frac{P_1}{P_2} \right\| V_1 \|$$

$$= \left\| \frac{33.74\ \cancel{lb}}{\cancel{ft^3}} \right\| \left\| \frac{\cancel{ft^3}}{0.12\ \cancel{lb}} \right\| \left\| \frac{1.00\ \cancel{atm}}{1\ \cancel{atm}} \right\| \left\| \frac{65.70\ ft^3}{\text{pig lanucher-event}} \right\| = 18{,}473 \text{ scf/pig launcher-event}$$

Equipment	Pig Volume (acf)	Volume at Atmosphere (scf)
20" Pig Launcher	65.70	18,473
20" Pig Receiver	61.51	17,295
12" Pig Launcher	24.17	6,796
12" Pig Receiver	22.56	6,343
10" Pig Receiver	17.18	4,830
8" Pig Launcher	13.11	3,686
8" Pig Receiver	11.27	3,169

2. Calculate the total annual volume from the launching events ($V_{PigLaunchers\text{-}scf/yr}$).

$$V_{PigLauncher\text{-}scf/yr} = [(V_{PigLauncher}) * (N_{PigLaunchers})] * [(\sum_{Pigging\ Events})]$$

Using the 20" pig launchers as an example:

$$= \left\| \frac{3{,}686\ scf}{\cancel{pig\ launcher\text{-}event}} \right\| \left\| \frac{1\ \cancel{pig\ launcher}}{} \right\| \left\| \frac{1\ \cancel{events}_{smart\ pigging}}{yr} + \frac{2\ \cancel{events}_{clean\ pigging}}{yr} \right\|$$

$$= 11{,}058 \text{ scf/yr}$$

Equipment	Volume (scf)	Number	Volume (scf/yr)
20" Pig Launcher	18,473	0	0
20" Pig Receiver	17,295	0	0
12" Pig Launcher	6,796	0	0
12" Pig Receiver	6,343	0	0
10" Pig Receiver	4,830	0	0
8" Pig Launcher	3,686	1	11,058
8" Pig Receiver	3,169	1	9,507
		Total Annual Pigging Event Volume	20,565

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [74]
SUBJECT	Middletown Station -- Existing Equipment Fugitive Emission Estimate		
BASED ON	SPLP Process and Instrumentation Drawings (P&IDs)	DRAWING NUMBER	E_MIDD_P030000 Sheets 1 through 6

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		8/16/2016

Objective: Calculation the Maximum Hourly and Annual Average Emissions associated with fugitive components for the proposed fittings, valves, relief valves, and other miscellaneous component types.

Inputs and Assumptions:

1. Component counts

Equipment Counts:

Fittings:	399
Valves:	225
Relief Valves:	1
Pump Seals:	1

Other Components:

Coriolis Meter	1
Prover	1
Composite Sampler	0
Instruments	29
Static Mixer	0
Check Valves	3
TOTAL Other Components	34

2. The leak emission factors are taken from the USEPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, November, 1995, Table 2-3 for light liquid service.
3. Emission Leak Factors:

Fittings:	8.00E-06	kilogram per hour per component (kg/hr-component)
Valves:	4.30E-05	kg/hr-component
Relief Valves:	1.30E-04	kg/hr-component
Pump Seals:	5.40E-04	kg/hr-component
Other Components:	1.30E-04	kg/hr-component

4. Assume the total organic compound emissions are equivalent to total VOCs.
5. The HAP content as a result of the LPG ($WT\%_{HAP}$): 0 wt %
6. The relief valves on any butane, propane, and ethane spheres/tanks that release to the atmosphere are fugitive emitters.
7. Butane, propane, and ethane do not contain any HAPs.
8. Number of atmospheric relief valves on non-HAP spheres/tanks (N_{RVBPS}): 1 Relief Valves
9. The contingency (Cont) for as-built modifications during the construction phase is: 20 %
10. Operating service factor (OSF): 100 %

Calculations:

1. Convert the component leak EFs from kg/hr-component to lb/hr-component ($EF_{lb/hr\text{-}component}$).

Using fittings as an example:

$$EF_{Fittings\_b/hr\text{-}component} = (EF_{kg/hr\text{-}component}) * (CF_{kg\text{-}g}) / (CF_{g\text{-}lb})$$

$$= \frac{8.00E\text{-}06 \ \cancel{kg}}{hr\text{-}component} \left| \frac{1{,}000 \ \cancel{g}}{1 \ \cancel{kg}} \right| \frac{1 \ lb}{453.6 \ \cancel{g}} = 1.76E\text{-}05 \ lb/hr\text{-}component$$

Equipment Type	Leak EF (lb/hr-component)
Fittings	1.76E-05
Valves	9.48E-05
Relief Valves to atm	2.87E-04
Pump Seals	1.19E-03
Other Components	2.87E-04

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [75]
SUBJECT	Middletown Station -- Existing Equipment Fugitive Emission Estimate		
BASED ON	SPLP Process and Instrumentation Drawings (P&IDs)	DRAWING NUMBER	E_MIDD_P030000 Sheets 1 through 6

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		8/16/2016

Calculations (Continued):

2. Calculate the VOC Max Hourly ER in lb/hr ($ER_{VOClb/hr}$).

Using fittings as an example:

$ER_{Fittings\text{-}VOClb/hr} = (EF_{lb/hr\text{-}component})^* (EC_{Fittings})$

$= \frac{1.76E\text{-}05 \text{ lb}}{\text{hr-}\sout{\text{component}}} \quad 399 \quad \sout{\text{components}} = 7.02E\text{-}03 \text{ lb VOCs/hr}$

Equipment Type	Leak EF (lb/hr-component)	Equipment Count	VOC Max Hourly (lb/hr)
Fittings	1.76E-05	399	7.02E-03
Valves	9.48E-05	225	2.13E-02
Relief Valves to atm	2.87E-04	1	2.87E-04
Pump Seals	1.19E-03	1	1.19E-03
Other Components	2.87E-04	34	9.76E-03
		TOTAL:	**3.96E-02**

3. Calculate the ER for HAPs in lb/hr ($ER_{RV\text{-}HAPlb/hr}$) for the relief valves to atmosphere (not butane or propane sphere relief valves).

$ER_{RV\text{-}HAPlb/hr} = \{ (EF_{RV\text{-}lb/hr\text{-}component}) * [(EC_{RV}) - (N_{RVBPS})] \} * [(WT\%_{HAP}) / (CF_{\%\text{-}DecEq})]$

$= \frac{2.87E\text{-}04 \text{ lb}}{\text{hr-}\sout{\text{component}}} \quad 1 - 1 \frac{}{\sout{\text{comp}}} * \left[0 \ \sout{\text{wt\%}} \ \frac{1 \ \sout{\text{DecEq}}}{100 \ \sout{\text{wt\%}}} \right] = 0.00E+00 \text{ lb HAPs/hr}$

4. Calculate the ER for HAPs in lb/hr ($ER_{HAPlb/hr}$) for the fittings, valves, and other components.

Using fittings as an example:

$ER_{Fittings\text{-}HAPlb/hr} = (ER_{Fittings\text{-}VOClb/hr}) * (WT\%_{HAP}) / (CF_{\%\text{-}DecEq})$

$= \frac{7.02E\text{-}03 \text{ lb}}{\text{hr}} \quad 0 \ \sout{\%} \ \frac{1 \ \sout{\text{DecEq}}}{100 \ \sout{\text{wt\%}}} = 0.00E+00 \text{ lb-HAPs/hr}$

Equipment Type	HAP Max Hourly (lb/hr)
Fittings	N/C
Valves	N/C
Relief Valves to atm	N/C
Pump Seals	N/C
Other Components	N/C
TOTAL:	**N/C**

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [76]
SUBJECT	Middletown Station -- Existing Equipment Fugitive Emission Estimate		
BASED ON	SPLP Process and Instrumentation Drawings (P&IDs)	DRAWING NUMBER	E_MIDD_P030000 Sheets 1 through 6

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		8/16/2016

Calculations (Continued):

5. Calculate the Annual ER for VOCs in tpy ($ER_{VOC\text{-}tpy}$).

Using fittings as an example:

$ER_{FittingsVOC\text{-}tpy} = (ER_{FittingsVOC\text{-}lb/hr}) * (CF_{hr\text{-}yr}) * (OSF) / (CF_{\%\text{-}DecEq}) / (CF_{lb\text{-}tons})$

$$= \frac{7.02E\text{-}03\ lb}{hr} \left| \frac{8{,}760\ hr}{yr} \right| 100\ \% \left| \frac{1\ DecEq}{100\ \%} \right| \frac{1\ t}{2{,}000\ lb} = 3.07E\text{-}02 \text{ tpy VOCs}$$

Equipment Type	VOC Max Hourly (lb/hr)	VOC Annual Average
Fittings	7.02E-03	3.07E-02
Valves	2.13E-02	9.33E-02
Relief Valves to atm	2.87E-04	1.26E-03
Pump Seals	1.19E-03	5.21E-03
Other Components	9.76E-03	4.27E-02
TOTAL		**1.73E-01**

6. Calculate the ER for HAPs in tpy ($ER_{RV\text{-}HAPtpy}$) for the relief valve to atmosphere (this is in addition to the butane or propane sphere relief valves).

$ER_{RV\text{-}HAPtpy} = (ER_{RV\text{-}HAPlb/hr}) * (CF_{hr\text{-}yr}) * (OSF) / (CF_{\%\text{-}DecEq}) / (CF_{lb\text{-}ton})$

$$= \frac{0.00E+00\ lb}{hr} \left| \frac{8{,}760\ hr}{yr} \right| 100\ \% \left| \frac{1\ DecEq}{100\ \%} \right| \frac{1\ t}{2{,}000\ lb} = 0.00E+00 \text{ tpy HAPs}$$

7. Calculate the ER for HAPs in tpy (ER_{HAPtpy}) for fittings, valves, and other components.

Using fittings as an example:

$ER_{Fittings\text{-}HAPtpy} = (ER_{Fittings\text{-}VOCtpy}) * (WT\%_{HAP}) / (CF_{\%\text{-}DecEq})$

$$= \frac{3.07E\text{-}02\ ton}{year} \left| \frac{0\ wt\%}{} \right| \frac{1\ DecEq}{100\ \%} = 0.00E+00 \text{ tpy HAPs}$$

Equipment Type	HAP Annual (tpy)
Fittings	N/C
Valves	N/C
Relief Valves to atm	N/C
Pump Seals	N/C
Other Components	N/C
TOTAL:	**N/C**

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[77]
SUBJECT	Middletown Station -- Existing Equipment Fugitive Emission Estimate			
BASED ON	SPLP Process and Instrumentation Drawings (P&IDs)	DRAWING NUMBER	E_MIDD_P030000 Sheets 1 through 6	
BY	VJPlachy	CHECKED BY	AMO'Bradovich	DATE 8/16/2016

Calculations (Continued):

8. Incorporate the contingency into Maximum Hourly and Annual Average VOC fugitives ($TF_{VOCMax\text{-}Ann}$).

Using Maximum Hourly as an example:

$TF_{VOCMaxHrly\text{-}lb/hr} = (ER_{TOTAL\text{-}VOClb/hr}) * [(1) + (Cont\%) / (CF_{\%\text{-}Dec\ Eq})]$

$$= \left|\frac{3.96E\text{-}02\ lb}{hr}\right| 1 + \left\|\frac{20\ \%}{}\right| \left|\frac{1\ \text{DecEq}}{100\ \%}\right\| = 4.75E\text{-}02\ lb\ VOCs/hr$$

VOC Fugitive Emission Rate		
Type	**ER**	**TF_{VOC}**
Max Hourly (lb/hr)	0.04	0.05
Annual Average (tpy)	0.17	0.21

9. Incorporate the contingency into Maximum Hourly and Annual Average total HAP fugitives ($TF_{HAPMaxHrly}$).

Using Maximum Hourly as an example:

$TF_{HAPMaxHrly\text{-}lb/hr} = (ER_{TOTAL\text{-}HAPlb/hr}) * [(1) + (Cont\%) / (CF_{\%\text{-}Dec\ Eq})]$

$$= \left|\frac{0.00E+00\ lb}{hr}\right| 1 + \left\|\frac{20\ \%}{}\right| \left|\frac{1\ \text{DecEq}}{100\ \%}\right\| = 0.00E+00\ lb\ HAPs/hr$$

HAP Fugitive Emission Rate		
Type	**ER**	**TF_{HAP}**
Max Hourly (lb/hr)	N/C	N/C
Annual Average (tpy)	N/C	N/C

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[78]
SUBJECT: Middletown Station -- Existing Equipment Product Analysis Specification			
BASED ON SPLP Product Analyses		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 4/19/2016

Objective: Calculate Product Specifications for Butane, Propane, and Liquid Petroleum Gas (LPG) volatile organic compounds (VOCs) and hazardous air pollutants (HAPs).

Inputs and Assumptions:

1. Composition of the Butane and Propane stream analyses are as provided by SPLP.
2. Only the LPG stream will contain hazardous air pollutants (HAPs).
3. VOCs for Butane and Propane Streams are hydrocarbon constituents that contain three or more carbon atoms in their molecular formula, that is, ethane is a not a regulated VOC.
4. Composition of the Butane Stream:
   - propane: 2 mole percent (mol%)
   - i-butane: 44 mol%
   - n-butane: 54 mol%
   - i-pentane: 1 mol%
5. Composition of the Propane Stream:
   - ethane: 2 mol%
   - propane: 95 mol%
   - i-butane: 3.5 mol%
6. Composition of the LPG Stream: LPG is not present at this station.
   - ethane: 0 mol%
   - propane: 0 mol%
   - i-butane: 0 mol%
   - n-butane: 0 mol%
   - i-pentane: 0 mol%
   - n-pentane: 0 mol%
   - n-hexane: 0 mol%
7. Molecular Formula (MF) and Molecular Weight (MW)

Constituent	MF	MW	
ethane:	C_2H_6	30.07	lb per lb-mole (lb/lb mol)
propane:	C_3H_8	44.10	lb/lb mol
i-butane:	iC_4H_{10}	58.12	lb/lb mol
n-butane:	nC_4H_{10}	58.12	lb/lb mol
i-pentane:	iC_5H_{12}	72.15	lb/lb mol
n-pentane:	nC_5H_{12}	72.15	lb/lb mol
n-hexane:	nC_6H_{14}	86.17	lb/lb mol

CLIENT Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER 112IC05958.20 [79]
SUBJECT: Middletown Station -- Existing Equipment Product Analysis Specification	
BASED ON SPLP Product Analyses	DRAWING NUMBER Not Applicable

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		4/19/2016

Calculations:

1. Determine the molar mass (MM) of each constituent in butane and propane stream.
   Using the propane in Butane Stream as an example:

$$MM_{propane/Butane} = [(Mol\%_{propane/Butane}) / (CF_{\%\text{-}DecEq})] * (MW_{propane})$$

$$= \left\| \frac{2 \ \cancel{\%}}{100 \ \cancel{\%}} \middle| \frac{1 \ \cancel{DecEq}}{} \right\| \frac{44.10 \ lb}{lb\text{-}mol} = 0.88 \ lb/lb\text{-}mol$$

Butane Stream			
Component	**Mol%**	**MW (lb/lb-mol)**	**MM (lb/lb-mol)**
propane	2	44.10	0.88
i-butane	44	58.12	25.57
n-butane	54	58.12	31.38
i-pentane	1	72.15	0.72
		TOTAL:	**58.55**

Propane Stream			
Component	**Mol%**	**MW (lb/lb-mol)**	**MM (lb/lb-mol)**
ethane	2	30.07	0.60
propane	95	44.10	41.90
i-butane	3.5	58.12	2.03
		TOTAL:	**44.53**

LPG Stream			
Component	**Mol%**	**MW (lb/lb-mol)**	**MM (lb/lb-mol)**
ethane	0.00	30.07	0.00
propane	0.00	44.1	0.00
i-butane	0.00	58.1	0.00
n-butane	0.00	58.1	0.00
i-pentane	0.00	72.2	0.00
n-pentane	0.00	72.2	0.00
n-hexane	0.00	86.1	0.00
		TOTAL:	**0.00**

2. Calculate the weight percent (Wt%) of each component in butane and propane streams.
   Using the propane in Butane Stream as an example:

$$Wt\%_{propane/Butane} = (MM_{propane/Butane}) / (MM_{total}) * (CF_{DecEq\text{-}\%})$$

$$= \left\| \frac{0.88 \ \cancel{lb}}{\cancel{lb\text{-}mol}} \middle| \frac{\cancel{lb\text{-}mol}}{58.55 \ \cancel{lb}} \right\| \frac{100 \ wt\%}{1 \ \cancel{DecEq}} = 1.50 \ wt\%$$

Butane Stream		
Component	**MM (lb/lb-mol)**	**Wt%**
propane	0.88	1.50
i-butane	25.57	43.67
n-butane	31.38	53.60
i-pentane	0.72	1.23
TOTAL:	**58.55**	**100.00**

Propane Stream		
Component	**MM (lb/lb-mol)**	**Wt%**
ethane	0.60	1.35
propane	41.90	94.09
i-butane	2.03	4.56
TOTAL:	**44.53**	**100.00**

LPG Stream		
Component	**MM (lb/lb-mol)**	**Wt%**
ethane	0.00	0
propane	0.00	0
i-butane	0.00	0
n-butane	0.00	0
i-pentane	0.00	0
n-pentane	0.00	0
n-hexane	0.00	0
TOTAL:	**0.00**	**0.00**

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[80]
SUBJECT:	Middletown Station -- Existing Equipment Product Analysis Specification			
BASED ON	SPLP Product Analyses	DRAWING NUMBER	Not Applicable	
BY	CHECKED BY		DATE	
VJPlachy	AMO'Bradovich		4/19/2016	

Calculations (continued):

3. Calculate the VOC Wt% of in Butane and Propane Streams.
   a. Butane Stream

$Wt\%_{ButaneVOC}$ = ∑Wt% for components with carbon atoms of C_3 or higher
= $(Wt\%_{propane}) + (Wt\%_{i\text{-}butane}) + (Wt\%_{n\text{-}butane}) + (Wt\%_{i\text{-}pentane})$
= 1.50 + 43.67 + 53.60 + 1.23 wt% = 100.00 wt% VOC

   b. Propane Stream

$Wt\%_{PropaneVOC}$ = ∑Wt% for components with carbon atoms of C_3 or higher
= $(Wt\%_{propane}) + (Wt\%_{i\text{-}butane})$
= 94.09 + 4.56 wt% = 98.65 wt% VOC

   c. LPG Stream

$Wt\%_{LPGVOC}$ = ∑Wt% for components with carbon atoms of C_3 or higher
= $(Wt\%_{propane}) + (Wt\%_{i\text{-}butane}) + (Wt\%_{n\text{-}butane}) + (Wt\%_{i\text{-}pentane}) + (Wt\%_{n\text{-}pentane}) + (Wt\%_{n\text{-}hexane})$
= 0 + 0 + 0 + 0 + 0 + 0 wt% = 0.00 wt% VOC

$Wt\%_{LPGHAP}$ = Wt% of Hexane
= 0 wt% HAP

Butane Stream		
Component	MM (lb/lb-mol)	Wt%
propane	0.88	1.50
i-butane	25.57	43.67
n-butane	31.38	53.60
i-pentane	0.72	1.23
TOTAL VOCs:		**100.00**

Propane Stream		
Component	MM (lb/lb-mol)	Wt%
ethane	0.60	N/A
propane	41.90	94.09
i-butane	2.03	4.56
TOTAL VOCs:		**98.65**

LPG Stream		
Component	MM (lb/lb-mol)	Wt%
ethane	0.00	0
propane	0.00	0
i-butane	0.00	0
n-butane	0.00	0
i-pentane	0.00	0
n-pentane	0.00	0
n-hexane	0.00	0
TOTAL VOCs:		**0.00**
TOTAL HAPs:		**0**

CLIENT: Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER: 112IC05958.20 [81]	
SUBJECT: Middletown Station -- Existing Equipment Combustion Source's Hazardous Air Pollutant (HAP) Emission Factor Estimate			
BASED ON: Emission Calculation Workbooks		DRAWING NUMBER: Not Applicable	
BY: VJPlachy	CHECKED BY: AMO'Bradovich		DATE: 4/19/2016

Objective: Develop emission factors for Hazardous Air Pollutants (HAPs) based on AP-42 Section 1.4, Tables 1.4-3 and 1.4-4, and Section 3.3 Table 3.3-2.

Inputs and Assumptions: AP-42; Section 1.4; Tables 1.4-3 and 1.4-4
Source: http://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

AP-42, Section 1.4, Tables 1.4-3 and 1.4-4 Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

Individual HAP	Emission Factor (EF) (lb/MMscf)
2-Methylnaphthalene	2.40E-05
3-Methylchloranthrene	1.80E-06
7,12-Dimethylbenz(a)anthracene	1.60E-05
Acenaphthene	1.80E-06
Acenaphthylene	1.80E-06
Anthracene	2.40E-06
Benz(a)anthracene	1.80E-06
Benzene	2.10E-03
Benzo(a)pyrene	1.20E-06
Benzo(b)fluoranthene	1.80E-06
Benzo(g,h,i)perylene	1.20E-06
Benzo(k)fluoranthene	1.80E-06
Chrysene	1.80E-06
Dibenzo(a,h)anthracene	1.20E-06
Dichlorobenzene	1.20E-03
Fluoranthene	3.00E-06
Fluorene	2.80E-06
Formaldehyde	7.50E-02
Hexane	1.80E+00
Indeno(1,2,3-cd)pyrene	1.80E-06
Naphthalene	6.10E-04
Phenanathrene	1.70E-05
Pyrene	5.00E-06
Toluene	3.40E-03
Arsenic	2.00E-04
Beryllium	1.20E-05
Cadmium	1.10E-03
Chromium	1.40E-03
Cobalt	8.40E-05
Manganese	3.80E-04
Mercury	2.60E-04
Nickel	2.10E-03
Selenium	2.40E-05
TOTAL ($HAP_{individual-total}$):	**1.89E+00**

Calculations: Total ($HAP_{individual-total}$) = Sum of the individual HAP constituents

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[82]
SUBJECT Middletown Station -- Existing Equipment Conversion Factors, Physical Properties, and Abbreviations / Acronyms used in the emission estimate calculation workbooks.			
BASED ON SPLP Equipment Data / Specifications / Reference Material		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Objective: Consolidate the inputs of conversion factors, emission factors, acronyms, and abbreviations that are used throughout the emission estimations associated with potential emission sources for midstream operations.

Inputs and Assumptions:

1. Miscellaneous Conversion Factors (CF):

   1 lb-mol = 379.5 scf

   Basis: Ideal gas law conversion factor (CF_{ideal}):

   1 mole of any ideal gas at standard conditions occupies a volume of 379.5 cubic feet (cf).

   10,000 = ppm H_2S = 1 mole % H_2S = 627 grains H_2S per 100 scf

   Source: AP-42 Chapter 5.3 Table 5.3.1; footnote d.

   https://www3.epa.gov/ttn/chief/ap42/ch05/final/c05s03.pdf

2. CO_2e Global Warming Potential EFs (EF_{GWP})

CO_2	CH_4	N_2O
1	25	298

CO_2e emission rates use the following carbon equivalence factors: 25 for CH_4 and 298 for N_2O from 40 CFR Part 98, Subpart A, Table A-1.

http://www.ecfr.gov/cgi-bin/text-idx?SID=7cd55ec5ecd5f06bf94c50d3452a94c3&mc=true&node=pt40.21.98&rgn=div5%20-%20ap40.21.98_19.1#ap40.21.98_19.1

3. Flare Emission Factors (EFs)

NO_X[a]	CO[a]	VOC[a]	$PM/PM_{10}/PM_{2.5}$[a]	SO_X[b]	HAPs	CO_2		CH_4[d]	N_2O[d]
						butane[c]	propane[c]		
(lb/MMBtu)				(ppmw)		(kg/MMBtu)			
0.068	0.31	0.57	0	30	TBD	64.77	62.87	0.003	0.0006

Footnotes:

a. NO_X, CO, PM, and VOC emission factor (EF) source is AP-42; Chapter 13.5 for Industrial Flares, Table 13.5-1 and 13.5-2, dated: April 2015.
   PM emissions are assumed to be negligible because the enclosed flare is considered to be 100% smokeless.
   https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_4-20-15.pdf

b. Provided by SPLP

c. Gas heat content (Btu/scf) for butane and propane (kg/MMBtu) is based on the higher heating values (HHV) presented in 40 CFR Part 98 Subpart C, Table C-1.

d. CH_4 and N_2O emission factors (kg/MMBtu) are based on the default emission factors presented in 40 CFR Part 98 Subpart C, Table C-2 for "Petroleum (All fuel types in Table C-1)."
   http://www.ecfr.gov/cgi-bin/text-idx?SID=7cd55ec5ecd5f06bf94c50d3452a94c3&mc=true&node=pt40.21.98&rgn=div5%20-%20ap40.21.98_19.1%20-%20ap40.21.98_138.1%20-%20ap40.21.98_138.1

NOTES:

AP-42 VOC EF is only applicable to emission estimates for VOCs from the pilot gas, that is, VOC emissions from the captured gas that are sent to the flare from GC, Pumps, and RV emissions are based on the flare's DRE.

4. Sources of standard operating scenario emission to the flare can include: GC(s), Pump Seal(s), and/or Relief Valves that are connected to the flare header.

5. Sources of maintenances emission to the flare can include evaluation of the following equipment: filter(s), pig launcher(s), pig receiver(s), and/or prover(s).

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20 [83]	
SUBJECT Middletown Station -- Existing Equipment Conversion Factors, Physical Properties, and Abbreviations / Acronyms used in the emission estimate calculation workbooks.			
BASED ON SPLP Equipment Data / Specifications / Reference Material		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Inputs and Assumptions (Continued):

6. Physical Properties:

Source: http://www.lenntech.com/calculators/molecular/molecular-weight-calculator.htm

i-butane	= $n\text{-}C_4H_{10}$	= 58.12	lb/lb mol (g/g mol)	
n-butane	= $i\text{-}C_4H_{10}$	= 58.12	lb/lb mol (g/g mol)	
carbon	= C	= 12.01	lb/lb mol (g/g mol)	
carbon monoxide	= CO	= 28.01	lb/lb mol (g/g mol)	Calculated
ethane	= C_2H_6	= 30.07	lb/lb mol (g/g mol)	
methane	= CH_4	= 16.04	lb/lb mol (g/g mol)	
n-hexane	= C_6H_{14}	= 86.17	lb/lb mol (g/g mol)	
hydrogen	= H	= 1.01	lb/lb mol (g/g mol)	
nitrogen	= N	= 14.01	lb/lb mol (g/g mol)	
nitrogen dioxide	= N_2O	= 44.02	lb/lb mol (g/g mol)	Calculated
oxygen	= O	= 16.00	lb/lb mol (g/g mol)	
i-pentane	= $i\text{-}C_5H_{12}$	= 72.15	lb/lb mol (g/g mol)	
n-pentane	= $n\text{-}C_5H_{12}$	= 72.15	lb/lb mol (g/g mol)	
propane	= C_3H_8	= 44.10	lb/lb mol (g/g mol)	
sulfur	= S	= 32.07	lb/lb mol (g/g mol)	
sulfur dioxide	= SO_2	= 64.07	lb/lb mol (g/g mol)	Calculated

7. Higher heating value (HHV):

a. butane

$HHV_{propane}$ = 2,516 Btu/scf

Source: http://www.altenergy.com/downloads/pdf_public/propdatapdf.pdf

b. butane

HHV_{butane} = 0.103 MMBtu/gal default HHV

40 CFR Part 98 Subpart C, Table C-1 value used with the Volume of butane vapor/gallon @ 60°F.

Source: http://www.ecfr.gov/cgi-bin/text-idx?SID=9da8a4fcd9db970a85466ea8928596cb&mc=true&node=sp40.21.98.c&rgn=div6#ap40.21.98_13

Vol_{butane} = 31.75 scf/gal at 60°F

Source: http://www.aeropres.com/files/physical%20properties.pdf

HHV_{butane} = 3,244 Btu/scf $\left(\frac{0.103\ \text{MMBtu}}{\text{gal}}\right)\left(\frac{\text{gal}}{31.75\ \text{scf}}\right)\left(\frac{1E{+}06\ \text{Btu}}{1\ \text{MMBtu}}\right)$

8. Conversion factors (CF):

				Source:
1 bhp	=	0.746	kW	http://www.convertunits.com/from/horsepower/to/kilowatt
1 °F	=	460.67	°R	http://www.convertunits.com/from/Fahrenheit/to/Rankine
1 atm	=	14.7	psi	http://www.convertunits.com/from/atm/to/psi
1 day	=	24	hours	http://www.convertunits.com/from/day/to/hour
1 %	=	1E+04	ppmw	http://www.rapidtables.com/convert/number/PPM_to_Percent.htm
1 DecEq	=	100	%	http://www.calculatorsoup.com/calculators/math/percent-to-decimal-calculator.php
1 g	=	0.002205	lb	http://www.convertunits.com/from/grams/to/pounds
1 grain	=	0.000143	lb	http://www.convert-me.com/en/convert/weight/grain.html
1 hp-hr	=	7,000	Btu	Source: AP-42, Table 3.3-1; footnote a.

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20 [84]	
SUBJECT Middletown Station -- Existing Equipment Conversion Factors, Physical Properties, and Abbreviations / Acronyms used in the emission estimate calculation workbooks.			
BASED ON SPLP Equipment Data / Specifications / Reference Material		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Inputs and Assumptions (Continued):

8. Conversion factors (CF) (Continued): Source (Continued):

1 hr	=	60	minutes	http://www.convertunits.com/from/hours/to/minutes
1 kg	=	1,000	g	http://www.convertunits.com/from/kilograms/to/grams
1 kg/m^3	=	0.008345	lb/gal	http://convert-to.com/conversion/density/convert-kg-per-m3-to-lb-per-gal.html
1 lb	=	453.6	g	http://www.convertunits.com/from/pounds/to/grams
1 lb	=	0.4536	kg	http://www.convertunits.com/from/pounds/to/kilograms
1 lb	=	8.34	gal@60°F	http://www.engineeringtoolbox.com/water-density-specific-weight-d_595.html
1 MMBtu	=	1E+06	Btu	http://www.convertunits.com/from/million+British+thermal+unit/to/British+thermal+unit
1 MMscf	=	1E+06	scf	http://www.convertunits.com/from/million+cubic+feet/to/cubic+feet
1 pascal	=	0.000010	atm	http://www.convertunits.com/from/pascal/to/atmosphere+[standard]
1 ppmw	=	0.0001	wt%	http://www.rapidtables.com/convert/number/PPM_to_Percent.htm
1 ft^3 / scf	=	28,317	cc	http://www.convertunits.com/from/cubic+feet/to/cubic+centimeters
1 ton	=	2,000	lb	http://www.convertunits.com/from/ton+[short,+US]/to/pounds
1 yr	=	8,760	hrs	Calculated: (24 hours/day) * (365 days/year)

9. Abbreviations / Acronyms

%	=	percent
Ann	=	annual
AOH	=	annual operating hours
cc	=	cubic centimeter
CF	=	conversion factor
CH_4	=	methane
CO	=	carbon monoxide
CO_2e	=	carbon dioxide equivalent
dec	=	decimal
DecEq	=	Decimal Equivalent
EC	=	equipment count
EF	=	emission factor
eq	=	equivalent
ER	=	Emission Rate
FR	=	flow rate
ft	=	feet
ft^3	=	cubic feet
g	=	gram
GC	=	gas chromatograph
HAP	=	hazardous air pollutant
HHV	=	higher heating value
hr	=	hour
kg	=	kilogram
kg/MMBtu	=	kilograms per million British thermal units
lb	=	pound
lb/MMBtu	=	pounds per million British thermal units
lb/MMscf	=	pounds per million standard cubic feet
lb/scf	=	pounds per standard cubic feet

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20 [85]	
SUBJECT Middletown Station -- Existing Equipment Conversion Factors, Physical Properties, and Abbreviations / Acronyms used in the emission estimate calculation workbooks.			
BASED ON SPLP Equipment Data / Specifications / Reference Material		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 5/23/2016

Inputs and Assumptions (Continued):

9. Abbreviations / Acronyms (Continued)

lb-mol = pound mole
LPG = liquid petroleum gas
LHV = lower heating value
Max Daily = maximum daily
Max Hourly = maximum hourly
MM = molar mass
mol = mole
MW = molecular weight
n = moles
N/A = Pollutant is Not Applicable to this source
N/A E = This equipment is not applicable to this station
N/C = Not Calculated
N_2O = nitrogen dioxide
NOx = oxides of nitrogen
OSF = operating service factor
P = pressure
PM = particulate matter
PM_{10} = particles with an aerodynamic diameter less than or equal to 10 micrometers
$PM_{2.5}$ = particles with an aerodynamic diameter less than or equal to 2.5 micrometers
ppmw = parts per million by weight
propane = C_3H_8
psi = pounds per square inch
psia = pounds per square inch absolute
psig = pounds per square inch gauge
$R_{specific}$ = Ideal gas law constant specific to units
RV = relief valve
S = sulfur
scf = standard cubic feet
SG_O = specific gravity of the oil
SO_2 = sulfur dioxide
SO_x = oxides of sulfur
T = temperature
t = ton
TBD = To Be Determined
TF = Total Fugitives
tpy = tons per year
USEPA = United States Environmental Protection Agency
V = volume
VS = valve seat
VOC = volatile organic compound
wt = weight
yr = year

Appendix B, Attachment 2: Aggregation Language

The purpose of this document is to supply supplemental information regarding the aggregation text for the Sunoco Pipeline L.P. (SPLP) Request for Determination (RFD) submittals to the Pennsylvania Department of Environmental Protection (PADEP) South Central Regional Office (SCRO) associated with the Mariner East (ME) Project (the Project).

SPLP understands that Pennsylvania is considered a "moderate" ozone nonattainment area for oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) because Pennsylvania is a jurisdiction in the Ozone Transport Region (Section 184 of the Clean Air Act). Therefore, an aggregation determination under New Source Review (NSR) would be determined on a case-by-case basis using the two-part test that considers whether the air contamination source or combination of sources are located on one or more contiguous or adjacent properties and whether the sources are owned or operated by the same person under common control. This case-by-case single source determination would apply to all sources irrespective of their separate status as "minor" or "major" air contamination sources. PADEP and the Pennsylvania Environmental Hearing Board have made clear that the terms "contiguous" and "adjacent" should be given their plain meaning. To that end, PADEP's guidance document has developed a common sense approach to determine if sources are located on adjacent or contiguous properties and considers sources located within a quarter-mile distance to be considered contiguous or adjacent (PADEP, 2012). Sources greater than a quarter-mile may be considered contiguous or adjacent on a case-by-case basis. Interdependence may be a factor in conducting a single source determination. That said, the plain meaning of the terms "contiguous" and "adjacent," and not interdependence, should be the dispositive factor in determining whether stationary sources are located on contiguous or adjacent properties.

To determine if the under common control test is met, ownership of each of the operations is just one aspect in determining if the facilities are under common control. If a contract for service relationship exists between the two companies and/or if a support/dependency relationship exists, then this would constitute indirect control. United States Environmental Protection Agency (USEPA) has historically interpreted that an evaluation of common control must consider whether the facilities are functionally interrelated or interdependent of each other. As discussed in the Federal Register (USEPA, 2009), USEPA states that "To be 'substantially related,' there should be an apparent interconnection–either technically or economically–between the physical and/or operational changes, or a complementary relationship whereby a change at a plant may exist and operate independently, however its benefit is significantly reduced without the other activity."

In determining whether the Middletown Pump Station's emissions should be aggregated with any another sources for the purpose of evaluating the applicability of the nonattainment NSR and Title V programs, initially one facility was identified: the Susquehanna River East Block Valve. Based on PADEP SCRO's request for additional clarification and for the expansion of the radius evaluated to approximately 5.0 miles, one additional facility, the Middletown Junction Emergency Flow Restricting Device (EFRD) Valve, was evaluated.

Susquehanna River East Block Valve

With this supplemental aggregation discussion, the distance between the Middletown Pump Station and the Susquehanna River East Block Valve is being approximately 3.6 miles. This updated distance is based upon finalized Process Flow Diagrams (PFDs) mile markers for the pipeline. The distance of approximately 3.6 miles exceeds the ¼ mile rule of thumb in the PADEP guidance document (PADEP, 2012).

Furthermore, aggregation would not be appropriate because the two sites should not otherwise be considered “adjacent” or “contiguous” due to the lack of any interdependence between the Susquehanna River East Block Valve and the Middletown Pump Station. The Susquehanna River East Block Valve is an independently operated valve for isolating a section of pipeline for safety, environmental, or maintenance purposes, whereas the Middletown Pump Station is to maintain pipeline system pressure during the transportation of natural gas liquids (NGLs). Neither location is dependent upon the other to properly function. In fact, both locations could fully function even if the other is nonfunctional.

In short, the Middletown Pump Station’s emissions should not be aggregated with those from the Susquehanna River East Block Valve because the two locations are not interdependent of each other and are not in close proximity of each other, and therefore are neither “contiguous” nor “adjacent” for the purposes of aggregating air emissions.

Middletown Junction EFRD Valve

The distance between the Middletown Pump Station and the Middletown Junction EFRD Valve is approximately 1.1 miles, which exceeds the ¼ mile rule of thumb in the PADEP guidance document (PADEP, 2012).

Furthermore, aggregation would not be appropriate because the two sites should not otherwise be considered “adjacent” or “contiguous” due to the lack of any interdependence between the Middletown Junction EFRD Valve and the Middletown Pump Station. The Middletown Junction EFRD Valve is an independently operated location for the public protection should the pipeline flow exceed predetermine maximum rates, that is, for the safety of the public and the environmental, whereas the Middletown Pump Station is to maintain pipeline system pressure during the transportation of natural gas liquids (NGLs). Neither location is dependent upon the other to properly function. In fact, both locations could fully function even if the other is nonfunctional.

In short, the Middletown Pump Station’s emissions should not be aggregated with those from the Middletown Junction EFRD Valve because the two locations are not interdependent of each other and are not in close proximity of each other, and therefore are neither “contiguous” nor “adjacent” for the purposes of aggregating air emissions.

REFERENCES:

Pennsylvania Department of Environmental Protection (PADEP), 2012. Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries. Document No.: 270-0810-006, October 6, 2012.

United States Environmental Protection Agency (USEPA), 2009. Title 40 Code of Federal Regulations Parts 51 and 52, Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Aggregation and Project Netting. Federal Register Volume 74, No. 10, January 15, 2009, pages 2376-2383.

Sunoco Logistics

September 9, 2016

FedEx: 7771 9363 0000

Mr. William Weaver
Program Manager
Pennsylvania Department of Environmental Protection
Bureau of Air Quality
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, Pennsylvania 17110

Subject: Addendum, Rev 1

RE: Pending State Only Operating Permit (SOOP) 22-03094 Addendum
Facility ID: 776463
Sunoco Pipeline L.P. (SPLP) Middletown Station
Londonderry Township, Dauphin County, Pennsylvania
Tetra Tech, Inc. Project No. 112IC05958

Dear Mr. Weaver:

SPLP is submitting this Addendum to the subject facility SOOP application. Triplicate hardcopies of this letter and the impacted SOOP attachments are enclosed (one original and two copies).

There is no change in the status of Middletown Station and the physical operation remains as represented in the May 2014 SOOP Application. This addendum is being submitted because the emissions associated with the Middletown Station have been recalculated based on:

- Updated equipment information including flare pilot gas flow rate,
- More detailed information regarding maintenance activities,
- As-built Piping and Instrumentation Diagrams (P&IDs),
- Current equipment specific emission factors, and
- A more conservative flare emission estimate utilizing the manufacturer's guaranteed design destruction and removal efficiency (DRE) of 98%.

As part of the review of existing equipment and potential station modifications, the DRE associated with a 10 million British thermal unit per hour (MMBtu/hr) flare was evaluated. The manufacturer (John Zink) shop testing and a field stack study conducted at a similar SPLP facility on an identical flare demonstrates the capability of the 10 MMBtu/hr to achieve a DRE of 99.99 percent (%) for these size units as presented in Tables 1 and 2, respectively. However, we do not presently have sufficient data or operating history to determine that a 99.99% DRE can be achieved for the operational life of the flare. We do however anticipate that the more conservative 98% DRE that is the manufacturer's minimum rated performance can be achieved and likely exceeded for the operational life of the flare when the manufacturer's recommended maintenance schedule is followed. See John Zink's Recommended Maintenance Form for Production Flare (Attachment A).

Furthermore, the potential for changing one or more flares present at this or other aboveground facilities serving the same pipeline system to larger units is being considered. Although the larger units may be capable of achieving a 99.99% DRE or better over the operational life of the flare, SPLP does not have stack study data or historic operational data to support the 99.99% DRE for those flares.

Table 1. John Zink's October 23 through 25, 2013 Stack Emission Study Summary Results

Parameter	Average Result	Data Source
VOC Destruction Efficiency	99.993%	0 – 30 - 0 Load Data
VOC Destruction Efficiency	99.999%	30 - 70 - 30 Load Data
VOC Destruction Efficiency	99.999%	70 - 100 - 70 Load Data
VOC Destruction Efficiency	99.999%	90 - 00 Load Data
John Zink Stack Emissions Study, EPA 40 CFR Part 60 Subpart OOOO for the ZTOF025X15PF Unit. Tulsa R&D Facility. Tulsa, Oklahoma. October 23 through 25, 2013		

Table 2. Sunoco April 26, 2016 Stack Study Summary Results

Parameter	Average Result	Fuel Source
Destruction and Removal Efficiency	99.996%	Propane and Ethane
Blue Mountain Environmental Management Corporation Volatile Organic Compound Destruction and Removal Efficiency Study Test Report. John Zink Flare System. SPLP Twin Oaks Station. Aston, Pennsylvania, Delaware County. April 26, 2016.		

SPLP also evaluated the manufacturer's DRE design guarantee, which was a 98% DRE. Based upon the presently available data SPLP determined that it is appropriate and conservative to utilize the manufacturer's design guarantee DRE of 98%. SPLP also believes that by installing, operating, and maintaining all enclosed flares in accordance with the manufacturer's (John Zink's) guidance, a minimum 98% DRE can be anticipated for the operational life of the enclosed flares. Again, based on our operations and testing, we believe that a DRE in excess of 99% is likely for the life of the unit, but have chosen the more conservative number for our calculations.

Consequently, SPLP has updated the flare emission estimate to reflect the design DRE of 98% for Plainfield enclosed flare and plans to incorporate the design based DRE in future submittals. This change in DRE results in a very minor increase in the emissions calculations.

SPLP is replacing the following SOOP attachments with the enclosures of this letter as described in the bulleted list below. Modifications to the following only include those items impacted by this update.

- A revised State-Only Permit Application Form is enclosed and the following sections have been modified:
  - Section 1.1 – Application Type
  - Section 1.2 – Plant Information
  - Section 2.1 – Potential Emission Estimates for the Site
  - Section 3 – Site Inventory
  - Section 7 – General Source Information Subsections 7.1, 7.2, and 7.4
  - Section 8 – Control Device Information Subsections 8.1 and 8.2
- A revised Appendix B, Attachment 1 – Emission Calculations is enclosed.
  - Note that the worst-case emission rate per pollutant per product was utilized. The updated emission rates were estimated based on applying the physical properties of the products (i.e., heating value, gas density, etc.) that would result in the highest potential-to-emit estimates.
  - Additionally, note that fugitive pump seal emissions are included in overall facility fugitive emissions and are not considered a separate line item.
- A revised Appendix B, Attachment 2 – Aggregation Language is enclosed.

Additionally, per PADEP SCRO's request, SPLP has reviewed SOOP SECTION E language in regards to the current monitoring system for the pilot flame and other Pennsylvania SPLP SOOP SECTION E language. The current SPLP flare monitoring systems consist of a signal from the pilot flame detection device that is transmitted to the Supervisory Control and Data Acquisition (SCADA) system. In the event of a pilot flame malfunction, the flare auto re-ignition will be initiated. Although pilot flame failure information

is manually logged, it is not collected in the SCADA system historian. Therefore, for consistency with the PADEP SCRO issued SOOPs for Marklesburg, Hollidaysburg, and Plainfield Stations and to reflect the current system operations, SPLP is suggesting the following language for SECTION E. Source Groups Restrictions. IV. RECORDKEEPING REQUIREMENTS:

> #004 [25 Pa. Code §127.441]: "When the enclosed flare is not operational, the permittee shall record the downtime and associated emissions."
>
> #005 [25 Pa. Code §127.441]: "The permittee shall maintain detailed records of all maintenance performed on the enclosed flare. The permittee shall retain these records for a minimum of five (5) years and shall make them available to the department upon its request."

Please contact Jed Werner at 610-670-3297 or by email (jawerner@sunocologistics.com) if you have any questions.

Sincerely,

Matthew L. Gordon
Principal Engineer

MLG:vjp

cc: Project file 112IC05958 (electronic)
Jed Werner, SPLP (email)
Christopher Embry, SPLP (email)
Megan Allison, Tetra Tech (email)

MLG:vjp
Enclosures: SOOP Addendum for SPLP Middletown Station
Attachment A
John Zink's Recommended Maintenance Form for Production Flare

Form 2700-PM-AQ13

Appendix B:
Attachment 1 (Potential-to-Emit Calculations)
Attachment 2 (Aggregation Analysis)

SYSTEM COMPONENT	INTERVAL	DATE	INITIALS	COMMENTS
General				
Confirm all covers are secure.	monthly			
Inspect enclosures for moisture.	monthly			
Confirm no gas or liquid leaks exist.	monthly			
Confirm all threaded connections are tight.	annually			
Replace all thermocouples.	annually			
Calibrate instruments and flow meter.	annually			
Flare				
Record flame arrester differential pressure.	monthly			
Inspect exterior paint.	monthly			
Conduct recommended System Testing.	quarterly			
Inspect internal insulation.	quarterly			
Inspect foundation and anchor bolts.	annually			
Clean sight port, flare tip, and flame arrester.	annually			
Conduct emissions performance test.	annually			
Pilot				
Record pilot gas pressure.	monthly			
Inspect mixer for debris or moisture.	monthly			
Clean mixer and orifice.	quarterly			
Clean solenoid.	annually			
Replace electrode.	annually			

Weaver, William

From: WERNER, JED A <JAWERNER@sunocologistics.com>
Sent: Friday, March 10, 2017 1:51 PM
To: Weaver, William
Subject: Mariner East facilities
Attachments: MARINER EAST I EQUIPMENT LIST.pdf

Mr. Weaver,

Attached is a list of all the sources installed at each Pump Station as part of the Mariner East project.

In the Southcentral Region Pump Stations there are the following pigging sources:

Hollidaysburg

- One (1) Pig Launcher – 8 inch
- One (1) Pig Receiver – 8 inch

Mt. Union

- One (1) Pig Launcher – 8 inch
- One (1) Pig Receiver – 8 inch

Middletown

- One (1) Pig Launcher – 8 inch
- One (1) Pig Receiver – 8 inch

Beckersville

- One (1) Pig Launcher – 8 inch
- One (1) Pig Receiver – 8 inch

Please let me know if you have any questions

Jed A. Werner
Manager - Environmental Compliance and Projects
525 Fritztown Road
Sinking Spring, PA 19608
p-610-670-3297
c-610-858-0802
f-866-599-4936

EVERY day, is a good day!

MARINER EAST I: STATION EQUIPMENT

Southwest Region

Delmont Station

- One (1) Mainline Pump – 1,500 horsepower (hp)
- One (1) Filter – 31.94 ft^3
- One (1) Pig Launcher – 8 in
- One (1) Pig Receiver – 12 in
- One (1) Propane Storage Tank – 60,000 gallons
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Hose – 2 in diameter, 18 feet long
- One (1) Basket Strainer – 0.34 ft^3
- One (1) Basket Strainer – 1.27 ft^3
- One (1) Prover – 5.35 ft^3
- One (1) Enclosed Flare – 10 million British thermal units per hour (MMBtu/hr)

Blairsville Station

- One (1) Mainline Pump – 1,500 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Ebensburg Station

- One (1) Mainline Pump – 1,750 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Cramer Station

- One (1) Mainline Pump – 1,750 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

South Central Region

Hollidaysburg Station

- One (1) Mainline Pump – 1,500 hp
- One (1) Filter – 31.94 ft^3
- One (1) Prover – 31.42 ft^3
- One (1) Pig Launcher – 8 in
- One (1) Pig Receiver – 8 in
- One (1) Coriolis Meter
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Marklesburg Station

- One (1) Mainline Pump – 1,250 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Mt. Union Station

- One (1) Mainline Pump – 1,500 hp
- One (1) Filter – 31.94 ft^3
- One (1) Pig Launcher – 8 in
- One (1) Pig Receiver – 8 in
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Doylesburg Station

- One (1) Mainline Pump – 1,500 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Mechanicsburg Station

- One (1) Mainline Pump – 1,750 hp
- One (1) Filter – 31.94 ft^3

Plainfield Station

- One (1) Mainline Pump – 1,750 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Middletown Station

- One (1) Mainline Pump – 1,500 hp
- One (1) Filter – 31.94 ft^3
- One (1) Prover – 31.42 ft^3

- One (1) Pig Launcher – 8 in
- One (1) Pig Receiver – 8 in
- One (1) Coriolis Meter
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Cornwall Station

- One (1) Mainline Pump – 1,500 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Blainsport Station

- One (1) Mainline Pump – 1,750 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Beckersville Station

- One (1) Mainline Pump – 1,750 hp
- One (1) Filter – 31.94 ft^3
- One (1) Gas Chromatograph
- One (1) Pig Launcher – 8 in
- One (1) Pig Receiver – 8 in
- One (1) Propane Pilot Gas Tank – 500 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Southeast Region

Eagle Station

- One (1) Mainline Pump – 1,000 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 1,000 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Boot Station

- One (1) Mainline Pump – 1,750 hp
- One (1) Filter – 31.94 ft^3
- One (1) Propane Pilot Gas Tank – 1,000 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

Twin Oaks Station

- One (1) Filter – 31.94 ft^3
- One (1) Prover – 31.42 ft^3
- One (1) Pig Launcher – 12 in
- One (1) Pig Receiver – 8 in
- One (1) Coriolis Meter
- One (1) Propane Pilot Gas Tank – 1,000 gallons
- One (1) Enclosed Flare – 10 MMBtu/hr

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

March 22, 2017

Mr. Chris Embry
Sr. Environmental Specialist
Sunoco Logistics
535 Fritztown Road
Sinking Spring, PA 19608

Re: Request for Determinations #1436
25 Pa. Code 127.14(a)(8) exemption request
Sunoco Pipeline, L.P. (SPLP)
SPLP Middletown Station
Londonderry Township, Dauphin County

Dear Mr. Embry:

After review, the Department of Environmental Protection has determined that the facility modifications to add equipment and components for cleaning and inspection of the pipeline and to maintain pipeline system pressure during the transportation of natural gas liquids is exempt from the Plan Approval requirements per 25 PA Code §127.14(d) listed as No. 44 in the Department's Plan Approval and Operating Permit Exemptions list under Title 25 PA Code §127.14(a)(8). It is the Department's understanding that the additional equipment at this facility will include the following:

1) Standard Operating Scenario Emission Sources which will include gas releases from two (2) Mainline Booster Pumps (4,500 hp), which are controlled by the John Zink Enclosed ZTOF Flare rated at 30.0 mmbtu/hr.
2) Maintenance Operating Scenario Emission Sources which will include gas releases from one (1) Pig Launcher (20 in.), one (1) Pig Receiver (20 in.), two (2) Filters and one (1) Prover, which will be controlled by the John Zink Enclosed ZTOF Flare rated at 30.0 mmbtu/hr. The emissions were previously controlled by a John Zink Enclosed ZTOF Flare rated at 10.0 mmbtu/hr.
3) One (1) Flare Knockout Tank – no emissions are associated with the tank.
4) Fugitive Emissions Sources which include fugitive VOC and HAP emissions resulting from leaks of sealed surfaces from valve stems, flanges, connectors and other miscellaneous component types.

It is also the Department's understanding that potential to emit from the project will not exceed 0.03 tpy NOx, 0.15 tpy CO, 0.93 tpy VOC and 0.05 tpy HAPs.; that any compression for the project will be electrically powered as supplied by a public utility; that the flare will be operated by the manufacturer's specification and maintained by the manufacturer's recommended maintenance schedule; that the facility will implement a leak detection and repair program using

audible, visual, and olfactory detection methods on a monthly basis to satisfy BAT for fugitive emissions; that the Middletown Station is not considered to be adjacent or contiguous with any facilities under common control; and that this project will not trigger the requirements of 25 PA Code Subchapter E or 40 CFR Part 52.

The Department has also determined that this project is not exempt from the operating permit requirements.

This exemption does not affect your obligation to meet all applicable Pennsylvania Air Quality Regulations for this source. All air contamination sources and air pollution control devices must be operated in a manner consistent with the manufacturer's specifications and good engineering practice. Please be advised that this exemption is only valid for the equipment, throughput, and emission levels proposed in this request for determination (RFD). A revised RFD or plan approval application may be required prior to any future expansions or changes which increase atmospheric emissions.

On August 31, 2016, SPLP submitted an addendum to the Mariner East I draft operating permit #22-03094. The potential emissions were recalculated to be 0.06 tpy NOx, 0.26 tpy CO, 0.89 tpy VOC and 0.01 tpy Methane, which the Department has determined are exempt from Plan Approval requirements but not exempt from the operating permit requirements.

If you have any questions or comments, please call me at 717.705.4879.

Sincerely,

Darrell Hartline

Darrell Hartline
Air Quality Permitting Section
Air Quality Program

Enclosure

cc: Permits/SC Region 22-03094, B3

OFFICIAL USE ONLY

RFD #: 1436

Date Received: 8/31/16 Reviewed By: Darrell Hartline

☒ A plan approval is not required for this source (See 25 Pa. Code Section 127.14(a)(1)-(9)

☐ An operating permit is not required for this source (See 25 Pa. Code Section 127.443(a))

☐ The source(s) do(es) not qualify for exemption. Applicant is required to submit a plan approval application.

☒ The source(s) do(es) not qualify for exemption. Applicant is required to submit an operating permit application.

Thomas J. Hanlon
Signature

Thomas J. Hanlon, Permitting Chief
Name and Title

Date 3/22/17

Remarks: Please reference the cover letter for remarks.

Conditions:

TETRA TECH

[103]

August 30, 2016

FedEx: 7771 1496 2149

Mr. William Weaver
Program Manager
Pennsylvania Department of Environmental Protection
Bureau of Air Quality
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, Pennsylvania 17110

Subject: Submittal of Three (3) Pending State Only Operating Permit (SOOP) Addendums and Three (3) Proposed Equipment Request for Determinations (RFDs)
Tetra Tech, Inc. Project No. 112IC05958

RE: Sunoco Pipeline L.P. (SPLP) Stations:

- Beckersville Station
  Facility ID: 782678
  Brecknock, Berks County, Pennsylvania

- Middletown Station
  Facility ID: 776463
  Londonderry Township, Dauphin County, Pennsylvania

- Mount Union Station
  Facility ID: 776946
  Shirley Township, Huntingdon County, Pennsylvania

Dear Mr. Weaver:

There are a total of six (6) triplicate hardcopy submittals (one original and two copies) enclosed in this package, as itemized below:

1. The Beckersville Station SOOP Addendum Package;
2. The Middletown Station SOOP Addendum Package;
3. The Mount Union Station SOOP Addendum Package;
4. The Beckersville Station RFD Package;
5. The Middletown Station RFD Package; and
6. The Mount Union Station RFD Package;

Please contact Jed Werner at 610-670-3297 or by email (jawerner@sunocologistics.com) if you have any questions.

Sincerely,

Valerie J. Plachy, P.E.
Air Quality Specialist

JAW:vjp

cc: Project file 112IC05958 (electronic)
Jed Werner, SPLP (email)
Christopher Embry, SPLP (email)
Megan Allison, Tetra Tech (email)
Valerie Plachy, Tetra Tech (email)

Enclosures:

Three (3) copies of SOOP Addendum packages for SPLP Beckersville, Middletown, and Mount Union Stations

Three (3) copies of RFD submittal packages for SPLP Beckersville, Middletown, and Mount Union Stations

TETRA TECH

August 30, 2016

FedEx: 7771 1496 2149

Mr. William Weaver
Program Manager
Pennsylvania Department of Environmental Protection
Bureau of Air Quality
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, Pennsylvania 17110

Subject: Request for Determination (RFD)

RE: Facility ID: 776463
Sunoco Pipeline L.P. (SPLP) Middletown Station
Londonderry Township, Sauphin County, Pennsylvania
Tetra Tech, Inc. Project No. 112IC05958

Dear Mr. Weaver:

SPLP is submitting the enclosed RFD for the subject facility in triplicate hardcopies (one original and two copies).

Please contact Jed Werner at 610-670-3297 or by email (jawerner@sunocologistics.com) if you have any questions.

Sincerely,

Valerie J. Plachy, PE

Valerie J. Plachy, P.E.
Air Quality Specialist

ORIGINAL

VJP:vjp

cc: Project file 112IC05958 (electronic)
Jed Werner, SPLP (email)
Christopher Embry, SPLP (email)
Megan Allison, Tetra Tech (email)

Enclosures: Request for Determination; SPLP Middletown Station

REQUEST FOR DETERMINATION

Sunoco Pipeline, L.P.

Middletown Station

Dauphin County, PA

Prepared for:

Sunoco Pipeline, L.P.
535 Fritztown Road
Sinking Spring, PA 19608

Prepared by:

TETRA TECH

Tetra Tech, Inc.
400 Penn Center Blvd., Suite 200
Pittsburgh, PA 15235

www.tetratech.com

August 2016

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

Attachment A – RFD Forms

Attachment B – Air Emission Calculations

ABBREVIATIONS AND ACRONYMS

%	percent
AVO	audible, visual, and olfactory
BAT	Best Available Technology
CAA	Clean Air Act
CAAA	1990 Clean Air Act Amendments
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
DRE	destruction and removal efficiency
EFRD	Emergency Flow Restricting Device
ft	feet
ft^3	cubic feet
GHG	greenhouse gas
HAP	hazardous air pollutant
HHV	higher heating value
hp	horsepower
hr	hour
hr/day	hours per day
hr/yr	hours per year
in	inch
lb/hr	pounds per hour
LPG	liquefied petroleum gas
MACT	Maximum Achievable Control Technology
ME	Mariner East
MMBtu	million British thermal units
MMBtu/hr	million British thermal units per hour
MOS	Maintenance Operations Scenario
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
N/C	not calculated
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NGL	natural gas liquid
NNSR	Nonattainment New Source Review
NO_x	oxides of nitrogen
NSPS	New Source Performance Standards
NSR	New Source Review
OTR	Ozone Transport Region
PADEP	Pennsylvania Department of Environmental Protection
PFD	process flow diagram
P&ID	Piping and Instrumentation Diagram
PM_{10}	particles with an aerodynamic diameter less than or equal to 10 micrometers
ppmw	parts per million by weight
PSD	Prevention of Significant Deterioration
PTE	potential-to-emit
QA/QC	quality assurance/quality control
RFD	Request for Determination

ABBREVIATIONS AND ACRONYMS

(CONTINUED)

SCADA	supervisory control and data acquisition
scf	standard cubic feet
scf/hr	standard cubic feet per hour
SCRO	Southcentral Regional Office
SIC	Standard Industrial Classification
SOS	Standard Operating Scenario
SO_2	sulfur dioxide
SO_x	oxides of sulfur
SOOP	State-Only Operating Permit
SPLP	Sunoco Pipeline, L.P.
the Facility	proposed Middletown Station modifications
tpy	tons per year
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VRU	vapor recovery unit
wt%	percent by weight

1 INTRODUCTION

Sunoco Pipeline L.P. (SPLP) proposes to expand the Mariner East (ME) pipelines to support natural gas liquid (NGL) transportation including propane, butane, liquefied petroleum gas (LPG), and ethane. In addition to expanding the existing ME pipelines, some aboveground facilities such as block valves and pump stations will be required to support the expansion. Specifically, for the purposes of this Request for Determination (RFD), SPLP is proposing to modify the pending State-Only Operating Permit (SOOP) emission limits for Middletown Station located in Londonderry Township, Dauphin County, Pennsylvania. This RFD is being submitted as an addition to the August 2016 Middletown Station Addendum. (The August 2016 Middletown Addendum requested emission limits updates based upon re-calculations that were associated with finalized AP-42 emission factors, updated equipment information, more detailed information regarding maintenance activities, current preliminary Piping and Instrementation Diagrams [P&IDs], current equipment emission factors, an utilizing the manufacturer's [John Zink's] flare design destruction and removal efficiency (DRE) of 98 percent [%] for pending SOOP permit number 22-03094.) Product transportation will be facilitated by the proposed Middletown Station modifications (the Facility). The Facility is considered a minor source for all pollutants and is operating under a pending SOOP (permit number 22-03094). Middletown Station will remain a minor source for all pollutants after completion of the proposed modifications. The proposed modifications will not impact the current station emissions but proposes additional equipment, that is, new emission sources. The Facility will consist of added equipment and components to be utilized for cleaning and inspection of the pipeline and to maintain pipeline system pressure during the transportation of NGLs. Table 1-1 below details the emissions sources and the control equipment.

Table 1-1. Equipment List.

Equipment List	Rating/Size	Quantity
Standard Operating Scenario Emission Sources		
Mainline Booster Pumps (4,500 hp)	0.21 scf/hr	2
Maintenance Operations Scenario Emission Sources		
Pig Launcher (20 in)	65.70 ft^3	1
Pig Receiver (20 in)	61.51 ft^3	1
Filter	56.55 ft^3	2
Prover	5.35 ft^3	1
Control Equipment		
Enclosed Flare	30 MMBtu/hr	1
Pressure Vessel		
Flare Knockout Tank	60 in x 20 ft	1
Fugitive Emission Sources		
Various component types and quantities based on engineering design		

The Facility will continue to operate under two scenarios: the Standard Operating Scenario (SOS) and the Maintenance Operations Scenario (MOS). The vapors associated with SOS and MOS

activities will be captured and diverted to the proposed enclosed flare for control of volatile organic compounds (VOCs) and, with these modifications, hazardous air pollutants (HAPs). Fugitive sources (e.g., emissions from sealed surfaces associated with equipment such as valve stems, flanges, and other miscellaneous component types) will be added to Middletown Station and the current flare will be replaced with a larger capacity flare.

The proposed enclosed flare will be a John Zink Company LLC enclosed ZTOF flare with a maximum heat input rating of 30 MMBtu/hr that will replace the existing 10 MMBtu/hr enclosed flare. The purpose of the flare is to control VOC and HAP emissions associated with the SOS and MOS emission sources. The destruction and removal efficiency (DRE) of the flare is 98 percent (%) based upon the proposed manufacturer's (John Zink's) design. This DRE has been utilized to estimate potential controlled emissions from the Facility.

Emissions during the SOS operations are continuous in nature and minor. SOS emissions are those associated with the pump seal leaks. The emissions resulting from SOS activities are detailed in Section 2.1.1. Because MOS activities are intermittent in nature, the emission resulting from these MOS activities are also intermittent. The MOS operations are detailed in Section 2.1.2. Emissions associated with both the SOS and MOS operations are captured and diverted to the enclosed flare.

Though many individual pieces of equipment are included, this RFD will only include two sources as indicated in Table 1-2.

Table 1-2. Source List

Source Description	Source Name
SOS & MOS emissions diverted to an enclosed flare	Control Device (Enclosed Flare) (FL-9708)
Fugitive emissions consisting of various component types and quantities	Fugitives (FE-01)
Note: Pressurized tanks are not included in the Source List. No emissions are associated with the pressurized tanks; however, pressurized tank components are included in the fugitive equipment counts for a conservative estimate.	

Emissions from each source and the entire Facility will be de minimis and will not exceed the emission limits for de minimis emission increases as allowed by Title 25 of Pennsylvania Code (25 Pa Code §127.449(d)) presented in Table 1-3:

Table 1-3. De Minimis Emission Increases.

Compound	Single Source (tpy)	Entire Facility (tpy)
Carbon Monoxide (CO)	1	20
Oxides of Nitrogen (NO_x)	1	5
Oxides of Sulfur (SO_x)	1.6	8
Particulate Matter <10µ (PM_{10})	0.6	3
Volatile Organic Compounds (VOCs)	1	5

The Facility site location map is provided as Figure 1 and a process flow diagram (PFD) is provided as Figure 2. The Facility emission estimates summary and detailed calculation methodology are presented in Section 2. An analysis of federal and state regulations applicable to the Facility are presented in Section 3. References are presented in Section 4. The RFD forms and emission calculations are presented as Attachments in Section 5.

2 EMISSION ESTIMATES

2.1 New Emission Sources

The proposed emission sources for the Facility modifications will consist of the:

- SOS emissions captured from the pump seal leaks;
- MOS emissions associated with filter maintenance, pigging operations, prover maintenance, and other miscellaneous routine maintenance activities that may occur; and
- Fugitive sources (e.g., emission from sealed surfaces associated with equipment such as valve stems, pump seals, flanges, and other miscellaneous component types) as a result of leaks from the sealed surfaces.

The vapors associated with SOS and MOS emission sources will be captured and diverted to the enclosed flare header for the control of VOC and HAP emissions.

Detailed emission calculations are presented in Attachment B and summarized in Tables 2-1 and 2-2.

2.1.1 Standard Operating Scenario Emission Sources

The potential SOS emission source represented in this RFD for the Facility is from the pump seal leaks. These emissions are being captured and sent to the enclosed flare for the control of VOC emissions into the atmosphere.

To clarify, the pump seal leaks that are a result of the proposed modifications include the installation of two (2) mainline booster pumps, which will be used to maintain system pressure. Each mainline booster pump will have two seals, one entering (inlet seal) and one exiting (outlet

seal) the pump. This system will be designed to capture the NGLs vented from the seals that will be sent to the enclosed flare on a continuous basis to control VOC and HAP emissions.

2.1.2 Maintenance Operations Scenario Emission Sources

Emissions associated with MOS for the Facility represented in this RFD will generally result from pigging operations, filter maintenance, prover maintenance, and other miscellaneous maintenance activities that may occur, which are directly associated with the operation of the Facility.

Pigging operations are maintenance activities that clean and inspect the integrity of isolated pipeline sections. The pig launchers and receivers require depressurization (e.g., venting) after pigging activities and the resulting vapors are directed to the enclosed flare for the control of VOC and HAP emissions.

The filters are inline devices that prevent foreign objects from entering the pumps. Maintenance of the filters may be performed, which could consist of cleaning or replacing filter screens. Filters are depressurized (e.g., venting) prior to maintenance and the resulting vapors are captured and directed to the enclosed flare to control VOC and HAP emissions.

The prover is a quality assurance/quality control (QA/QC) measuring device used to assure the accuracy of the meters. Maintenance of the provers may be performed, which could consist of performing a water draw, seal replacement, or other maintenance activities. Provers are depressurized prior to maintenance and the resulting vapors will be captured and directed to the enclosed flare to control VOC and HAP emissions.

2.1.3 Enclosed Flare

A new 30 MMBtu/hr enclosed flare (John Zink Company LLC enclosed ZTOF model flare), which will replace the existing 10 MMBtu/hr enclosed flare, is proposed to control the VOC and HAP emissions captured from the existing and proposed SOS and MOS emission sources. Propane, supplied by an existing pressurized storage tank, associated with the current 10 MMBtu/hr flare, will continue to be used as the pilot gas fuel source. Propane used to supply the pilot of the 30 MMBtu/hr flare will be combusted at the same rate as that for the existing 10 MMBtu/hr flare, that is, 0.053 MMBtu/hr (22 standard cubic feet per hour [scf/hr]). The pilot gas emission were presented to the Pennsylvania Department of Environmental Protection (PADEP) as part of the August 2016 Addendum for Middletown Station and will not be addressed in this RFD. The design-based DRE of the proposed flare is 98% and the flare will be designed to comply with the applicable requirements specified in 40 Code of Federal Regulations (CFR) 60.18.

As with the existing flare, the proposed flare will operate and will be monitored 24 hours per day (hr/day), seven days per week via a supervisory control and data acquisition (SCADA) system and a physical inspection will occur at a minimum of once per week. SPLP will install, operate, and maintain the enclosed flare in accordance with the manufacturer's guidelines and specifications.

The flare will be equipped with a pilot gas control system that includes a pressure regulator, a fail-close shutdown valve, a manual block valve, and a pressure indicator to monitor and assure operation. Additionally, the flare will be equipped with an auto re-ignition system. Under standard operating conditions, continuous flow from pilot gas and pump seal leaks would be the only sources of potential uncontrolled emissions during a flare malfunction (i.e., the pilot flame is unable to be re-ignited by the operating system or another type of malfunction). In the event of a flare malfunction during a scheduled maintenance event, the activity would be halted until an operational flare becomes available.

To provide a conservative flare emission estimate for the proposed modifications at the Facility, the design based DRE of 98% has been used for the purposes of this RFD.

2.1.4 Pressure Vessel

SPLP proposes to install a 60-inch in diameter by 20-foot long pressurized tank for the collection of entrained liquids in the existing flare header piping. The tank will not have a liquid level, therefore, there will be no working or evaporative losses associated with this tank. The knockout tank acts as a "bump in the line" under SOS and MOS activities, that is, the product directed to the flare due to SOS and MOS activities flows through the knock out tank in-route to the flare. Additionally, this tank will be considered an exempt source in accordance with the Trivial Activity Category No. 24 [Storage tanks, vessels, and containers holding or storing liquids that will not emit any VOCs or HAPs] listed in PADEP's Air Quality Permit Exemptions, Document Number 275-2101-003 (PADEP 2013).

2.1.5 Fugitive Emissions

Fugitive sources (e.g., emissions from sealed surfaces associated with equipment such as valve stems, pump seals, flanges, and other miscellaneous component types) are present at the Facility and are potential sources of fugitive VOC emissions. In addition to pump seal leaks that are collected and directed to the flare, pump seal leaks that are associated with sealed surfaces at the pump shaft that leak to the atmosphere were included in the fugitive emissions estimate. The fugitive emission estimates were developed using the leak emission factors for light liquid service presented in Table 2-3 of the USEPA report "Protocol for Equipment Leak Emission Estimates" (USEPA 1995) and the item count quantities are based on the current engineering P&IDs for the Facility. An addition of a 20% contingency was incorporated to account for any engineering and design changes as well as any other changes that may occur.

2.2 Calculation Methodology

The emissions associated with the Facility were calculated in accordance with regulatory guidance and are based on the most representative data available. The calculation methodology is presented below for each source type; emission summaries are presented in Section 2 for the Facility modifications and the existing sources. The emissions associated with the existing sources reflect the recalculations presented to the PADEP as part of the August 2016 Addendum for the Middletown Station. (The August 2016 Addendum re-calculations were based on updated

equipment information, more detail information regarding maintenance activities, current P&IDs, and current emission factors. Additionally, to provide a conservative in the August 2016 Addendum and this RFD, flare emission estimate are based on the manufacturer's design DRE of 98%.)

Calculations were estimated based on the Facility operating for 8,760 hours per year (hr/yr), that is, a 100% operating service factor. The NGLs for the proposed Facility modifications will consist of butane, LPG, propane, and ethane. Based on a representative analysis of each NGL, butane consists of 100 percent by weight (wt%) of regulated VOCs; the LPG product consists of 99.95 wt% of regulated VOCs; and, the propane product consists of 98.65 wt% regulated VOCs. The ethane product consists of 100 wt% VOCs that are exempt under 40 CFR §51.100(s)(1). Only the LPG contains any measurable HAPs with a maximum HAP concentration of approximately 5.86 wt%. In order to conservatively estimate the potential-to-emit (PTE) for the Facility, the worst case emission rate per pollutant per product was utilized. These emission rates were applied to each pollutant based on the various physical properties of the products (i.e., heating value, gas density, molecular weight, HAP content, etc.). The Facility annual average PTE was estimated based on the SOS, MOS, and fugitive emissions. For estimating the impact to the maximum hourly PTE the maximum design heat input to the flare and fugitive emissions were utilized.

The proposed SOS emission source that is being directed to the enclosed flare is the pump seal leaks. The pump seal leak rates were provided by the manufacturer (Sulzer) as 0.21 scf/hr per pump.

Emissions associated with MOS activities are based on the estimated annual vented emissions being sent to the proposed enclosed flare as a result of pigging events, filter maintenance, prover maintenance, and miscellaneous routine maintenance activities. The anticipated maintenance operations include: "clean" pigging occurring on an annual basis; "smart" pigging (an inline integrity inspection of the pipeline) occurring once every five years; annual prover maintenance that may consist of performing a water draw, seal replacement, or other maintenance activities; filter maintenance, which may include cleaning or replacement of filter screens, estimated to occur four times during the first year and once per year beyond the first year; and other miscellaneous routine maintenance activities required for station operations. Based on the proposed MOS and to account for other miscellaneous routine maintenance activities, annual MOS emissions were conservatively estimated assuming two (2) clean pigging activities, one (1) smart pigging activity, two (2) prover maintenance events, and six (6) filter maintenance activities per year. Emissions associated with these activities will be routed to the proposed enclosed flare.

Flare combustion emissions are estimated for SOS sources and MOS activities that are directed to the flare. These emissions consist of oxides of nitrogen (NO_x), carbon monoxide (CO), VOCs, HAPs, oxides of sulfur (SO_X) as sulfur dioxide (SO_2), and greenhouse gases (GHGs) as measured as carbon dioxide equivalents (CO_2e). The NO_x and CO emissions were estimated based on emission factors presented in USEPA's AP-42 Section 13.5 (USEPA, 2015). VOC and HAP emissions were estimated based on a 98% DRE flare design. SO_2 emissions were estimated

assuming that the total sulfur content of the NGL is completely converted to SO_2 during the combustion process. Based on the representative analysis of the NGL, the maximum amount of sulfur in the NGL is 30 parts per million by weight (ppmw). GHG emissions were estimated utilizing the emission factors for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) presented in Tables C-1 and C-2 of 40 CFR Part 98, Subpart C (USEPA, 2016a).

The proposed Facility modifications will include fugitive VOC and HAP emission sources in addition to the emissions from SOS and MOS sources. Potential fugitive emission estimates were quantified based on the proposed new equipment and estimated component counts from the current preliminary P&IDs, a 20% item count contingency, and the best available emission factors for fugitive emissions from NGL operations. The fugitive emission calculations were estimated using the leak emission factors for light liquid service presented in Table 2-3 of USEPA report "Protocol for Equipment Leak Emission Estimates" (USEPA, 1995) and a representative NGL analysis.

2.3 Potential Emissions

Based on the calculation methodology presented above, the potential maximum hourly and annual average emission rates for the modifications to the Facility are presented in Table 2-1. Table 2-2 presents the Facility overall PTE and de minimis Emission Change Rates Comparison. Table 2-3 features the overall PTE for Middletown Station. (The August 2016 Middletown Addendum request for the pending SOOP permit number 22-03094 emission limits updates was based upon re-calculations that were associated with finalized AP-42 emission factors, updated equipment information, more detailed information regarding maintenance activities, current preliminary P&IDs, current equipment emission factors, and utilizing the manufacturer's [John Zink's] flare design DRE of 98%.)

As shown in Table 2-2 and Table 2-3, the Middletown Station updated emissions changes result in a de minimis increase in emissions, pursuant to 25 Pa. Code §127.449.

Table 2-1. Post-Control Proposed Project Emission Estimates

Emission Source	NO_X	CO	VOC	SO_X	HAP	CO_2e (GHG)
			(lb/hr)			
Control Device (Flare)[1]	2.63	12.00	36.50	0.11	2.14	5,540
Fugitives	N/C	N/C	0.11	N/C	0.01	N/C
TOTAL MAXIMUM HOURLY	**2.63**	**12.00**	**36.61**	**0.11**	**2.15**	**5,540**
			(tpy)			
Control Device (Flare)[1]	0.03	0.15	0.47	0.001	0.03	70.85
Fugitives	N/C	N/C	0.46	N/C	0.02	N/C
TOTAL ANNUAL AVERAGE	**0.03**	**0.15**	**0.93**	**<0.01**	**0.05**	**70.85**

[1] Smokeless flares have no measurable particulate emissions pursuant to AP-42, Section 13.5, Table 13.5-1 (USEPA, 2015).

Table 2-2. Potential to Emit and De Minimis Emission Change Rate Comparison

Pollutant	NO_x	CO	VOC
Source	(tpy)		
PTE de minimis Change Request as submitted in the August 2016 Addendum	0.06	0.26	0.89
Proposed Facility Modification PTE Increases (as presented in Table 2-1)	0.03	0.15	0.93
Proposed Net Change to the Overall Facility PTE In This RFD	0.09	**0.41**	**1.82**
Source	tpy per source per permit term		
25 PA Code §127.449(d) de minimis Emission Rates	**1**	**4**	**1**
Source	tpy per facility per permit term		
25 PA Code §127.449(d) de minimis Emission Rates	**5**	**20**	**5**

Table 2-3. Middletown Station Post Project Overall Potential-to-Emit

Emission Source	NO_x	CO	VOC	SO_x	HAP	CO_2e (GHG)
	(lb/hr)					
Control Device (Flare)[1]	2.63	12.00	36.50	0.11	2.14	5,540
Fugitives	N/C	N/C	0.16	N/C	0.01	N/C
TOTAL MAXIMUM HOURLY	**2.63**	**12.00**	**36.66**	**0.11**	**2.15**	**5,540**
	(tpy)					
Control Device (Flare)[1]	0.09	0.41	1.15	0.003	0.03	187.35
Fugitives	N/C	N/C	0.67	N/C	0.02	N/C
TOTAL ANNUAL AVERAGE	**0.09**	**0.41**	**1.82**	**<0.01**	**0.05**	**187.35**

[1] Smokeless flares have no measurable particulate emissions pursuant to AP-42, Section 13.5, Table 13.5-1 (USEPA, 2015).

3 REGULATORY REVIEW AND APPLICABILITY

3.1 New Source Review

Separate preconstruction review procedures have been established for new major projects and major modifications of existing major sources proposed in designated attainment areas (areas in which air quality is better than the National Ambient Air Quality Standards [NAAQS]) and nonattainment areas (areas in which air quality is worse than NAAQS) under the Clean Air Act (CAA) New Source Review (NSR) program. The preconstruction review process for new or modified major sources located in areas designated as attainment or unclassifiable is performed under the Prevention of Significant Deterioration (PSD) program (USEPA, 2009). The preconstruction review process for new or modified major sources located in nonattainment areas is performed under the Nonattainment New Source Review (NNSR) program. A new major facility or major modification at an existing major facility can undergo both types of review, depending on the total emissions of each pollutant and the regional air quality attainment status.

The major source threshold under PSD depends upon the type of facility. A facility is considered major source under PSD if it emits or has the potential-to-emit any criteria pollutant greater than 100 tons per year (tpy) if it belongs to one of the 28 categories of stationary sources listed under 40 CFR 52.21 (b)(1)(i). The PSD major source threshold for all other source categories is 250 tpy. The Facility is not one of the named 28 source categories, and therefore the applicable major source PSD threshold is 250 tpy. All of Pennsylvania is located within the Ozone Transport Region (OTR) and considered a moderate non-attainment area for ozone. Accordingly, the NNSR major source threshold for ozone precursors NO_x and VOC are 100 and 50 tpy, respectively. Based on the Facility's PTE as documented in Table 2-1 as well as in Attachment B, PSD and NNSR major source thresholds will not be exceeded, and; therefore, NSR would not apply (USEPA 2016c).

3.2 New Source Performance Standards

USEPA has established New Source Performance Standards (NSPS) under 40 CFR 60 that regulate air pollutant emissions from certain categories of stationary sources. For combustion sources, emission standards typically are expressed in terms of mass emissions per unit of fuel combusted, fuel quality, or exhaust gas concentration. Sources subject to a specific NSPS category are also subject to the general rules in 40 CFR 60, Subpart A. Applicability of the Facility source categories under 40 CFR 60 is discussed below for emission units included in the Facility (USEPA, 2016b).

- 40 CFR 60, Subpart Kb applies to storage vessels with a capacity greater than or equal to 75 cubic meters that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984. A 60-inch in diameter by 20-foot long (11.2 cubic meters) pressurized knock out tank is proposed for the Facility. However, this vessel is exempt from Subpart Kb in accordance with 40 CFR §60.110b(d)(2) as pressurized vessels designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere and because the vessel is less than 75 cubic meters.
- 40 CFR 60, Subpart OOOOa applies to certain types of natural gas and crude oil processing equipment, generally associated with the processing of natural gas, pipeline distribution of crude oil, or pipeline transportation of natural gas (USEPA, 2016b). The Facility is part of the NGL transmission system and is not considered an affected facility under Subpart OOOOa; therefore, Subpart OOOOa does not apply to the Facility.

3.3 National Emission Standards for Hazardous Air Pollutants

The National Emissions Standards for Hazardous Air Pollutants (NESHAP), codified in 40 CFR Parts 61 and 63, regulate HAP emissions. Part 61 was promulgated prior to the 1990 Clean Air Act Amendments (CAAA) and regulates only eight types of hazardous substances (asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride). The Facility is not in one of the source categories regulated by Part 61; therefore, the requirements of Part 61 are not applicable.

The 1990 CAAA established an initial list of 189 HAPs, resulting in the promulgation of 40 CFR Part 63. Part 63, also known as the Maximum Achievable Control Technology (MACT) standards, regulates HAP emissions from both major sources of HAP emissions, and non-major (area) sources of HAP emissions within specific source categories. Part 63 defines a major source of HAP as any "stationary source or group of stationary sources located within a contiguous area and under common control" that has the PTE 10 tpy of any single HAP or 25 tpy of HAPs in aggregate. The Facility HAP emissions are below these limits, and therefore 40 CFR 63 is not applicable to the Facility.

3.4 Source Aggregation

Pursuant to PADEP guidance, two or more facilities may be considered a single source when they are under common control, operate on properties that are contiguous or adjacent to each other, have the same two-digit Standard Industrial Classification (SIC) Code and interact such that they are not fully independent operations. Emissions from these sources must be aggregated and considered a single source to evaluate applicability with regards to permitting requirements under the PSD, NSR, and Title V programs. If the aggregate emissions from the sources meets or exceeds a major source emission threshold under one of these permitting programs, then the aggregated source must obtain a major source permit under that program (PADEP, 2012).

Pennsylvania is considered a "moderate" ozone nonattainment area for NO_x and VOCs because Pennsylvania is a jurisdiction in the OTR (Section 184 of the CAA). Therefore, an aggregation determination under NNSR would be determined on a case-by-case basis using the two-part test which considers whether the air contamination source or combination of sources are located on one or more contiguous or adjacent properties and whether the sources are owned or operated by the same person under common control. This case-by-case single source determination would apply to all sources irrespective of their separate status as "minor" or "major" air contamination sources. PADEP has developed a guidance document to assist in performing single stationary source determinations (PADEP, 2012). Within this guidance document, PADEP has developed a common sense approach in determining if sources are located on adjacent or contiguous properties and considers sources located within a quarter-mile distance to be considered contiguous or adjacent. Sources greater than a quarter-mile apart may be considered contiguous or adjacent on a case-by-case basis.

To determine if the under common control test is met, ownership of each of the operations is just one aspect in determining if the facilities are under common control. If a contract for service relationship exists between the two companies and/or if a support/dependency relationship exists, then this would constitute indirect control. USEPA has historically interpreted that an evaluation of common control must consider whether the facilities are functionally interrelated or interdependent of each other. As discussed in the Federal Register (USEPA, 2009), USEPA states that "To be 'substantially related,' there should be an apparent interconnection–either technically or economically–between the physical and/or operational changes, or a

complementary relationship whereby a change at a plant may exist and operate independently, however its benefit is significantly reduced without the other activity."

In determining whether the Middletown Pump Station's emissions should be aggregated with any another sources for the purpose of evaluating the applicability of the nonattainment NSR and Title V programs, initially one facility was identified: the Susquehanna River East Block Valve. Based on PADEP Southcentral Regional Office's (SCRO's) request for additional clarification and for the expansion of the radius evaluated to approximately 5.0 miles, one additional facility, the Middletown Junction Emergency Flow Restricting Device (EFRD) Valve, was evaluated.

3.4.1 Susquehanna River East Block Valve

The distance between the Middletown Pump Station and the Susquehanna River East Block Valve is approximately 3.6 miles, which exceeds the one-quarter mile rule of thumb in the PADEP guidance document (PADEP, 2012).

Furthermore, aggregation would not be appropriate because the two sites should not otherwise be considered "adjacent" or "contiguous" due to the lack of any interdependence between the Susquehanna River East Block Valve and the Middletown Pump Station. The Susquehanna River East Block Valve is an independently operated valve for isolating a section of pipeline for safety, environmental, or maintenance purposes, whereas the Middletown Pump Station is to maintain pipeline system pressure during the transportation of NGLs. Neither location is dependent upon the other to properly function. In fact, both locations could fully function even if the other is nonfunctional.

In short, the Middletown Pump Station's emissions should not be aggregated with those from the Susquehanna River East Block Valve because the two locations are not interdependent of each other and are not in close proximity of each other, and therefore are neither "contiguous" nor "adjacent" for the purposes of aggregating air emissions.

3.4.2 Middletown Junction EFRD Valve

The distance between the Middletown Pump Station and the Middletown Junction EFRD Valve is approximately 1.1 miles, which exceeds the one-quarter mile rule of thumb in the PADEP guidance document (PADEP, 2012).

Furthermore, aggregation would not be appropriate because the two sites should not otherwise be considered "adjacent" or "contiguous" due to the lack of any interdependence between the Middletown Junction EFRD Valve and the Middletown Pump Station. The Middletown Junction EFRD Valve is an independently operated location for the public protection should the pipeline flow exceed predetermine maximum rates, that is, for the safety of the public and the environmental, whereas the Middletown Pump Station is to maintain pipeline system pressure during the transportation of NGLs. Neither location is dependent upon the other to properly function. In fact, both locations could fully function even if the other is nonfunctional.

In short, the Middletown Pump Station's emissions should not be aggregated with those from the Middletown Junction EFRD Valve because the two locations are not interdependent of each other and are not in close proximity of each other, and therefore are neither "contiguous" nor "adjacent" for the purposes of aggregating air emissions.

3.5 Pennsylvania State Requirements

Air pollution control regulations have been established by the PADEP for miscellaneous sources and air emissions associated with stationary sources. These regulations were evaluated for applicability to this Facility. The sources of emissions for the proposed Facility modifications are not listed as a regulated sources in 25 PA Code Chapters 123 and 129. The emissions of VOC and NO_x from stationary sources are presented in this RFD; however, none of the sources are regulated by 25 PA Code Chapters 123 and 129.

As previously discussed the following source at the Facility is considered an exempt source; however, the emissions from this source were estimated as part of the PTE for the Facility to determine major source applicability.

- Knockout tank - Trivial Activity Category No. 24 [Storage tanks, vessels, and containers holding or storing liquids that will not emit any VOC or HAP] listed in PADEP's Air Quality Permit Exemptions, Document Number 275-2101-003.

3.5.1 Best Available Technology

Best Available Technology (BAT) is required for each source as part of a Plan Approval application per 25 Pa. Code §127.12(a)(5) and defined in 25 Pa. Code §121.1 as:

> *"Equipment, devices, methods or techniques as determined by the Department which will prevent, reduce or control emissions of air contaminants to the maximum degree possible and which are available or may be made available."*

Because the estimated emissions for the proposed modifications at this Facility will not exceed de minimis thresholds, a Plan Approval application is not required to be prepared and BAT would not apply to these sources. However, it is understood that the final determination regarding permitting requirements is decided by PADEP. Additionally, SPLP has evaluated BAT for controlling emissions from the SOS and MOS sources. The two control devices that were evaluated to control the VOC and HAP emissions were an enclosed flare and a vapor recovery unit (VRU). The enclosed flare is a proven technology to effectively reduce the VOC and HAP emissions with a design DRE of 98%. SPLP did evaluate the use of a VRU to control the VOCs and HAPs; however, the VRU is not able to be utilized for this operation due to the associated high pressures of the NGL vapors and the inability to recycle any of the recovered condensate NGLs back into pipeline system. Therefore, a VRU was determined not to be technically feasible for the Facility. Based on this, the enclosed flare would be considered BAT for the Facility.

BAT for fugitive emissions from the NGL operations as a result of leaks from sealed surfaces from the operating equipment and pipelines was also evaluated. The potential source of fugitive emissions generated from the NGL streams include various equipment and their components such as connectors, flanges, valves, pump seals, meters, vents, sample ports, etc. SPLP will implement a leak detection and repair program using audible, visual, and olfactory detection (AVO) methods on a monthly basis to satisfy BAT for fugitive emissions, which is consistent with previous SOOPs issued by PADEP for similar SPLP facilities. Facility personnel will conduct monthly inspections for visible stack emissions, fugitive emissions, and malodors. This stack emission observation will not be required to be performed by a person certified as a qualified observer under USEPA Method 9 for Visual Determination of the Opacity of Emissions from Stationary Sources. Records of each inspection will be maintained on site for a period of five (5) years and available upon request. The inspection records will identify each leak and the time until it is repaired.

3.5.2 Permit Applicability

To determine the permit applicability, potential emissions were estimated as set forth in this RFD. Emission estimates associated with this RFD are presented in Attachment B. The emissions estimates were then compared to the Middletown Station August 2016 Addendum PTE Values to determine 25 Pa. Code §127.449(d) applicability. Details of this evaluation follow.

The existing Middletown Station is considered a minor source for all pollutants and operates under pending SOOP 22-03094. The RFD values, updated PTE estimates in the August 2016 Addendum, and the proposed net change to the Facility PTE are summarized in Section 2 of this document and in comparison with 25 PA Code §127.449(d).

Based upon this evaluation as presented in Section 2 of this document, the net potential emission change for each pollutant does not exceed the emission rates set forth by 25 PA Code §127.449(d) from a single facility during the term of the permit, that is, the potential emission changes are considered de minimis. SPLP requests that PADEP accept this RFD as a notification for a de minimis emission change to reflect the emission estimates presented in Attachment B. However, it is understood that the final determination regarding permitting requirements is decided by PADEP.

4 REFERENCES

PADEP, 2012. Guidance for Performing Single Stationary Source Determinations for Oil and Gas Industries. Document Number 270-0810-006. October 6, 2012.

PADEP, 2013. "Air Quality Permit Exemptions," Document Number 275-2101-003. July 26, 2003. Revised August 10, 2013.

USEPA, 1995. Protocol for Equipment Leak Emission Estimates. EPA-453/R-95-017, Table 2-3, November, 1995.

USEPA, 2009. Title 40 Code of Federal Regulations Parts 51 and 52, Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NNSR): Aggregation and Project Netting. Federal Register Volume 74, No. 10, January 15, 2009, pages 2376-2383.

USEPA, 2015. AP-42. Compilation of Air Pollution Emission Factors, Volume I: Stationary Point and Area Sources, Section 13.5, Industrial Flares, Tables 13.5-1 and 13.5-2, Fifth Edition, April, 2015.

USEPA, 2016a. Title 40 CFR, Part 98, Subpart C. - Mandatory Greenhouse Gas Reporting, Appendix, Tables C-1 and C-2. February 22, 2016.

USEPA, 2016b. Title 40 CFR, Part 60. Standards of Performance for New Stationary Sources. April 4, 2016.

USEPA. 2016c. Title 40 CFR, Part 52. Approval and Promulgation of Implementation Plans. June 23, 2016.

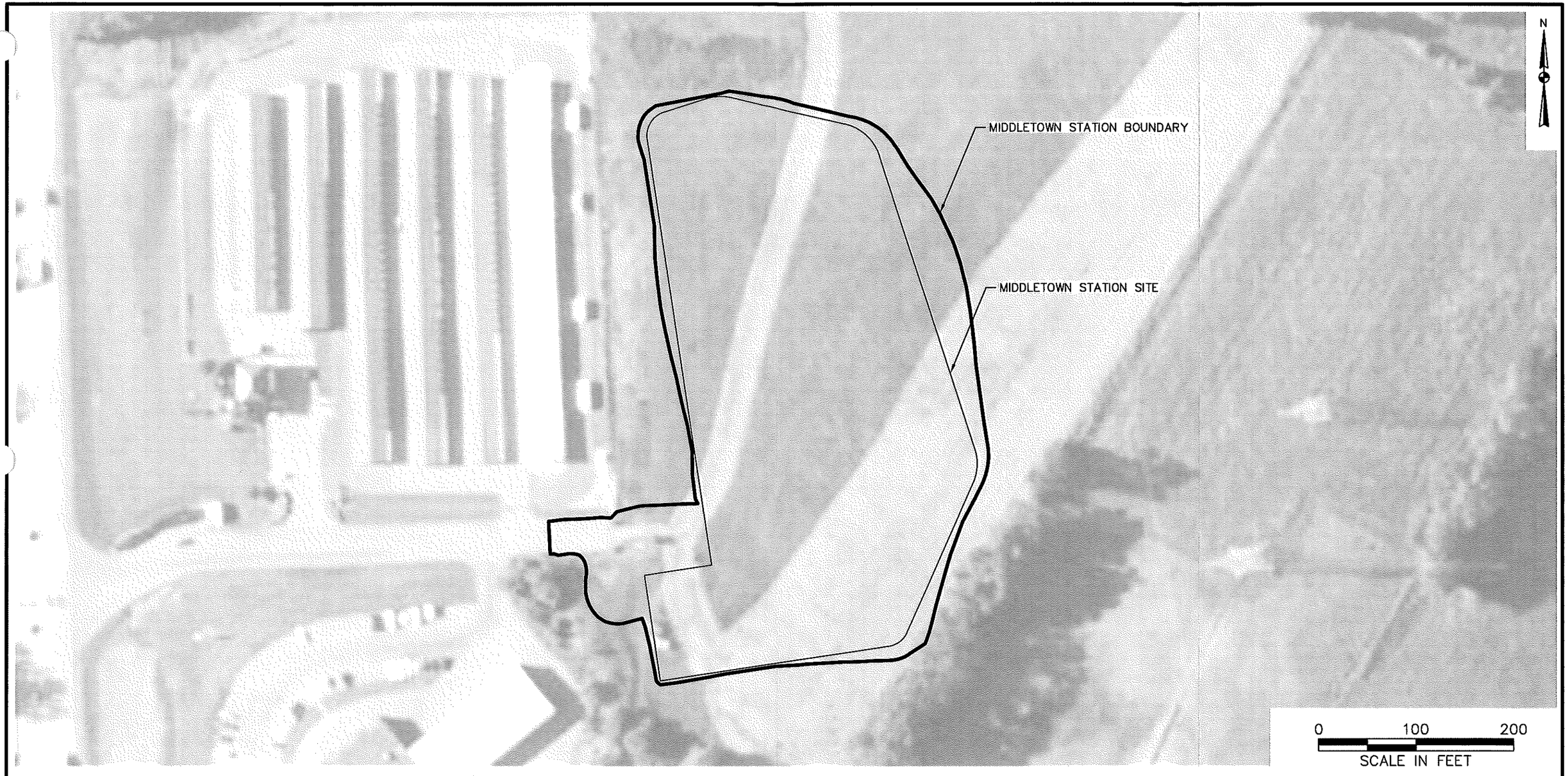
5 REQUEST FOR DETERMINATION

This submittal includes RFD forms associated with the emissions from flaring activities and fugitives. The supporting information associated with this RFD package includes the following:

- Figures
  - Figure 1 – Site Location Map
  - Figure 2 – Process Flow Diagram
- Attachment A – RFD Forms
- Attachment B – Air Emission Calculations

Figures

THIS PAGE INTENTIONALLY LEFT BLANK



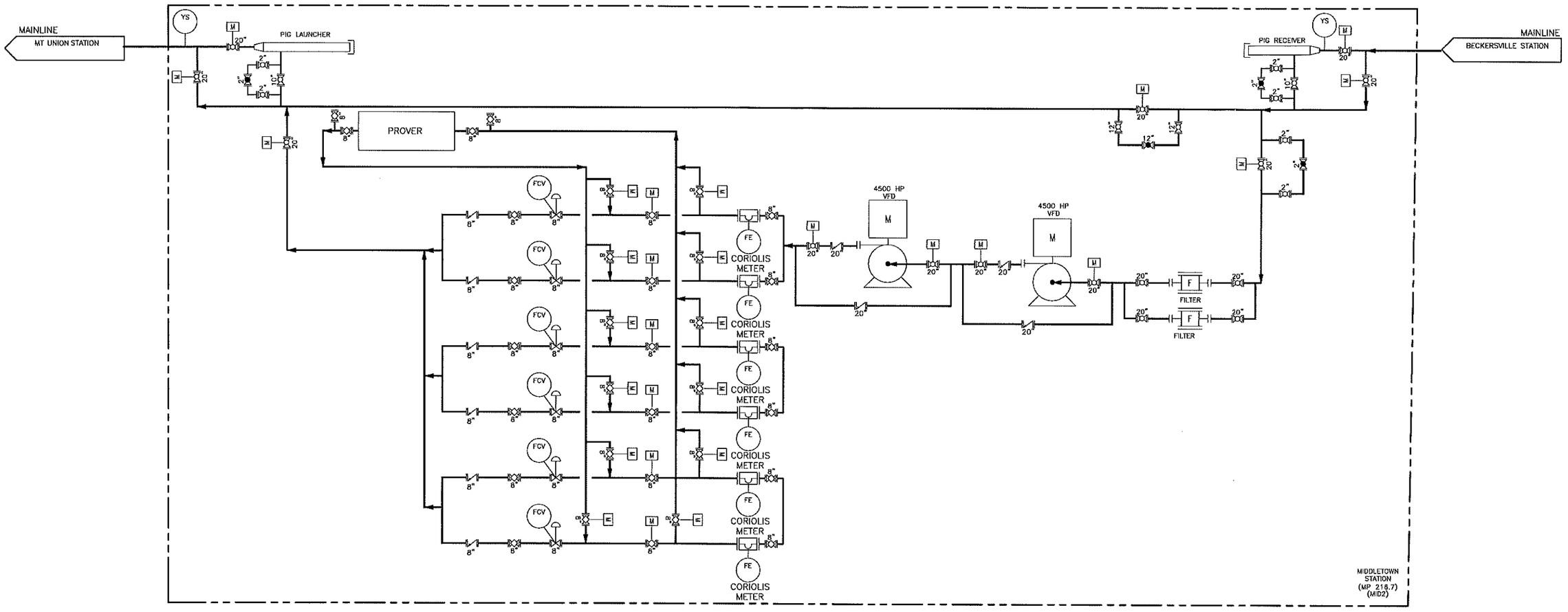
TETRA TECH
WWW.TETRATECH.COM
661 ANDERSEN DRIVE – FOSTER PLAZA 7
PITTSBURGH, PA 15220
T: (412) 921-7090 | F: (412) 921-4040

SUNOCO PIPLINE L.P.
DAUPHIN COUNTY, PENNSYLVANIA

SITE LOCATION MAP
PENNSYLVANIA PIPELINE PROJECT
MIDDLETOWN STATION

DATE:	9/25/15
PROJECT NO.:	112IC05958
DESIGNED BY:	MS
DRAWN BY:	NN
CHECKED BY:	TD
SHEET: 1 OF 1	

FIGURE 1



REV.	DATE	APP'd	DESCRIPTION	APPROVAL
0	06/08/16	3840-00555	ISSUED FOR CONSTRUCTION	ALF FK ZBE

ENGINEERING RECORD	
DRAWN BY	L.COTE
CHECKED BY	A.KARPF
APPROVED BY	F.KAY
DATE	2015/07/07
SCALE	NONE
REI PROJ #	02959

Sunoco Logistics Partners L.P.

PENNSYLVANIA PIPELINE PROJECT
FIGURE 2: PROCESS FLOW DIAGRAM
SUNOCO PIPELINE, L.P.
MIDDLETOWN STATION
DAUPHIN COUNTY, PA

TETRA TECH ROONEY
(303) 792-5911

OLD DRAWING NO.

DWG. NO.

REV. NO. 0

Attachment A – RFD Forms

THIS PAGE INTENTIONALLY LEFT BLANK

2700-PM-AQ0017 Rev. 11/2009

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AIR QUALITY

RECEIVED
AUG 31 2016
DEP SOUTHCENTRAL REGION
AIR QUALITY

[7132]

Request for Determination of Changes of Minor Significance and Exemption from Plan Approval/Operating Permit Under Pa Code §127.14 or §127.449

A. Type of Request

Exemption from Plan Approval

Select all that apply (see Instructions):
http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf

- ☒ Minor Sources or classes of sources, pursuant to 25 Pa. Code § 127.14(a)(1)-(7).
- ☒ Other sources and classes of sources of minor significance, pursuant to 25 Pa. Code § 127.14(a)(8).
- ☐ Physical changes to sources of minor significance, pursuant to 25 Pa. Code § 127.14(a)(9).
- ☐ Additional physical changes of minor significance that do not add new equipment, pursuant to 25 Pa. Code § 127.14(c)(1).
- ☐ Additional physical changes of minor significance that add new equipment, pursuant to 25 Pa. Code § 127.14(c)(2).
- ☒ Changes due to de minimis increases in emissions, pursuant to 25 Pa. Code § 127.449.

Exemption from Operating Permit

Select all that apply (see Instructions):
http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf

- ☒ Other sources and classes of sources of minor significance, pursuant to 25 Pa. Code § 127.14(a)(8).
- ☐ Physical changes to sources of minor significance, pursuant to 25 Pa. Code § 127.14(a)(9).
- ☐ Additional physical changes of minor significance that do not add new equipment, pursuant to 25 Pa. Code § 127.14(c)(1).
- ☐ Additional physical changes of minor significance that add new equipment, pursuant to 25 Pa. Code § 127.14(c)(2).
- ☒ Changes due to de minimis increases in emissions, pursuant to 25 Pa. Code § 127.449.

(Must have valid operating permit conditions authorizing de minimis increases.)

B. Facility/Company Information

Facility/Company Name: Sunoco Pipeline, L.P. **Plant Name** (if applicable): Middletown Station

Site Address: 2100 Vine Street, Middletown, PA 17057; Latitude 40° 13' 17.1078" N, Longitude -76° 43' 1.2606" W

Municipality: Londonderry Township **County:** Dauphin

Mailing Address (if different): 535 Fritztown Road, Sinking Spring, PA 19608

Federal Employer Identification Number (EIN) (if applicable): 23-3102656

Current Operating Permit No. (if applicable): 10-29574 (pending) **NAICS Code:** 493190

Person Completing Form: Valerie Plachy, P.E.	**Affiliation:** Tetra Tech, Inc.
Address (if different from facility/company): 400 Penn Center Blvd., Suite 200, Pittsburgh, PA 15235	**Telephone:** (412) 829 - 3610 **E-Mail:** Valerie.Plachy@tetratech.com
Facility/Company Contact Person: Chris Embry	**Title:** Sr. Enironmental Specialist
Address (if different from facility/company): 535 Fritztown Road Sinking Spring, PA 19608	**Telephone:** (610) 670 - 3237 **E-Mail:** CPEMBRY@sunocologistics.com

C. Project Description

Project Type: ☐ New construction ☒ Modification ☐ Remediation ☐ Other (see Instructions) http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf

Total number of sources in project: 3

Description of project (may include process description, site diagram, and any other pertinent information – see Instructions (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf) and attach supporting documents in Section F. as needed):
See attached report for a description of project and sources.

Request for Determination of Changes of Minor Significance and Exemption from Plan Approval/Operating Permit Under 25 Pa. Code § 127.14 or §127.449

D. Source Description

Complete a separate sheet for each source included in the project. For projects with more than one source, make additional copies of this page or download from DEP's Air Quality/Permits Web site (www.depweb.state.pa.us, keyword: Request for Determination.)

Source Name: Fugitives (FE-01)

Source Category Code and Description (2700-BK-DEP4103.pdf): 50.007; Petroleum Refining Equipment Leaks/Fugitive Emissions

Source location (if source is portable, submit a separate Request For Determination (RFD) application for each operating location):

Middletown Station

Type: Fugitives ☒ Stationary ☐ Portable (Enter number of days in operation at this location: _____)

Is equipment existing or proposed? ☐ **Existing** ☒ **Proposed**

Actual or Planned Date of Installation: 10/15/2016

Source Description (see Instructions (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf) for examples of applicable information, attach supporting documents in Section F, and provide separate justification for any document designated as Confidential Business Information):

Fugitive sources include but are not limited to: emissions from sealed surfaces associated with equipment such as valve stems, flanges, and other miscellaneous component types. Fugitive emissions are a result of leaks from the sealed surfaces which contain the pipeline NGLs and are in service 24 hours per day. See attached document for more details regarding the facility operations.

Is the source subject to any New Source Performance Standards (NSPS) or National Emission Standards for Hazardous Air Pollutants (NESHAP) or Maximum Achievable Control Technology (MACT) standard? If yes, specify federal citation including Subpart.

☐ Yes Subpart: _____ ☒ No

You must enter potential emissions below. If also reporting actual emissions, provide the actual emission amounts and calculations as attachment(s) in Section F. of this RFD.

Pollutant(s) (from Instructions)	Emissions (lbs/hr)*	Emissions (tons/year)*	Calculation Method Code Appendix B
PM	0.00	0.00	NA
PM-10	0.00	0.00	NA
PM-2.5	0.00	0.00	NA
SOx	0.00	0.00	NA
CO	0.00	0.00	NA
NOx	0.00	0.00	NA
VOC	0.11	0.46	9-EPA factors & 11-material balance
Total HAPs**	0.01	0.02	9-EPA factors & 11-material balance

Will the construction or modification of this source increase emissions from other sources at the facility?

☐ **Yes (Describe and quantify emissions on separate sheet)**

☒ **No**

Is the construction or modification of the source subject to 25 Pa. Code, Chapter 127, Subchapter E, New Source Review (NSR) requirements or Prevention of Significant Deterioration (PSD) of Air Quality regulations at Subchapter D?

☐ **Yes** ☒ **No**

* Must enter value or N/A

** For speciated HAPs (see Instructions (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf) for required speciated HAPs) or other pollutants, please attach additional sheets in Section F.

Request for Determination of Changes of Minor Significance and Exemption from Plan Approval/Operating Permit Under 25 Pa. Code § 127.14 or §127.449

D. Source Description

Complete a separate sheet for each source included in the project. For projects with more than one source, make additional copies of this page or download from DEP's Air Quality/Permits Web site (www.depweb.state.pa.us, keyword: Request for Determination.)

Source Name: Enclosed Flare (FL-9708)

Source Category Code and Description (2700-BK-DEP4103.pdf): 11.005; EXTERNAL COMBUSTION -- Natural Gas Combustion

Source location (if source is portable, submit a separate Request For Determination (RFD) application for each operating location):

Middletown Station

Type: Enclosed Flare ☒ Stationary ☐ Portable (Enter number of days in operation at this location: _____)

Is equipment existing or proposed? ☐ **Existing** ☒ **Proposed**

Actual or Planned Date of Installation: 10/15/2016

Source Description (see Instructions (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf) for examples of applicable information, attach supporting documents in Section F, and provide separate justification for any document designated as Confidential Business Information):

The existing enclosed flare is a John Zink Company LLC enclosed ZTOF model flare with a maximum heat input rating of 30 million British thermal units per hour (MMBtu/hr). The enclosed flare will be used to control VOC and HAP emissions associated with standard operating and maintenance operations scenarios associated with pipeline NGLs. The destruction and removal efficiency (DRE) of the flare is 98 percent (%) based upon the proposed manufacturer's (John Zink's) design. The flare will operate 24 hours per day. See attached document for more details regarding the facility operations.

Is the source subject to any New Source Performance Standards (NSPS) or National Emission Standards for Hazardous Air Pollutants (NESHAP) or Maximum Achievable Control Technology (MACT) standard? If yes, specify federal citation including Subpart.

☐ Yes Subpart: _____ ☒ No

You must enter potential emissions below. If also reporting actual emissions, provide the actual emission amounts and calculations as attachment(s) in Section F. of this RFD.

Pollutant(s) (from Instructions)	Emissions (lbs/hr)*	Emissions (tons/year)*	Calculation Method Code Appendix B
PM	0.00	0.00	15 – AP-42
PM-10	0.00	0.00	15 – AP-42
PM-2.5	0.00	0.00	15 – AP-42
SO_x	0.11	<0.01	11 - Material Balance
CO	12.00	0.15	15 – AP-42
NO_x	2.63	0.03	15 – AP-42
VOC	36.50	0.47	15 – AP-42, 12 - Efficiency of Control Device
Total HAPs**	2.14	0.03	12 - Efficiency of Control Device

Will the construction or modification of this source increase emissions from other sources at the facility?

☐ **Yes (Describe and quantify emissions on separate sheet)**

☒ **No**

Is the construction or modification of the source subject to 25 Pa. Code, Chapter 127, Subchapter E, New Source Review (NSR) requirements or Prevention of Significant Deterioration (PSD) of Air Quality regulations at Subchapter D?

☐ **Yes** ☒ **No**

* Must enter value or N/A

** For speciated HAPs (see Instructions (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf) for required speciated HAPs) or other pollutants, please attach additional sheets in Section F.

Request for Determination of Changes of Minor Significance and Exemption from Plan Approval/Operating Permit Under 25 Pa. Code § 127.14 or §127.449

D. Source Description

Complete a separate sheet for each source included in the project. For projects with more than one source, make additional copies of this page or download from DEP's Air Quality/Permits Web site (www.depweb.state.pa.us, keyword: Request for Determination.)

Source Name: Knockout Drum (TK-9170)

Source Category Code and Description (2700-BK-DEP4103.pdf): 42.009; ORGANIC LIQUID STORAGE & MARKETING -- Volatile Organic Liquid Storage

Source location (if source is portable, submit a separate Request For Determination (RFD) application for each operating location): Middletown Station

Type: ☒ Stationary ☐ Portable (Enter number of days in operation at this location: _____)

Is equipment existing or proposed? ☐ **Existing** ☒ **Proposed**

Actual or Planned Date of Installation: 10/15/2016

Source Description (see Instructions (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf) for examples of applicable information, attach supporting documents in Section F, and provide separate justification for any document designated as Confidential Business Information):

A single tank for the collection of entrained liquid material prior to the vapors flowing to the flare. During standard and maintenance operations, the knockout tank will not have associated working or breathing losses, because it does not maintain a liquid level. Only SOS and MOS associated vapor emissions and fugitive emissions will be associated with this tank. Fugitive Emissions are addressed in the separate fugitive RFD form. SOS and MOS emissions are addressed in the separate flare RFD form. See attached application report document for more detail on the operations.

Is the source subject to any New Source Performance Standards (NSPS) or National Emission Standards for Hazardous Air Pollutants (NESHAP) or Maximum Achievable Control Technology (MACT) standard? If yes, specify federal citation including Subpart.

☐ Yes Subpart: _____ ☒ No

You must enter potential emissions below. If also reporting actual emissions, provide the actual emission amounts and calculations as attachment(s) in Section F. of this RFD.

Pollutant(s) (from Instructions)	Emissions (lbs/hr)*	Emissions (tons/year)*	Calculation Method Code Appendix B
PM	NA	NA	NA
PM-10	NA	NA	NA
PM-2.5	NA	NA	NA
SO_x	NA	NA	NA
CO	NA	NA	NA
NO_x	NA	NA	NA
VOC	NA	NA	NA
Total HAPs**	NA	NA	NA

Will the construction or modification of this source increase emissions from other sources at the facility?

☐ **Yes (Describe and quantify emissions on separate sheet)**

☒ **No**

Is the construction or modification of the source subject to 25 Pa. Code, Chapter 127, Subchapter E, New Source Review (NSR) requirements or Prevention of Significant Deterioration (PSD) of Air Quality regulations at Subchapter D?

☐ **Yes** ☒ **No**

* Must enter value or N/A

** For speciated HAPs (see Instructions (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf) for required speciated HAPs) or other pollutants, please attach additional sheets in Section F.

Request for Determination of Changes of Minor Significance and Exemption from Plan Approval/Operating Permit Under 25 Pa Code §127.14 or §127.449

E. Exemption History

Identify all sources exempted within the last five years from plan approval/operating permit requirements for one of the following reasons: 1. Request for Determination (RFD), 2. Exemption List, or 3. De minimis emissions provisions of 25 Pa. Code §127.449 (see Instructions) (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf):

		Reason for Exemption (check one)		
Source Name	**Date of Installation**	**RFD**	**Exemption List**	**De Minimis**
Enclosed Flare	12/01/2014	☐	☐	☒
Pressurized Propane Storage Tank	12/01/2014	☐	☒	☒
Fugitives	12/01/2014	☐	☐	☒
		☐	☐	☐
		☐	☐	☐
		☐	☐	☐

F. List of Attached Documents (see Instructions) (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf)

List all supporting documents attached to this application. If any document contains Confidential Business Information (CBI), provide justification on separate attachment (see Instructions) (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf).

Confidential?	Description of Attachment
☐	**A document that provides the project description, facility layout, list of emission sources, emission estimation methodologies, estimates for potential emissions, and a regulatory review/applicability determination.**
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	

G. Signature of Responsible Person or Authorized Designee (see Instructions) (http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77119/2700-BK-DEP4103.pdf)

I, Matthew L. Gordon, certify under penalty of law as provided in 18 Pa. C.S.A. § 4904 and 35 P.S. § 4009(b)(2) that based on information and belief formed after reasonable inquiry, the statements and information contained in this form are true, accurate, and complete.

Signature: Matthew L. Gordon **Title: Principal Engineer** **Date:** 7/1/2016

Name (typed or printed): **Matthew L. Gordon** **Telephone: 610-670-3284**

Note: Please make a copy of this application and all attachments for your records and maintain all information related to this application for review by DEP.

OFFICIAL USE ONLY

RFD #:

Date Received: _____ **Reviewed By:** _____

☐ **A plan approval is not required for this source (See 25 Pa. Code Section 127.14(a)(1)-(9)**

☐ **An operating permit is not required for this source (See 25 Pa. Code Section 127.443(a))**

☐ **The source(s) do(es) not qualify for exemption. Applicant is required to submit a plan approval application.**

☐ **The source(s) do(es) not qualify for exemption. Applicant is required to submit an operating permit application.**

_____ _____

Signature **Name and Title**

Date _____

Remarks:

Conditions:

THIS PAGE INTENTIONALLY LEFT BLANK

Attachment B – Air Emission Calculations

THIS PAGE INTENTIONALLY LEFT BLANK

CLIENT: Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER: 112IC05958.20	
SUBJECT: Middletown Station (98% DRE) Request for Determination (RFD) -- Comparison Tables for Post-Control Existing Equipment and Proposed Facility Overall Summary Table			
BASED ON: Emission Calculation Workbooks		DRAWING NUMBER: Not Applicable	
BY: VJPlachy	CHECKED BY: AMO'Bradovich	APPROVED BY:	DATE: 8/29/2016

Objective: Summarize the controlled maximum hourly and annual emission rates.

1. **POST-CONTROL EMISSION ESTIMATES, PROPOSED FACILITY[1]**

Flared Emissions	Post-Controlled Maximum Hourly Emission Rate (lb/hr) - Proposed Facility									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Flared Emission Sources	2.63	12.00	36.50	N/C	0.11	2.14	5,520	0.39	0.04	5,540
Fugitive Sources	N/C	N/C	0.11	N/C	N/C	0.01	N/C	N/C	N/C	N/C
TOTAL Hourly Flared Emissions:	2.63	12.00	36.61	N/C	0.11	2.15	5,520	0.39	0.04	5,540

Flared Emissions	Post-Controlled Annual Average Emission Rate (tpy) - Proposed Facility									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Flared Emission Sources	0.03	0.15	0.47	N/C	0.001	0.03	70.55	0.01	0.001	70.85
Fugitive Sources	N/C	N/C	0.46	N/C	N/C	0.02	N/C	N/C	N/C	N/C
TOTAL Annual Flared Emissions:	0.03	0.15	0.93	N/C	<0.01	0.05	70.55	0.01	<0.01	70.85

2. **POST-CONTROL EMISSION ESTIMATES, EXISTING EQUIPMENT[1]**

Flared Emissions	Post-Control Maximum Hourly Emission Rate (lb/hr) - Existing Equipment									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2	CH_4	N_2O	CO_2e
Flared Emission Sources	0.88	4.02	12.22	N/C	0.04	0.00004	1,852	0.13	0.01	1,862
Fugitive Sources	N/C	N/C	0.05	N/C	N/C	N/C	N/C	N/C	N/C	N/C
TOTAL Hourly Flared Emissions:	0.88	4.02	12.27	N/C	0.04	<0.01	1,852	0.13	0.01	1,862

Flared Emissions	Post-Control Annual Average Emission Rate (tpy) - Existing Equipment									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2	CH_4	N_2O	CO_2e
Flared Emission Sources	0.06	0.26	0.68	N/C	0.002	0.0002	115.90	0.01	0.001	116.50
Fugitive Sources	N/C	N/C	0.21	N/C	N/C	N/C	N/C	N/C	N/C	N/C
TOTAL Annual Flared Emissions:	0.06	0.26	0.89	N/C	<0.01	<0.01	115.90	0.01	<0.01	116.50

3. **OVERALL POST-CONTROL EMISSION ESTIMATES[1]**

Flared Emissions	Post-Controlled Maximum Hourly Emission Rate (lb/hr)[2]									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Flared Emission Sources	2.63	12.00	36.50	N/C	0.11	2.14	5,520	0.39	0.04	5,540
Fugitive Sources	N/C	N/C	0.16	N/C	N/C	0.01	N/C	N/C	N/C	N/C
TOTAL Hourly Flared Emissions:	2.63	12.00	36.66	N/C	0.11	2.15	5,520	0.39	0.04	5,540

Flared Emissions	Post-Controlled Annual Average Emission Rate (tpy)[3]									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Flared Emission Sources	0.09	0.41	1.15	N/C	0.003	0.03	186.45	0.02	0.002	187.35
Fugitive Sources	N/C	N/C	0.67	N/C	N/C	0.02	N/C	N/C	N/C	N/C
TOTAL Annual Flared Emissions:	0.09	0.41	1.82	N/C	<0.01	0.05	186.45	0.02	<0.01	187.35

NOTE:

1. The emission estimate workbooks employ the "precision as displayed" option in Excel®; therefore, only the displayed significant figure are applied in the calculations. The minor impacts may occurred to emission estimates by utilizing this Excel® function/option.
2. The maximum hourly emission rate is based upon the flare capacity selecting the worst case for each pollutant.
3. The annual average emission rate is the sum of annual average emission rates for the existing equipment and the proposed facility modifications.

CLIENT: Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER: 112IC05958.20	
SUBJECT: Middletown Station (98% DRE) Request for Determination (RFD) -- Existing Equipment and Proposed Facility Overall Summary Table		Comparison Tables for Post-Control	
BASED ON: Emission Calculation Workbooks		DRAWING NUMBER: Not Applicable	
BY: VJPlachy	CHECKED BY: AMO'Bradovich	APPROVED BY:	DATE: 8/29/2016

Terminology/Acronyms

CH_4 = methane
CO = carbon monoxide
CO_2e = carbon dioxide equilvanet
HAP = hazardous air pollutant
N_2O = nitrogen dioxide
NOx = oxides of nitrogen
PM = particulate matter
$PM_{2.5}$ = particles with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10} = particles with an aerodynamic diameter less than or equal to 10 micrometers
SO_x = oxides of sulfur
VOC = volitale organic compound

CLIENT: Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER: 112IC05958.20	
SUBJECT: Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Overall Project Summary Table			
BASED ON: Emission Calculation Workbooks		DRAWING NUMBER: Not Applicable	
BY: VJPlachy	CHECKED BY: AMO'Bradovich		DATE: 8/12/2016

Objective: Summarize the controlled maximum hourly and annual emission rates.

1. **PRE-CONTROL EMISSION ESTIMATES**

Emissions Source	Pre-Control Maximum Hourly Emission Rate [pounds per hour (lb/hr)]									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2	CH_4	N_2O	CO_2e
Control Device (Flare):	N/C	N/C	1,830	N/C	N/C	107.00	N/C	N/C	N/C	N/C
Fugitives:	N/C	N/C	0.11	N/C	N/C	0.01	N/C	N/C	N/C	N/C
TOTAL MAXIMUM HOURLY:	N/C	N/C	1,830	N/C	N/C	107.01	N/C	N/C	N/C	N/C

Emissions Source	Pre-Control Annual Average Emission Rate [tons per year (tpy)]									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2	CH_4	N_2O	CO_2e
Control Device (Flare):	N/C	N/C	23.36	N/C	N/C	1.37	N/C	N/C	N/C	N/C
Fugitives:	N/C	N/C	0.46	N/C	N/C	0.02	N/C	N/C	N/C	N/C
TOTAL ANNUAL AVERAGE:	N/C	N/C	23.82	N/C	N/C	1.39	N/C	N/C	N/C	N/C

2. **POST-CONTROL EMISSION ESTIMATES**

Emission Source	Post-Controlled Maximum Hourly Emission Rate (lb/hr)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Control Device (Flare):	2.63	12.00	36.50	N/C	0.11	2.14	5,520	0.39	0.04	5,540
Fugitives:	N/C	N/C	0.11	N/C	N/C	0.01	N/C	N/C	N/C	N/C
TOTAL MAXIMUM HOURLY:	2.63	12.00	36.61	N/C	0.11	2.15	5,520	0.39	0.04	5,540

Emission Source	Post-Controlled Annual Average Emission Rate (tpy)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Control Device (Flare):	0.03	0.15	0.47	N/C	0.001	0.03	70.55	0.01	0.001	70.85
Fugitives:	N/C	N/C	0.46	N/C	N/C	0.02	N/C	N/C	N/C	N/C
TOTAL ANNUAL AVERAGE:	0.03	0.15	0.93	N/C	<0.01	0.05	70.55	0.01	<0.01	70.85

NOTE:

The emission estimate workbooks employ the "precision as displayed" option in Excel®; therefore, only the displayed significant figure are applied in the calculations. The minor impacts may occurred to emission estimates by utilizing this Excel® function/option.

Terminology/Acronyms

CH_4 = methane
CO = carbon monoxide
CO_2e = carbon dioxide equivalent
HAP = hazardous air pollutant
N/C = Not Calculated because it is not a pollutant associated with the source
N_2O = nitrogen dioxide
NOx = oxides of nitrogen
PM = particulate matter
$PM_{2.5}$ = particles with an aerodynamic diameter less than or equal to 2.5 micrometers
PM_{10} = particles with an aerodynamic diameter less than or equal to 10 micrometers
SO_x = oxides of sulfur
VOC = volatile organic compound

CLIENT: Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER: 112IC05958.20	
SUBJECT: Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Flare Summary Table			
BASED ON: Emission Calculation Workbooks		DRAWING NUMBER: Not Applicable	
BY: VJPlachy	CHECKED BY: AMO'Bradovich		DATE: 7/7/2016

Objective: Present the Maximum Short Term and Annual Emission Rates for the Updated emission estimates .

PRE-CONTROL EMISSION ESTIMATES

Emission Scenario	Pre-Controlled Maximum Hourly Emission Rate (lb/hr)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Standard Operating Scenario	N/C	N/C	6.00E-02	N/C	N/C	3.77E-03	N/C	N/C	N/C	N/C
Maintenance Operations Scenario	N/C	N/C	1.83E+03	N/C	N/C	1.07E+02	N/C	N/C	N/C	N/C
TOTAL MAXIMUM HOURLY:	N/C	N/C	1,830	N/C	N/C	107.00	N/C	N/C	N/C	N/C

Emission Scenario	Pre-Controlled Annual Emission Rate (tpy)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Standard Operating Scenario	N/C	N/C	2.63E-01	N/C	N/C	1.65E-02	N/C	N/C	N/C	N/C
Maintenance Operations Scenario	N/C	N/C	2.31E+01	N/C	N/C	1.35E+00	N/C	N/C	N/C	N/C
TOTAL ANNUAL AVERAGE:	N/C	N/C	23.36	N/C	N/C	1.37	N/C	N/C	N/C	N/C

POST-CONTROL EMISSION ESTIMATES

Emission Scenario	Post-Controlled Maximum Hourly Emission Rate (lb/hr)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Standard Operating Scenario	9.25E-05	4.22E-04	1.29E-03	N/C	3.86E-06	7.54E-05	1.94E-01	1.36E-05	1.36E-06	1.95E-01
Maintenance Operations Scenario	2.63E+00	1.20E+01	3.65E+01	N/C	1.10E-01	2.14E+00	5.52E+03	3.90E-01	4.00E-02	5.54E+03
TOTAL MAXIMUM HOURLY:	2.63	12.00	36.50	N/C	0.11	2.14	5,520	0.39	0.04	5,540

Emission Scenario	Post-Controlled Annual Emission Rate (tpy)									
	NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
Standard Operating Scenario	4.05E-04	1.85E-03	5.65E-03	N/C	1.69E-05	3.30E-04	8.50E-01	5.96E-05	5.96E-06	8.54E-01
Maintenance Operations Scenario	3.00E-02	1.50E-01	4.60E-01	N/C	1.00E-03	3.00E-02	6.97E+01	5.00E-03	5.00E-04	7.00E+01
TOTAL ANNUAL AVERAGE:	0.03	0.15	0.47	N/C	0.001	0.03	70.55	0.01	0.001	70.85

N/C = not calculated

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [146]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources		
BASED ON	SPLP Equipment Data / Specifications	DRAWING NUMBER	Not Applicable

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		6/6/2016

Objective: Develop example calculations: Maximum Hourly, Maximum Daily, and Annual Average Emission Rates for the proposed Standard Operating Scenario Emission Streams.

Inputs and Assumptions:

1. Potential stream products to the enclosed flare consistent of butane, propane, ethane, and/or LPG.
2. Sources of standard operating scenario emission sources to the enclosed flare that were evaluated included: chromatographs (GC), relief valves (RV), and booster, injection, and feed pump seals (Pump).
3. Maintenance intermittent emission sources to the enclosed flare that were evaluated include: gas releases from filter cleaning, prover maintenance, pigging events, and miscellaneous maintenance activities. Maintenance activity emission estimates will be presented in another calculation sheet.
4. Stream physical properties that result in the highest potential emission rates have been used.
5. Hourly flow to flare from Standard Operating Scenario Emission Streams:

RV ($FR_{RV\text{-}scf/hr}$):	0.00	scf/hr	→	0 scf/yr	No RVs to flare for this station
GC ($FR_{GC\text{-}scf/hr}$):	0.00	scf/hr	→	0 scf/yr	No GCs to flare for this station.
Booster Pumps ($FR_{BostPmp\text{-}scf/hr}$)	0.42	scf/hr	→	3,679 scf/yr	
Injection Pumps ($FR_{InjPmp\text{-}scf/hr}$)	0.00	scf/hr	→	0 scf/yr	No Injection Pump Seals to flare for this station.
Feed Pumps ($FR_{FeedPmp\text{-}scf/hr}$)	0.00	scf/hr	→	0 scf/yr	No Feed Pump Seals to flare for this station.
Pump ($FR_{total\text{-}scf/hr}$):	0.42	scf/hr	→	3,679 scf/yr	

6. Because the enclosed flare is considered to be 100% smokeless, particulate matter (PM) emissions are assumed to be negligible.
7. The flare's destruction and removal efficiency (DRE) for VOCs and HAPs only: 98 percent (%)
   The flare does not reduce/control NO_X, CO, SO_X, CO, CH_4, N_2O, or CO_2e emissions, that is, pre-control emissions equal post-control emissions.
8. Flare Emission Factors (EFs)

NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2		CH_4	N_2O
						butane	propane		
(lb/MMBtu)				(ppmw)		(kg/MMBtu)			
0.068	0.310	0.570	0	30	TBD	64.77	62.87	0.003	0.0006

AND ABBREVIATIONS / ACRONYMS "Standard Inputs" WORKSHEET TAB.

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [147]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources		
BASED ON	SPLP Equipment Data / Specifications	DRAWING NUMBER	Not Applicable

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		6/6/2016

Inputs and Assumptions (Continued):

9. Oxides of Sulfur (SO_X) emissions are:
   Based on the sulfur content of the stream.
   Assume SO_X as SO_2.
   Assumes that all the all fuel sulfur converts to SO_2.
10. CO_2e Global Warming Potential EFs (EF_{GWP})

CO_2	CH_4	N_2O
1	25	298

CO_2e emission estimates use the following carbon equivalence factors: 25 for CH_4, and 298 for N_2O from 40 CFR Part 98, Subpart A, Table A-1.

11. Maximum emission stream flow rates are achieved when assuming a stream composition of 100 weight percent (wt%) butane.
12. HAPs are generated from propane burned as pilot gas and are contained in the LPG stream.
13. LPG HAP content ($HAPs_{wt\%}$): 5.86 wt%
14. Operating service factor (OSF), that is, percent of the year the unit is operating: 100 %

Calculations:

STANDARD OPERATING SCENARIO EMISSION SOURCES

1. Calculate the SO_X Emission Factor (EF) in pounds per standard cubic feet (lb/scf) for butane.

$EF_{SOx(lb/scf)}$ = [(mole of the gas stream)] * [(concentration of sulfur in gas stream)] * [(molar ratio of SO_2 to S)]

= [(lb of gas stream) * (MW gas stream]
* [(concentration of sulfur in gas stream)] * [(molar ratio of SO_2 to S)]

= [(volume of gas stream as butane) * (MW butane)]
* [(concentration of sulfur ppmw) * ($CF_{ppmw\text{-}wt\%}$) / ($CF_{wt\%\text{-}DecEq}$)] * [(MW SO_2) / (MW S)]

= [($CF_{lb\_mol\text{-}scf}$) * (MW_{butane})] * [($SO_{2\text{-}ppmw}$) / ($CF_{ppmw\text{-}wt\%}$) / ($CF_{wt\%\text{-}DecEq}$)] * [(MW SO_2) / (MW S)]

=	1	~~lb-mol~~	58.12	~~lb butane~~	30	~~ppmw~~ S	1	%	1	~~DecEq~~	64.07 lb SO_2/~~lb-mol~~
	379.5 scf		1	~~lb-mole~~	gas stream ~~(butane)~~		10,000	~~ppmw~~	100	%	32.07 ~~lb S/lb-mol~~

= 9.18E-06 lb SO_2/cf of the gas stream = 9.18E-06 lb SO_X/cf of the gas stream

2. Calculate the total standard operating scenario flow to the flare in scf/hr ($Flow_{Std\text{-}scf/hr}$).

$Flow_{Std\text{-}scf/hr}$ = [$\sum$ Standard Operating Scenario Flow Rates to the Flare]

= (Flow from the GCs) + (Flow from RVs) + (Flow from Pumps)

= 0.00 + 0.00 + 0.42 scf/hr = 0.42 scf/hr standard operating scenario flow

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[148]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources			
BASED ON	SPLP Equipment Data / Specifications	DRAWING NUMBER	Not Applicable	
BY	VJPlachy	CHECKED BY	AMO'Bradovich	DATE 6/6/2016

Calculations (Continued):

STANDARD OPERATING SCENARIO EMISSION SOURCES

3. Calculate the flow rate (FR) from the standard operating scenario sources to the flare in MMBtu/hr.
   For the RVs as an example:

$Flow_{Std\text{-}MMBtu/hr} = (FR_{Std\text{-}scf/hr}) * (HHV_{Butane}) / (CF_{Btu\text{-}MMBtu})$

$$= \frac{0.42\ scf}{hr} \left| \frac{3{,}244\ Btu}{1\ scf} \right| \frac{1\ MMBtu}{1E{+}06\ Btu} = 1.36E\text{-}03\ MMBtu_{Std}/hr$$

4. Convert emission factor from kg/MMBtu to lb/MMBtu.
   Using butane CO_2 as and example:

$EF_{CO2(lb/MMBtu)} = [EF_{CO2(kg/MMBtu)}] / (CF_{kg\text{-}lb})$

$$= \frac{64.77\ kg}{MMBtu} \left| \frac{1\ lb}{0.4536\ kg} \right| = 142.79\ lb\ CO_2/MMBtu$$

EF										EF_{GWP}		
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CO_2 propane	CH_4	N_2O	CO_2	CH_4	N_2O
(lb/MMBtu)				(lb/scf)		(lb/MMBtu)				N/A		
0.068	0.310	0.57	N/A	9.18E-06	N/A	142.79	138.60	0.01	0.001	1	25	298

NOTE:
Because the EF for butane CO_2 is greater than the EF for propane CO_2, the butane CO_2 emission factor will be applied to estimate the maximum hourly, maximum daily, and annual average emission rates.

STANDARD OPERATING SCENARIO EMISSION SOURCES: Pre-control Emission Estimate

5. Calculate the VOC flow rate from the standard operating scenario sources before controls ($F\text{-}pre_{VOC}$) in lb/hr.
   a. For the GCs, the RVs, the Booster pumps, the Injection pumps, and the Feed Pumps.

$F\text{-}pre_{VOC\text{-}lb/hr} = (Flow_{Std\text{-}scf/hr}) / (CF_{scf\text{-}lb\text{-}mol}) * (MW_{butane})$

$$= \left\| 0.42 \frac{scf}{hr} \right| \frac{1\ lb\text{-}mol}{379.5\ scf} \left| \frac{58.12\ lb}{1\ lb\text{-}mole} \right\| = 0.06\ lb/hr$$

6. Calculate the EF for HAPs in pounds per scf (lb/scf).

$EF_{HAPs(lb/scf)} = (HAPs_{wt\%}) / (CF_{wt\%\text{-}DecEq}) * (MW_{butane}) / (CF_{scf\text{-}lb/mol})$

$$= \frac{5.86\ wt\%}{} \left| \frac{1\ DecEq}{100\ wt\%} \right| \frac{58.12\ lb}{lb\text{-}mol} \left| \frac{1\ lb\text{-}mol}{379.5\ scf} \right| = 0.009\ lb\ HAPs/scf$$

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [149]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources		
BASED ON	SPLP Equipment Data / Specifications	DRAWING NUMBER	Not Applicable

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		6/6/2016

STANDARD OPERATING SCENARIO EMISSION SOURCES: Pre-control Emission Estimate (Continued):

7. Calculate HAPs the flow rate from the standard operating scenario sources before controls ($ER\text{-}pre_{HAPS}$) in lb/hr.

$ER\text{-}pre_{HAPs\text{-}lb/hr} = (Flow_{Std\text{-}scf/hr}) * (ER_{HAPs\text{-}lb/scf})$

$= [(FR_{GC\text{-}scf/hr}) + (FR_{RV\text{-}scf/hr}) + (FR_{Pump\text{-}scf/hr})] * (ER_{HAPs\text{-}lb/scf})$

$= \| 0.42 \frac{scf}{hr} \| \frac{0.009 \text{ lb}}{1 \text{ scf}} \| =$ 3.77E-03 lb HAPs/hr

Pre-Control Maximum Hourly Emission Rate (ER) (lb/hr)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
N/C	N/C	6.00E-02	N/C	N/C	3.77E-03	N/C	N/C	N/C	N/C

Pre-Control Annual Average ER (tpy)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
N/C	N/C	2.63E-01	N/C	N/C	1.65E-02	N/C	N/C	N/C	N/C

POST CONTROLS

STANDARD OPERAING SCENARIO EMISSION SOURCES: Post-control Emission Estimate

8. Calculate the Maximum Hourly emission rate for SO_X $ER_{MaxHrlySOx}$.

$ER_{MaxHrlySOx} = (Flow_{Std\text{-}scf/hr}) * (EF_{NOx})$

$= \| 0.42 \frac{scf}{hr} \| 9.18E\text{-}06 \frac{lb}{scf} \| =$ 3.86E-06 lb SO_X /hr

9. Calculate the pre-control Annual Average emission rate for the remaining pollutants in tons per year (tpy).
Using NO_X as an example:

$ER\text{-}pre_{AnnAvgNOx} = (ER_{MaxHrlyNOx}) * (CF_{hours\text{-}year}) * (OSF) / (CF_{\%\text{-}DecEq}) / (CF_{lb\text{-}tons})$

$= \frac{9.25E\text{-}05 \text{ lb}}{1 \text{ hr}} \frac{8{,}760 \text{ hr}}{1 \text{ year}} \frac{100 \%}{1} \frac{1 \text{ DecEq}}{100 \%} \frac{1 \text{ ton}}{2{,}000 \text{ lb}} =$ 4.05E-04 tpy of NO_X

10. Calculate the maximum hourly emission rate $ER_{MaxHrly}$.
Using NO_X as an example:

$ER_{MaxHrlyNOx} = (EF_{NOx}) * (Flow_{Std\text{-}MMBtu/hr})$

$= \frac{0.068 \text{ lb}}{\text{MMBtu}} \frac{1.36E\text{-}03 \text{ MMBtu}}{\text{hr}} =$ 9.25E-05 lb NO_X /hr

11. Calculate the maximum hourly emission rate for CO_2e based on CO_2, CH_4, and N_2O emission rates.

$ER_{MaxHrlyCO2e} = \sum\{[(CO_{2\_lb/hr}) * (EF_{CO2\_GWP})] + [(CH_{4\_lb/hr}) * (EF_{CH4\_GWP})] + [(N_2O_{lb/hr}) * (EF_{N2O\_GWP})]\}$

$= \| 1.94E\text{-}01 \frac{lb}{hr} \| 1 \| + \| 1.36E\text{-}05 \frac{lb}{hr} \| 25 \| + \| 1.36E\text{-}06 \frac{lb}{hr} \| 298 \| =$ 1.95E-01 lb/hr

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [150]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Standard Operating Scenario Emission Sources		
BASED ON	SPLP Equipment Data / Specifications	DRAWING NUMBER	Not Applicable

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		6/6/2016

POST CONTROLS

STANDARD OPERAING SCENARIO EMISSION SOURCES: Post-control Emission Estimate (Continued)

12. Calculate the maximum hourly VOC flow rate (FR) from the standard operating scenario sources in lb/hr.

$Flow_{VOC\text{-}lb/hr} = (Flow_{Std\text{-}scf/hr}) / (CF_{scf\text{-}lb\text{-}mol}) * (MW_{butane}) * [1 - (DRE / CF_{\%\text{-}DecEq})]$

$= \left| 0.42 \frac{scf}{hr} \right| \left| \frac{1 \ lb\text{-}mol}{379.5 \ scf} \right| \left| \frac{58.12 \ lb}{lb\text{-}mole} \right| 1 - \left| 98 \ \% \right| \left| \frac{1 \ DecEq}{100 \ \%} \right| = 1.29E\text{-}03$ lb VOC/hr

13. Calculate the maximum hourly HAPs flow rate (FR) from the standard operating scenario sources in lb/hr.

$Flow_{HAPs\text{-}lb/hr} = (Flow_{Std\text{-}scf/hr}) * (EF_{HAPs(lb/hr)}) * [1 - (DRE / CF_{\%\text{-}DecEq})]$

$= \left| \frac{0.42 \ scf}{hr} \right| \left| \frac{0.009 \ lb}{1 \ scf} \right| 1 - \left| 98 \ \% \right| \left| \frac{1 \ DecEq}{100 \ \%} \right| = 7.54E\text{-}05$ lb HAPs/hr

14. Calculate CO_2 the flow rate (FR) from the standard operating scenario sources in lb/hr.

$Flow_{CO2\_lb/hr} = (Flow_{Std\_MMBtu/hr}) * (EF_{CO2\_lb/MMBtu})$

$= \left| \frac{1.36E\text{-}03 \ lb}{MMBtu} \right| \left| 142.79 \ MMBtu \right| = 1.94E\text{-}01$ lb CO_2/hr

Post Control Maximum Short Term Hourly Emission Rate (lb/hr)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
9.25E-05	4.22E-04	1.29E-03	N/C	3.86E-06	7.54E-05	1.94E-01	1.36E-05	1.36E-06	1.95E-01

15. Calculate the daily maximum emission rate $ER_{MaxDaily}$.

Using NO_X as an example:

$ER_{MaxDailyNOx} = (ER_{MaxStTmNOx}) * (CF_{hours\text{-}day})$

$= \left| \frac{9.25E\text{-}05 \ lb}{1 \ hr} \right| \left| \frac{24 \ hr}{1 \ day} \right| = 2.22E\text{-}03$ lb NO_X /day

Post Maximum Daily Emission Rate (lb/day)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
2.22E-03	1.01E-02	3.10E-02	N/C	9.26E-05	1.81E-03	4.66E+00	3.26E-04	3.26E-05	4.68E+00

16. Calculate the annual average emission rate for the remaining pollutants in tons per year (tpy).

Using NO_X as an example:

$ER_{AnnNOx} = (ER_{MaxShtTmNOx}) * (CF_{hours\text{-}year}) * (OSF) / (CF_{\%\text{-}DecEq}) * (CF_{lb\text{-}tons})$

$= \left| \frac{9.25E\text{-}05 \ lb}{1 \ hr} \right| \left| \frac{8{,}760 \ hr}{1 \ year} \right| 100 \ \% \left| \frac{1 \ DecEq}{100 \ \%} \right| \left| \frac{1 \ ton}{2{,}000 \ lb} \right| = 4.05E\text{-}04$ NO_X tpy

Annual Emission Rate (tpy)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
4.05E-04	1.85E-03	5.65E-03	N/C	1.69E-05	3.30E-04	8.50E-01	5.96E-05	5.96E-06	8.54E-01

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[151]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Standard Operating Scenario Sources: Total Flow from Booster Pump Seals			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated standard operating scenario		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/6/2016

Objective: Calculate the volume from the booster pumps that are sent to the enclosed flare.

Inputs and Assumptions:

1. The pump seal leaks will be captured and sent to the flare header as the volatile organic compound (VOC) and hazardous air pollutant (HAP) control device.
2. Worst case scenario is for the station to be at a sea level elevation. 0 ft
   Pressure at atmosphere: 1.00 atm
   Source for conversion: http://www.engineeringtoolbox.com/air-altitude-pressure-d_462.html
   Pressure at release point ($P_{act\text{-}release\text{-}atm}$) = Pressure at atmospheric = 1.00 atm
3. Operating service factor (OSF), that is, percent of the year the unit is operating: 100.00 %
4. Equipment Quantities:
   Booster Pumps (N_{BP}): 2
5. Equipment Volume:
6. Pump Seal Leak Rates:

Booster Pumps Inlet (LR_{BPin}):	5.5	grams per hour (g/hr) @ 60°I	269	psi	18.30	atm
Booster Pumps Outlet (LR_{BPout}):	26	g/hr @ 60°F	1,480	psi	100.68	atm

   Source: Pump seal leak rates provided by the Manufacturer (Sulzer):
7. The ideal gas law applies:
   $PV = nR_{specific}T$
8. System temperature: 40 degrees Fahrenheit (°F) = 500.67 degrees Rankine (°R)
9. Average release temperature: 60 °F = 520.67 °R
10. Propane physical properties result in the greatest release volumes, therefore, propane will be used to calculate the gas release volumes from the equipment.
11. Propane physical properties:.

Density at pipe pressure (ρ_{pipe}):	33.74	pounds per cubic feet (lb/ft^3) at 40°F and 1,480 psig
Density at atmospheric conditions ($\rho_{released}$):	0.12	pounds per standard cubic feet (lb/scf) at 60°F and 1 atm
Density at Booster Pump Inlet (ρ_{BPin}):	31.68	lb/ft^3 at 60°F at 269 psi
Density at Booster Pump Outlet (ρ_{BPout}):	32.92	lb/ft^3 at 60°F at 1,480 psi

   Source:
   a. The density of propane at atmospheric conditions taken from the National Institute of Standards and Technology website of isothermal properties for propane.
      http://webbook.nist.gov/cgi/fluid.cgi?ID=C74986&TUnit=F&PUnit=atm&DUnit=lbm%2Fft3&HUnit=Btu%2Flbm&WUnit=ft%2Fs&VisUnit=cP&STUnit=lb%2Fft&Type=IsoTherm&RefState=DEF&Action=Page
   b. The higher heating value (HHV) of Butane based on 40 CFR Part 98 Subpart C, Table C-1:
12. There are no hazardous air pollutants in butane, propane, or ethane.
13. Flare designed capacity (C_{flare}): 30 MMBtu/hr

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[152]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Standard Operating Scenario Sources: Total Flow from Booster Pump Seals			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated standard operating scenario		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/6/2016

Calculations:

1. Calculate the leakage rate per pump seal in acf/hr ($LR_{acf/hr}$) at seal pressure.

$$LR_{InjPin\text{-}acf/hr} = (LR_{InjPin\text{-}gm/hr}) / (CF_{g\text{-}lb}) / (\rho_{InjPin})$$

$$= \frac{5.5\ \text{g}}{\text{hr}} \left| \frac{1\ \text{lb}}{453.6\ \text{g}} \right| \frac{\text{acf}}{31.68\ \text{lb}} = 0.0004\ \text{acf/hr}$$

Pump Seal Description	Pump Seal Leak Rate	Density (lb/acf)	Leakage Rate (acf/hr)
Injection Inlet	5.5	31.68	0.0004
Injection Outlet	26	32.92	0.002

1. Calculate the leakage rate per pump seal in scf/hr at atmospheric pressure (LR_{atm}).

$$\frac{P_1V_1}{P_2V_2} = \frac{n_1RT_1}{n_1RT_2} \quad \text{Where } n_1 = n_2 \text{ and } T_1 = T_2 \quad ; \quad \frac{P_1V_1}{P_2V_2} = 1$$

$$P_1V_1 = P_2V_2 \quad \text{==»} \quad V_2 = P_1V_1 / P_2$$

$$LR_{atmBPin\text{-}scf/hr} = [(P_{BPin}) / (CF_{psi\text{-}atm}) * (LR_{BPin\text{-}acf/hr})] / (P_{atm})$$

$$= \left\| \frac{269\ \text{psi}}{} \right| \frac{1\ \text{atm}}{14.7\ \text{psi}} \left| \frac{0.0004\ \text{acf}}{\text{hr}} \right| \frac{1}{1.00\ \text{atm}} = 0.01\ \text{scf/hr}$$

Pump Seal	Pressure (psig)	Leakage Rate (acf/hr)	Leakage Rate (scf/hr)
Booster Inlet	269	0.0004	0.01
Booster Outlet	1,480	0.002	0.20

2. Calculate the total pump leakage rate in scf/hr ($LR_{total\text{-}scf/hr}$).

$$LR_{totalBP\text{-}scf/hr} = [\sum(LR_{atmBPin\text{-}scf/hr} + LR_{atmBPout\text{-}scf/hr})] * (N_{BP}) * (OSF) / (CF_{\%\text{-}DecEq})$$

$$= \left\| \frac{0.01\ \text{scf}}{\text{hr}} + \frac{0.20\ \text{scf}}{\text{hr}} \right\| \frac{2\ \text{pumps}}{} \left| 100.00\ \% \right| \frac{1\ \text{DecEq}}{100\ \%}$$

$$= 0.42\ \text{scf/hr}$$

3. Calculate the total pump leakage rate in scf/yr ($LR_{total\text{-}scf/yr}$)

$$LR_{totalBP\text{-}scf/yr} = (LR_{totalBP\text{-}scf/hr}) * (CF_{hr\text{-}yr}) * (OSF) / (CF_{\%\text{-}DecEq})$$

$$= \left| \frac{0.42\ \text{scf}}{\text{hr}} \right| \frac{8{,}760\ \text{hrs}}{1\ \text{yr}} \left| 100.00\ \% \right| \frac{1\ \text{DecEq}}{100\ \%} = 3{,}679\ \text{scf/yr}$$

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[153]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources			
BASED ON	SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios	DRAWING NUMBER	Not Applicable	
BY	VJPlachy	CHECKED BY	AMO'Bradovich	DATE 6/3/2016

Objective: Develop example calculations for: Maximum Hourly, Maximum Daily, and Annual Average Emission Rates for the proposed Maintenance Activities.

Inputs and Assumptions:

1. Potential stream products to the enclosed flare consistent of butane, propane, ethane and/or LPG.
2. Maintenance intermittent emission sources to the enclosed flare that were evaluated include: gas releases from filter cleaning, prover maintenance, pigging events, and miscellaneous maintenance activities.
3. The number of filter changes, prover maintenances, and pigging events has been developed to include miscellaneous maintenance activities.
4. Stream physical properties that result in the maximum potential emission rates have been used.
5. Example calculations for total annual volumes from filter changes, prover maintenances, and pigging events are presented in a separate example calculation sheet.
6. The flare's destruction and removal efficiency (DRE) for VOCs and HAPs only: 98.0 percent (%)
   The flare does not reduce/control NO_X, CO, SO_X, CO, CH_4, N_2O, or CO_2e emissions, that is, pre-control emissions equal post-control emissions.
7. Pilot gas is propane and was included in the existing equipment emission estimate. The flow of the pilot gas was not impacted by the flare design changes.
8. Total annual flow to flare from:

Filter (F) ($FR_{F\text{-}scf/yr}$):	190,800	standard cubic feet per year (scf/yr)
Prover (F) ($FR_{Prover\text{-}scf/yr}$):	3,008	scf/yr
Prover (F) ($FR_{Prover\text{-}scf/yr}$):	107,304	scf/yr
Total Maximum Annual Flow Rate (FR_{MaxAnn}):	301,112	scf/yr

Flare designed capacity (C_{flare}):	30	MMBtu/hr
Maximum Pilot Gas Hourly Flow rate ($FR_{MaxHrlyPilot}$):	0	British thermal units per hour (Btu/hr)

Flow rate conversions to the units below are presented in the Example Calculations for Enclosed Flare Emission Calculations: Total Maintenance.

Maintenance activity emission estimates are presented in another calculation sheet.

9. Because the enclosed flare is considered to be 100% smokeless, particulate matter (PM) emissions are assumed to be negligible.
10. Maximum emission stream flow rates are achieved when assuming a stream composition of 100 wt% butane
11. Flared Emission Factors (EFs)

NO_X	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_X	HAPs	CO_2 butane	CO_2 propane	CH_4	N_2O
(lb/MMBtu)				(ppmw)	(lb/MMBtu)	(kg/MMBtu)			
0.068	0.310	0.570	0	30	1.89	64.77	62.87	0.003	0.0006

NOTES FOR THIS TABLE ARE PRESENTED IN THE CONVERSION FACTORS, PHYSICAL PROPERTIES, AND ABBREVIATIONS / ACRONYMS WORKSHEET.

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[154]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/3/2016

Inputs and Assumptions (Continued):

12. HAPs are generated from propane burned as pilot gas and are contained in the LPG stream.
13. LPG HAP content ($HAPs_{wt\%}$): 5.86 wt%
14. Oxides of Sulfur (SO_X) emissions are:
    Based on the sulfur content of the stream.
    Assume SO_X as SO_2.
    Assumes that all the all fuel sulfur converts to SO_2.
15. CO_2e Global Warming Potential EFs (EF_{GWP})

CO_2	CH_4	N_2O
1	25	298

CO_2e emission estimates use the following carbon equivalence factors: 25 for CH_4, and 298 for N_2O from 40 CFR Part 98, Subpart A, Table A-1.

Calculations:

MAINTENANCE ACTIVITIES EMISSION SOURCES

1. Calculate the maximum hourly flow to the flare for maintenance activities (scf/hr)

$Flow_{scf/hr} = [(FR_{Flare\text{-}MMBtu/hr}) / (HHV_{Propane}) * (CF_{Btu\text{-}MMBtu})] - (Flow_{Std\text{-}scf/hr})$

$$= \left\| \frac{30 \ \text{MMBtu}}{\text{hr}} \middle| \frac{\text{scf}}{2{,}516 \ \text{Btu}} \middle| \frac{1E{+}06 \ \text{Btu}}{1 \ \text{MMBtu}} \right\| - \left| \frac{0.42 \ \text{scf}}{\text{hr}} \right| = 11{,}923 \ \text{scf/hr}$$

2. Calculate the SO_X emission factor in pounds per standard cubic feet (lb/scf).

$EF_{SOx(lb/scf)}$ = [(mole of the gas stream)] * [(concentration of sulfur in gas stream)] * [(molar ratio of SO_2 to S)]

= [(lb of gas stream) * (MW gas stream]
* [(concentration of sulfur in gas stream)] * [(molar ratio of SO_2 to S)]

= [(volume of gas stream as butane) * (MW_{butane})]
* [(concentration of sulfur ppmw) / ($CF_{ppmw\text{-}wt\%}$) / ($CF_{wt\%\text{-}DecEqui}$)] * [(MW SO_2) / (MW S)]

= [($CF_{lb\_mol\text{-}scf}$) * (MW_{butane})] * [($SO_{2\text{-}ppmw}$) / ($CF_{ppmw\text{-}wt\%}$) / ($CF_{wt\%\text{-}DecEqui}$)] * [(MW SO_2) / (MW S)]

$$= \left\| \frac{1 \ \text{lb-mol}}{379.5 \ \text{scf}} \middle| \frac{58.12 \ \text{lb butane}}{\text{lb-mol}} \middle| \frac{30 \ \text{ppmw S}}{\text{gas stream}} \middle| \frac{1 \ \text{wt\%}}{10000 \ \text{ppmw}} \middle| \frac{1 \ \text{DecEq}}{100 \ \text{wt\%}} \middle| \frac{64.07 \ \text{lb } SO_2\text{/lb-mol}}{32.07 \ \text{lb S/lb-mol}} \right\|$$

= 9.18E-06 lb SO_2/scf of the gas stream = 9.18E-06 lb SO_X/scf of the gas stream

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [155]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources		
BASED ON	SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios	DRAWING NUMBER	Not Applicable
BY	VJPlachy	CHECKED BY	AMO'Bradovich
DATE	6/3/2016		

Calculations:

MAINTENANCE ACTIVITIES EMISSION SOURCES

3. Convert emission factor from kg/MMBtu to lb/MMBtu.

Using butane CO_2 as an example:

$EF_{CO2(lb/MMBtu)} = [EF_{CO2(kg/MMBtu)}] / (CF_{kg-lb})$

$$= \left| \frac{64.77 \ \text{kg}}{\text{MMBtu}} \right| \left| \frac{1 \ \text{lb}}{0.4536 \ \text{kg}} \right| = 142.79 \ \text{lb } CO_2/\text{MMBtu}$$

EF										EF_{GWP}		
						CO_2						
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	butane	propane	CH_4	N_2O	CO_2	CH_4	N_2O
(lb/MMBtu)				(lb/scf)	(lb/MMBtu)					N/A		
0.068	0.310	N/C	N/C	9.18E-06	TBD	142.79	138.6	0.01	0.001	1	25	298

NOTE:

Because the EF for butane CO_2 is greater than the EF for propane CO_2, the butane CO_2 emission factor will be applied to estimate the maximum short term, maximum daily, and annual average emission rates.

MAINTENANCE ACTIVITIES EMISSION SOURCES ANNUAL EMISSION ESTIMATE

Pre-controls

4. Calculate the annual heat input HI_{Annual} in MMBtu/hr

$HI_{MMBtu/yr} = (FR_{MaxAnn}) * (HHV_{Butane}) / (CF_{Btu-MMBtu})$

$$= \left| \frac{301{,}112 \ \text{scf}}{\text{yr}} \right| \left| \frac{3{,}244 \ \text{Btu}}{\text{scf}} \right| \left| \frac{1 \ \text{MMBtu}}{1\text{E+06 Btu}} \right| = 976.81 \ \text{MMBtu/yr}$$

5. Calculate the VOC flow rate (FR) from the pre-control maintenance sources in lb/hr ($Fpre_{VOC-lb/hr}$).

$FRpre_{VOC-lb/hr} = (FR_{MaxHrly-scf/hr}) * (MW_{butane}) / (CF_{scf\_lb\text{-}mol}) * (VOC_{wt\%}) / (CF_{\%\text{-}DecEq})$

$$= \left| \frac{11{,}923 \ \text{scf}}{\text{hr}} \right| \left| \frac{58.12 \ \text{lb}}{\text{lb-mole}} \right| \left| \frac{1 \ \text{lb-mol}}{379.5 \ \text{scf}} \right| 100 \ \text{wt\%} \left| \frac{1 \ \text{DecEq}}{100 \ \%} \right|$$

$$= 1{,}826 \ \text{lb VOC /hr}$$

6. Calculate the EF for HAPs in pounds per scf (lb/scf).

$EF_{HAPs(lb/scf)} = (HAPs_{wt\%}) / (CF_{wt\%\text{-}DecEq}) * (MW_{butane}) / (CF_{scf\text{-}lb\_mol})$

$$= \left| \frac{5.86 \ \text{wt\%}}{} \right| \left| \frac{1 \ \text{DecEqu}}{100 \ \text{wt\%}} \right| \left| \frac{58.12 \ \text{lb}}{\text{lb-mol}} \right| \left| \frac{1 \ \text{lb-mol}}{379.5 \ \text{scf}} \right| = 0.009 \ \text{lb HAPs/scf}$$

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[156]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/3/2016

Calculations (Continued):

MAINTENANCE ACTIVITIES EMISSION SOURCES: Pre-control

7. Calculate HAPs the pre-control flow rate (FR) from the maintenance sources in lb/hr ($Fpre_{HAPs\text{-}lb/hr}$).

$FRpre_{HAPs\text{-}lb/hr} = (FR_{MaxHrly\text{-}scf/hr}) * (EF_{HAPs\text{-}lb/scf})$

$= \frac{11{,}923\ scf}{hr} \left| \frac{0.009\ lb}{1\ scf} \right| = 107.00\ lb\ HAPs/hr$

Pre-Control Maximum Hourly Emission Rate (lb/hr)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
N/C	N/C	1,826	N/C	N/C	107.00	N/C	N/C	N/C	N/C

8. Calculate the VOC pre-control annual emission rate from the maintenance sources in tpy.

$Fpre_{VOC(tpy)} = (FR_{MaxAnn}) * (MW_{butane}) / (CF_{lb\_mole\text{-}scf}) / (CF_{lb\text{-}ton})$

$= \frac{301{,}112\ scf}{yr} \left| \frac{58.12\ lb}{lb\text{-}mole} \right| \frac{1\ lb\text{-}mol}{379.5\ scf} \left| \frac{1\ ton}{2{,}000\ lb} \right| = 23.06\ tpy\ VOC$

9. Calculate the HAP pre-control annual emission rate from the maintenance sources in tpy.

$Fpre_{HAP(tpy)} = (Fpre_{VOC(tpy)}) * (HAPs_{wt\%}) / (CF_{\%\text{-}dec.eq.})$

$= \frac{23.06\ t}{yr} \left| 5.86\ wt\% \right| \frac{1\ DecEq}{100\ \%} = 1.35E{+}00\ tpy\ HAP$

Pre-Control Annual Average Emission Rate (tpy)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
N/C	N/C	23.06	N/C	N/C	1.35	N/C	N/C	N/C	N/C

10. Calculate the maximum hourly emission rate for SO_X $ER_{MaxStTmSOx}$.

$ER_{MaxStTmSOx} = (FR_{MaxHrly}) * (EF_{SOx})$

$= \frac{11{,}923\ scf}{hr} \left| \frac{9.18E\text{-}06\ lb}{scf} \right| = 1.09E\text{-}01\ lb\ SO_X/hr$

11. Calculate the maximum hourly emission rate for NO_x, CO, CO_2, CH_4, and N_2O $ER_{MaxStTm}$.
Using NO_X as an example:

$ER_{MaxStTmNOx} = (FR_{MaxHrly}) * (EF_{NOx}) * (HHV_{butane}) / (CF_{Btu\text{-}MMBtu})$

$= \frac{11{,}923\ scf}{hr} \left| \frac{6.80E\text{-}02\ lb}{MMBtu} \right| \frac{3{,}244\ Btu}{scf} \left| \frac{1\ MMBtu}{1E{+}06\ Btu} \right| = 2.63E{+}00\ lb\ NO_X/hr$

12. Calculate the maximum hourly emission rate for CO_2e based on CO_2, CH_4, and N_2O emission rates.

$ER_{MaxHrlyCO2e} = \sum\{[(CO_{2\text{-}lb/hr}) * (EF_{CO2\text{-}GWP})] + [(CH_{4\text{-}lb/hr}) * (EF_{CH4\text{-}GWP})] + [(N_2O_{\text{-}lb/hr}) * (EF_{N2O\text{-}GWP})]\}$

$= \left| \frac{5.52E{+}03\ lb}{hr} \right| 1 \left| + \right| \frac{3.90E\text{-}01\ lb}{hr} \left| 25 \right| + \left| \frac{4.00E\text{-}02\ lb}{hr} \right| 298 \Big| =$

$= \left| \frac{5.52E{+}03\ lb}{hr} \right| + \left| \frac{9.75E{+}00\ lb}{hr} \right| + \left| \frac{1.19E{+}01\ lb}{hr} \right| = 5.54E{+}03\ lb/hr$

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[157]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Enclosed Flare Emission Calculations: Maintenance Operations Scenario Emissions Sources			
BASED ON	SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios	DRAWING NUMBER	Not Applicable	
BY	VJPlachy	CHECKED BY	AMO'Bradovich	DATE 6/3/2016

Calculations (Continued):

MAINTENANCE ACTIVITIES EMISSION SOURCES: Post-control Emission Estimate (Continued)

13. Calculate the annual average emission rate for the CO_2e in tons per year (tpy).

$ER_{MaxStTmCO2e} = \sum\{[(CO_{2\text{-tpy}}) * (EF_{CO2\text{-GWP}})] + [(CH_{4\text{-tpy}}) * (EF_{CH4\text{-GWP}})] + [(N_2O_{\text{-tpy}}) * (EF_{N2O\text{-GWP}})]\}$

$= \left\| \frac{6.97E+01\ t}{yr} \right\| 1 \left\| + \left\| \frac{5.00E-03\ t}{yr} \right\| 25 \left\| + \left\| \frac{5.00E-04\ t}{yr} \right\| 298 \right\| = 7.00E+01$ tpy

14. Calculate the annual emission rate for the remaining pollutants in tons per year (tpy).
Using NO_X as an example:

$ER_{AnnualNOx} = (FR_{MMBtu/yr}) * (EF_{NOx}) / (CF_{lb\text{-}tons})$

$= \left| \frac{976.81\ \cancel{MMBtu}}{yr} \right| \frac{0.068\ \cancel{lb}}{\cancel{MMBtu}} \left| \frac{1\ t}{2{,}000\ \cancel{lb}} \right| = 3.32E-02$ tpy of NO_X

15. Calculate the SO_X emission rate from the maintenance sources in tpy.

$ER_{MaxStTmSOx} = (FR_{MaxAnn}) * (EF_{SOx}) / (CF_{lb\text{-}ton})$

$= \left| \frac{301{,}112\ \cancel{scf}}{yr} \right| \frac{9.18E-06\ \cancel{lb}}{\cancel{scf}} \left| \frac{1\ t}{2{,}000\ \cancel{lb}} \right| = 1.38E-03$ tpy SO_X

16. Calculate the post-control VOC and HAPs emission in lb/hr and tpy.
Using short term maximum VOCs as an example:

$Flow\text{-}post_{VOC\text{-}lb/hr} = (Flow_{VOCs\text{-}lb/hr}) * [1 - (DRE / CF_{\%\text{-}DecEq})]$

$= \left| \frac{1{,}826\ lb}{\cancel{hr}} \right\| 1 - \left| 98.0\ \cancel{\%} \right| \frac{1\ \cancel{DecEq}}{100\ \%} \right\| = 36.52$ lb VOCs/hr

Post Control Maximum Hourly Emission Rate (lb/hr)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
2.63	11.99	36.52	N/C	0.11	2.14	5,523	0.39	0.04	5,540

Post-Control Annual Average Emission Rate (tpy)									
NO_x	CO	VOC	$PM/PM_{10}/PM_{2.5}$	SO_x	HAPs	CO_2 butane	CH_4	N_2O	CO_2e
0.03	0.15	0.46	N/C	0.001	0.03	69.74	0.005	0.0005	70.00

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[158]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Maintenance Operations Scenario Sources: Total Flow from Prover			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/3/2016

Objective: Calculate the prover volume from maintenance activities that are sent to the enclosed flare.

Inputs and Assumptions:

1. Worst case scenario is for the station to be at a sea level elevation. 0 ft
   Pressure at atmosphere: 1.00 atm = 14.70 psi
   Source for conversion: http://www.engineeringtoolbox.com/air-altitude-pressure-d_462.html
2. Pipe pressure at release point ($P_{pipe\text{-}release\text{-}atm}$) = Pressure at atmospheric : 1.00 atm = 14.70 psi
3. Operating service factor (OSF), that is, percent of the year the unit is operating: 100.00 %
4. Propane physical properties result in the greatest release volumes, therefore, propane will be used to calculate the gas release volumes from the equipment.
5. Physical properties of propane were used to estimate volume because they yielded higher values.
6. Physical properties :
   Density at pipe pressure (ρ_{pipe}): 33.74 pounds per cubic feet (lb/ft^3) at 40°F and 1,480 psig
   Density at atmospheric conditions ($\rho_{released}$): 0.12 pounds per standard cubic feet (lb/scf) at 60°F and 1 atm
   NOTES:
   The density of propane at atmospheric conditions taken from the National Institute of Standards and Technology website of isothermal properties for propane.
   http://webbook.nist.gov/cgi/fluid.cgi?ID=C74986&TUnit=F&PUnit=atm&DUnit=lbm%2Fft3&HUnit=Btu%2Flbm&WUnit=ft%2Fs&VisUnit=cP&STUnit=lb%2Fft&Type=IsoTherm&RefState=DEF&Action=Page
7. Prover: Number of Provers ($N_{Provers}$): 1
   Max ann prover events (E_{Prover}): 2 events/yr
   Prover (V_{Prover}): 5.35 cubic feet (ft^3)
   Source: Equipment volume provided by the Manufacturer (FMD)

   NOTE:
   Prover maintenance volume release to flare calculations at atmospheric conditions are presented in Maintenance Activity Emission Sample Calculations .
8. Site maintenance will include evacuation of the provers.
9. The ideal gas law applies:
   $PV = nR_{specific}T$, where n is equivalent the number of moles multiplied by the molecular weight (MW) and divided by density (ρ).

Calculations:

1. Calculate the volume of gas released (V_{Prover}) in standard cubic feet (scf) at release temperature and pressure.

$$PV = nR_{specific}T$$

$$\frac{P_1V_1}{P_2V_2} = \frac{[n]RT_1}{[n]RT_2} = \frac{[(MW_{lb/lb\text{-}mole}) / \rho_1)] * (R_{specific}T_1)}{[(MW_{lb/lb\text{-}mole}) / \rho_2)] * (R_{specific}T_2)} = \frac{(\rho_2)}{(\rho_1)}$$

Solving for the release volume:

$$V_2 = \left\| \frac{\rho_1}{\rho_2} \right\| \left\| \frac{P_1}{P_2} \right\| V_1 \|$$

$$= \left\| \frac{33.74\ lb}{ft^3} \right\| \left\| \frac{ft^3}{0.12\ lb} \right\| \left\| \frac{1\ atm}{1\ atm} \right\| \frac{5.35\ ft^3}{event\text{-}prover} \| = 1{,}504 \text{ scf/event-prover}$$

2. Determine the total annual volume from the provers ($V_{prover\text{-}scf/yr}$).

$$V_{Prover\text{-}scf/yr} = (V_{Prover}) * (N_{Prover}) * (E_{Prover}) * (OSF) / (CF_{\%\text{-}DecEq})$$

$$= \left| \frac{1{,}504\ scf}{event\text{-}prover} \right| \left| \frac{1\ prover}{} \right| \left| \frac{2\ events}{1\ year} \right| 100.00\ \% \left| \frac{1\ DecEq}{100\ \%} \right| = 3{,}008 \text{ scf/yr}$$

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[159]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Maintenance Operations Scenario Sources: Total Flow from Filter			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/3/2016

Objective: Calculate the filter volume from maintenance activities that are sent to the enclosed flare.

Inputs and Assumptions:

1. Worst case scenario is for the station to be at a sea level elevation. 0 ft
   Pressure at atmosphere: 1.00 atm
   Source for conversion: http://www.engineeringtoolbox.com/air-altitude-pressure-d_462.html
2. Pipe pressure at release point ($P_{pipe\text{-}release}$) = Pressure at atmospheric = 1.00 atm
3. Operating service factor (OSF), that is, percent of the year the unit is operating: 100.00 %
4. Propane physical properties result in the greatest release volumes, therefore, propane will be used to calculate the gas release volumes from the equipment.
5. Propane physical properties:.
   Density at pipe pressure (ρ_{pipe}): 33.74 pounds per cubic feet (lb/ft^3) at 40°F and 1,480 psig
   Density at atmospheric conditions ($\rho_{released}$): 0.12 pounds per standard cubic feet (lb/scf) at 60°F and 1 atm
   NOTES:
   The density of propane at atmospheric conditions taken from the National Institute of Standards and Technology website of isothermal properties for propane.
   http://webbook.nist.gov/cgi/fluid.cgi?ID=C74986&TUnit=F&PUnit=atm&DUnit=lbm%2Fft3&HUnit=Btu%2Flbm&WUnit=ft%2Fs&VisUnit=cP&STUnit=lb%2Fft&Type=IsoTherm&RefState=DEF&Action=Page
6. Filter: Filters ($N_{Filters}$): 2
   Max annual filter changing events (E_{Filter}): 6 event-filter/yr
   Filter ($V_{Filters}$): 56.55 cubic feet (ft^3)
7. The ideal gas law applies:
   $PV = nR_{specific}T$, where n is equivalent the number of moles multiplied by the molecular weight (MW) and divided by density (ρ).

Calculations:

1. Calculate the volume of gas released (V_{Filter}) in standard cubic feet (scf) at release temperature and pressure.

$$PV = nR_{specific}T$$

$$\frac{P_1V_1}{P_2V_2} = \frac{[n]RT_1}{[n]RT_2} = \frac{[(MW_{lb/lb\text{-}mole}) / \rho_1)] * (R_{specific}T_1)}{[(MW_{lb/lb\text{-}mole}) / \rho_2)] * (R_{specific}T_2)} = \frac{(\rho_2)}{(\rho_1)}$$

Solving for the release volume:

$$V_2 = \left\| \frac{\rho_1}{\rho_2} \right\| \left\| \frac{P_1}{P_2} \right\| V_1 \|$$

$$= \left\| \frac{33.74\ lb}{ft^3} \right| \frac{ft^3}{0.12\ lb} \left\| \frac{1\ atm}{1\ atm} \right\| \frac{56.55\ ft^3}{filter\text{-}event} \| = 15{,}900\ scf/filter\text{-}event$$

2. Calculate the total annual volume released to the flare from filters cleanings in scf/yr ($V_{Filter\text{-}scf/yr}$).

$$V_{Filter\text{-}scf/yr} = (V_{Filter}) * (N_{Filter}) * (E_{Filter}) * (OSF) / (CF_{\%\text{-}DecEq})$$

$$= \left| \frac{15{,}900\ scf}{event\text{-}filter} \right| \frac{2\ filter}{} \left| \frac{6\ events}{yr} \right| 100.00\ \% \left| \frac{1\ DecEq}{100\ \%} \right| = 190{,}800\ scf/yr$$

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[160]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Maintenance Operations Scenario Sources: Total Flow from Pigging			
BASED ON	SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios	DRAWING NUMBER	Not Applicable	
BY	VJPlachy	CHECKED BY	AMO'Bradovich	DATE 6/3/2016

Objective: Calculate the pigging volume from maintenance activities that are sent to the enclosed flare.

Inputs and Assumptions:

1. Worst case scenario is for the station to be at a sea level elevation. 0 ft
   Pressure at atmosphere: 1.00 atm
   Source for conversion: http://www.engineeringtoolbox.com/air-altitude-pressure-d_462.html
2. Pipe pressure at release point ($P_{act\text{-}pipe\text{-}atm}$) = Pressure at atmospheric = 1.00 atm
   Density at pipe pressure (ρ_{pipe}): 33.74 pounds per cubic feet (lb/ft^3) at 40°F and 1,480 psig
   Density at atmospheric conditions ($\rho_{released}$): 0.12 pounds per standard cubic feet (lb/scf) at 60°F and 1 atm
3. Site maintenance will include evacuation of the pig launchers and receivers.
4. Equipment Quantities:
   - 20" Pig Launchers ($N_{20Launchers}$): 1
   - 20" Pig Receivers ($N_{20Receivers}$): 1
   - 12" Pig Launchers ($N_{12Launchers}$): 0
   - 12" Pig Receivers ($N_{12Receivers}$): 0
   - 10" Pig Receivers ($N_{10Receivers}$): 0
   - 8" Pig Launchers ($N_{8Launcher}$): 0
   - 8" Pig Receivers ($N_{8Receiver}$): 0
5. Equipment Volume:
   - Pig Launcher ($V_{20pig\text{-}Launcher}$): 65.70 cubic feet (ft^3)
   - Pig Receiver ($V_{20pig\text{-}Receiver}$): 61.51 ft^3
   - Pig Launcher ($V_{12pig\text{-}Launcher}$): 24.17 ft^3
   - Pig Receiver ($V_{12pig\text{-}Receiver}$): 22.56 ft^3
   - Pig Receiver ($V_{10pig\text{-}Receiver}$): 17.18 ft^3
   - Pig Launcher ($V_{8pig\text{-}Launcher}$): 13.11 ft^3
   - Pig Receiver ($V_{8pig\text{-}Receiver}$): 11.27 ft^3

   Source: Equipment volume provided by the Rooney Engineering (REI):
6. Pigging events:
   - Max ann smart pigging events ($E_{SmartPigging}$): 1 event/yr
   - Max ann clean pigging events ($E_{CleanPigging}$): 2 event/yr
7. The ideal gas law applies:
   $PV = nR_{specific}T$, where n is equivalent the number of moles multiplied by the molecular weight (MW) and divided by density (ρ).

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[161]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Maintenance Operations Scenario Sources: Total Flow from Pigging			
BASED ON SPLP provided equipment volume/specification for the maximum anticipated maintenance operation scenarios		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 6/3/2016

Calculations:

1. Calculate the volume of gas released (V_2) in standard cubic feet (scf) at release temperature and pressure.

Using 20" pig launcher as an example:

$$PV = nR_{specific}T$$

$$\frac{P_1V_1}{P_2V_2} = \frac{[n]RT_1}{[n]RT_2} = \frac{[(MW_{lb/lb\text{-}mole}) / \rho_1)] * (R_{specific}T_1)}{[(MW_{lb/lb\text{-}mole}) / \rho_2)] * (R_{specific}T_2)} = \frac{(\rho_2)}{(\rho_1)}$$

Solving for the release volume:

$$V_2 = \left\| \frac{\rho_1}{\rho_2} \right\| \left\| \frac{P_1}{P_2} \right\| V_1 \|$$

$$= \left\| \frac{33.74\ lb}{ft^3} \right| \frac{ft^3}{0.12\ lb} \| \frac{1.00\ atm}{1\ atm} \| \frac{65.70\ ft^3}{\text{pig launcher-event}} \| = 18{,}473 \text{ scf/pig launcher-event}$$

Equipment	Pig Volume (acf)	Volume at Atmosphere (scf)
20" Pig Launcher	65.70	18,473
20" Pig Receiver	61.51	17,295
12" Pig Launcher	24.17	6,796
12" Pig Receiver	22.56	6,343
10" Pig Receiver	17.18	4,830
8" Pig Launcher	13.11	3,686
8" Pig Receiver	11.27	3,169

2. Calculate the total annual volume from the launching events ($V_{PigLaunchers\text{-}scf/yr}$).

$V_{PigLauncher\text{-}scf/yr} = [(V_{PigLauncher}) * (N_{PigLaunchers})] * [(\sum_{Pigging\ Events})]$

Using the 20" pig launchers as an example:

$$= \left\| \frac{18{,}473\ scf}{pig\ launcher\text{-}event} \right| \frac{1\ pig\ launcher}{} \| \frac{1\ events_{smart\ pigging}}{yr} + \frac{2\ events_{clean\ pigging}}{yr} \|$$

$$= 55{,}419 \text{ scf/yr}$$

Equipment	Volume (scf)	Number	Volume (scf/yr)
20" Pig Launcher	18,473	1	55,419
20" Pig Receiver	17,295	1	51,885
12" Pig Launcher	6,796	0	0
12" Pig Receiver	6,343	0	0
10" Pig Receiver	4,830	0	0
8" Pig Launcher	3,686	0	0
8" Pig Receiver	3,169	0	0
Total Annual Pigging Event Volume			107,304

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[162]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Fugitive Emission Estimate			
BASED ON	SPLP Process and Instrumentation Drawings (P&IDs)	DRAWING NUMBER		
BY	VJPlachy	CHECKED BY	AMO'Bradovich	DATE 8/12/2016

Objective: Calculation the Maximum Hourly and Annual Average Emissions associated with fugitive components for the proposed fittings, valves, relief valves, and other miscellaneous component types.

Inputs and Assumptions:

1. Component counts

Equipment Counts:		Other Components:	
Fittings:	1,029	Coriolis Meter	6
Valves:	440	Prover	1
Relief Valves:	1	Composite Sampler	0
Pump Seals:	2	Instruments	60
		Static Mixer	0
		Check Valves	22
		TOTAL Other Components	89

2. The leak emission factors are taken from the USEPA Protocol for Equipment Leak Emission Estimates, EPA-453/R-95-017, November, 1995, Table 2-3 for light liquid service.
3. Emission Leak Factors:

Fittings:	8.00E-06	kilogram per hour per component (kg/hr-component)
Valves:	4.30E-05	kg/hr-component
Relief Valves:	1.30E-04	kg/hr-component
Pump Seals:	5.40E-04	kg/hr-component
Other Components:	1.30E-04	kg/hr-component

4. Assume the total organic compound emissions are equivalent to total VOCs.
5. The HAP content as a result of the LPG ($WT\%_{HAP}$): 5.86 wt %
6. The relief valves on any butane, propane, and ethane spheres/tanks that release to the atmosphere are fugitive emitters.
7. Butane, propane, and ethane do not contain any HAPs.
8. Number of atmospheric relief valves on non-HAP spheres/tanks (N_{RVBPS}): 0 Relief Valves
9. The contingency (Cont) for as-built modifications during the construction phase is: 20 %
10. Operating service factor (OSF): 100 %

Calculations:

1. Convert the component leak EFs from kg/hr-component to lb/hr-component ($EF_{lb/hr\text{-}component}$).

Using fittings as an example:

$$EF_{Fittings\_lb/hr\text{-}component} = (EF_{kg/hr\text{-}component}) * (CF_{kg\text{-}g}) / (CF_{g\text{-}lb})$$

$$= \left| \frac{8.00E\text{-}06 \ \cancel{kg}}{hr\text{-}component} \right| \left| \frac{1{,}000 \ g}{1 \ \cancel{kg}} \right| \left| \frac{1 \ lb}{453.6 \ g} \right| = 1.76E\text{-}05 \ lb/hr\text{-}component$$

Equipment Type	Leak EF (lb/hr-component)
Fittings	1.76E-05
Valves	9.48E-05
Relief Valves to atm	2.87E-04
Pump Seals	1.19E-03
Other Components	2.87E-04

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[163]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Fugitive Emission Estimate			
BASED ON	SPLP Process and Instrumentation Drawings (P&IDs)	DRAWING NUMBER		
BY	VJPlachy	CHECKED BY	AMO'Bradovich	DATE 8/12/2016

Calculations (Continued):

2. Calculate the VOC Max Hourly ER in lb/hr ($ER_{VOClb/hr}$).

Using fittings as an example:

$$ER_{Fittings\text{-}VOClb/hr} = (EF_{lb/hr\text{-}component})^* (EC_{Fittings})$$

$$= \left| \frac{1.76E\text{-}05 \quad lb}{hr\text{-}component} \right| \quad 1{,}029 \quad \text{components} \quad = \quad 1.81E\text{-}02 \quad lb\ VOCs/hr$$

Equipment Type	Leak EF (lb/hr-component)	Equipment Count	VOC Max Hourly (lb/hr)
Fittings	1.76E-05	1029	1.81E-02
Valves	9.48E-05	440	4.17E-02
Relief Valves to atm	2.87E-04	1	2.87E-04
Pump Seals	1.19E-03	2	2.38E-03
Other Components	2.87E-04	89	2.55E-02
		TOTAL:	**8.80E-02**

3. Calculate the ER for HAPs in lb/hr ($ER_{RV\text{-}HAPlb/hr}$) for the relief valves to atmosphere (not butane or propane sphere relief valves).

$$ER_{RV\text{-}HAPlb/hr} = \{ (EF_{RV\text{-}lb/hr\text{-}component}) * [(EC_{RV}) - (N_{RVBPS})] \} * [(wt\%_{HAP}) / (CF_{\%\text{-}DecEq})]$$

$$= \left[\left| \frac{2.87E\text{-}04 \quad lb}{hr\text{-}component} \right| \quad 1 \quad - \quad 0 \quad \left| comp \right| \right] * \left[5.86 \quad wt\% \quad \left| \frac{1 \quad DecEq}{100 \quad wt\%} \right| \right] = \quad 1.68E\text{-}05 \quad lb\ HAPs/hr$$

4. Calculate the ER for HAPs in lb/hr ($ER_{HAPlb/hr}$) for the fittings, valves, and other components.

Using fittings as an example:

$$ER_{Fittings\text{-}HAPlb/hr} = (ER_{Fittings\text{-}VOClb/hr}) * (WT\%_{HAP}) / (CF_{\%\text{-}DecEq})$$

$$= \left| \frac{1.81E\text{-}02 \quad lb}{hr} \right| \quad 5.86 \quad \% \quad \left| \frac{1 \quad DecEq}{100 \quad wt\%} \right| \quad = \quad 1.06E\text{-}03 \quad lb\ HAPs/hr$$

Equipment Type	HAP Max Hourly (lb/hr)
Fittings	1.06E-03
Valves	2.44E-03
Relief Valves to atm	1.68E-05
Pump Seals	1.39E-04
Other Components	1.49E-03
TOTAL:	**5.15E-03**

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20 [164]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Fugitive Emission Estimate		
BASED ON	SPLP Process and Instrumentation Drawings (P&IDs)	DRAWING NUMBER	

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		8/12/2016

Calculations (Continued):

5. Calculate the Annual ER for VOCs in tpy ($ER_{VOC-tpy}$).

Using fittings as an example:

$ER_{FittingsVOC-tpy} = (ER_{FittingsVOC-lb/hr}) * (CF_{hr-yr}) * (OSF) / (CF_{\%-DecEq}) / (CF_{lb-tons})$

$$= \frac{1.81E\text{-}02\ lb}{hr} \left| \frac{8{,}760\ hr}{yr} \right| 100\ \% \left| \frac{1\ DecEq}{100\ \%} \right| \frac{1\ t}{2{,}000\ lb} = 7.93E\text{-}02 \text{ tpy VOCs}$$

Equipment Type	VOC Max Hourly (lb/hr)	VOC Annual Average (tpy)
Fittings	1.81E-02	7.93E-02
Valves	4.17E-02	1.83E-01
Relief Valves to atm	2.87E-04	1.26E-03
Pump Seals	2.38E-03	1.04E-02
Other Components	2.55E-02	1.12E-01
TOTAL		**3.86E-01**

6. Calculate the ER for HAPs in tpy ($ER_{RV-HAPtpy}$) for the relief valve to atmosphere (this is in addition to the butane or propane sphere relief valves).

$ER_{RV-HAPtpy} = (ER_{RV-HAPlb/hr}) * (CF_{hr-yr}) * (OSF) / (CF_{\%-DecEq}) / (CF_{lb-ton})$

$$= \frac{1.68E\text{-}05\ lb}{hr} \left| \frac{8{,}760\ hr}{yr} \right| 100\ \% \left| \frac{1\ DecEq}{100\ \%} \right| \frac{1\ t}{2{,}000\ lb} = 7.36E\text{-}05 \text{ tpy HAPs}$$

7. Calculate the ER for HAPs in tpy (ER_{HAPtpy}) for fittings, valves, and other components.

Using fittings as an example:

$ER_{Fittings-HAPtpy} = (ER_{Fittings-VOCtpy}) * (WT\%_{HAP}) / (CF_{\%-DecEq})$

$$= \frac{7.93E\text{-}02\ ton}{year} \left| \frac{5.86\ wt\%}{} \right| \frac{1\ DecEq}{100\ \%} = 4.65E\text{-}03 \text{ tpy HAPs}$$

Equipment Type	HAP Annual (tpy)
Fittings	4.65E-03
Valves	1.07E-02
Relief Valves to atm	7.36E-05
Pump Seals	6.09E-04
Other Components	6.56E-03
TOTAL:	**2.26E-02**

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[165]
SUBJECT	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Fugitive Emission Estimate			
BASED ON	SPLP Process and Instrumentation Drawings (P&IDs)	DRAWING NUMBER		
BY	VJPlachy	CHECKED BY	AMO'Bradovich	DATE 8/12/2016

Calculations (Continued):

8. Incorporate the contingency into Maximum Hourly and Annual Average VOC fugitives ($TF_{VOCMax\text{-}Ann}$).

Using Maximum Hourly as an example:

$TF_{VOCMaxHrly\text{-}lb/hr} = (ER_{TOTAL\text{-}VOClb/hr}) * [(1) + (Cont\%) / (CF_{\%\text{-}Dec\ Eq})]$

$$= \left| \frac{8.80E\text{-}02\ lb}{hr} \right| 1 + \left\| \frac{20\ \%}{} \right| \frac{1\ \ DecEq}{100\ \%} \Bigg\| = 1.06E\text{-}01\ lb\ VOCs/hr$$

VOC Fugitive Emission Rate		
Type	**ER**	**TF_{VOC}**
Max Hourly (lb/hr)	0.09	0.11
Annual Average (tpy)	0.39	0.46

9. Incorporate the contingency into Maximum Hourly and Annual Average total HAP fugitives ($TF_{HAPMaxHrly}$).

Using Maximum Hourly as an example:

$TF_{HAPMaxHrly\text{-}lb/hr} = (ER_{TOTAL\text{-}HAPlb/hr}) * [(1) + (Cont\%) / (CF_{\%\text{-}Dec\ Eq})]$

$$= \left| \frac{5.15E\text{-}03\ lb}{hr} \right| 1 + \left\| \frac{20\ \%}{} \right| \frac{1\ \ DecEq}{100\ \%} \Bigg\| = 6.18E\text{-}03\ lb\ VOCs/hr$$

HAP Fugitive Emission Rate		
Type	**ER**	**TF_{HAP}**
Max Hourly (lb/hr)	0.01	0.01
Annual Average (tpy)	0.02	0.02

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[166]
SUBJECT:	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Product Analysis Specification			
BASED ON	SPLP Product Analyses	DRAWING NUMBER	Not Applicable	
BY	CHECKED BY		DATE	
VJPlachy	AMO'Bradovich		4/19/2016	

Objective: Calculate Product Specifications for Butane, Propane, and Liquid Petroleum Gas (LPG) volatile organic compounds (VOCs) and hazardous air pollutants (HAPs).

Inputs and Assumptions:

1. Composition of the Butane and Propane stream analyses are as provided by SPLP.
2. Only the LPG stream will contain hazardous air pollutants (HAPs).
3. VOCs for Butane and Propane Streams are hydrocarbon constituents that contain three or more carbon atoms in their molecular formula, that is, ethane is a not a regulated VOC.
4. Composition of the Butane Stream:
   - propane: 2 mole percent (mol%)
   - i-butane: 44 mol%
   - n-butane: 54 mol%
   - i-pentane: 1 mol%
5. Composition of the Propane Stream:
   - ethane: 2 mol%
   - propane: 95 mol%
   - i-butane: 3.5 mol%
6. Composition of the LPG Stream:
   - ethane: 0.08 mol%
   - propane: 63.8 mol%
   - i-butane: 7.39 mol%
   - n-butane: 17.8 mol%
   - i-pentane: 3.40 mol%
   - n-pentane: 4.09 mol%
   - n-hexane: 3.49 mol%
7. Molecular Formula (MF) and Molecular Weight (MW)

Constituent	MF	MW	
ethane:	C_2H_6	30.07	lb per lb-mole (lb/lb mol)
propane:	C_3H_8	44.10	lb/lb mol
i-butane:	iC_4H_{10}	58.12	lb/lb mol
n-butane:	nC_4H_{10}	58.12	lb/lb mol
i-pentane:	iC_5H_{12}	72.15	lb/lb mol
n-pentane:	nC_5H_{12}	72.15	lb/lb mol
n-hexane:	nC_6H_{14}	86.17	lb/lb mol

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[167]
SUBJECT:	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Product Analysis Specification			
BASED ON	SPLP Product Analyses	DRAWING NUMBER	Not Applicable	
BY	CHECKED BY		DATE	
VJPlachy	AMO'Bradovich		4/19/2016	

Calculations:

1. Determine the molar mass (MM) of each constituent in butane and propane stream.
   Using the propane in Butane Stream as an example:

$$MM_{propane/Butane} = [(Mol\%_{propane/Butane}) / (CF_{\%\text{-}DecEq})] * (MW_{propane})$$

$$= \left\| \frac{2\ \%}{100\ \%} \right| \left| \frac{1\ \cancel{DecEq}}{} \right| \left| \frac{44.10\ lb}{lb\text{-}mol} \right| = 0.88\ lb/lb\text{-}mol$$

Butane Stream			
Component	**Mol%**	**MW (lb/lb-mol)**	**MM (lb/lb-mol)**
propane	2	44.10	0.88
i-butane	44	58.12	25.57
n-butane	54	58.12	31.38
i-pentane	1	72.15	0.72
		TOTAL:	**58.55**

Propane Stream			
Component	**Mol%**	**MW (lb/lb-mol)**	**MM (lb/lb-mol)**
ethane	2	30.07	0.60
propane	95	44.10	41.90
i-butane	3.5	58.12	2.03
		TOTAL:	**44.53**

LPG Stream			
Component	**Mol%**	**MW (lb/lb-mol)**	**MM (lb/lb-mol)**
ethane	0.08	30.07	0.02
propane	63.80	44.1	28.14
i-butane	7.39	58.1	4.29
n-butane	17.80	58.1	10.34
i-pentane	3.40	72.2	2.45
n-pentane	4.09	72.2	2.95
n-hexane	3.49	86.1	3.00
		TOTAL:	**51.19**

2. Calculate the weight percent (Wt%) of each component in butane and propane streams.
   Using the propane in Butane Stream as an example:

$$Wt\%_{propane/Butane} = (MM_{propane/Butane}) / (MM_{total}) * (CF_{DecEq\text{-}\%})$$

$$= \left\| \frac{0.88\ lb}{lb\text{-}mol} \right| \left| \frac{lb\text{-}mol}{58.55\ lb} \right| \left| \frac{100\ wt\%}{1\ \cancel{DecEq}} \right| = 1.50\ wt\%$$

Butane Stream		
Component	**MM (lb/lb-mol)**	**Wt%**
propane	0.88	1.50
i-butane	25.57	43.67
n-butane	31.38	53.60
i-pentane	0.72	1.23
TOTAL:	**58.55**	**100.00**

Propane Stream		
Component	**MM (lb/lb-mol)**	**Wt%**
ethane	0.60	1.35
propane	41.90	94.09
i-butane	2.03	4.56
TOTAL:	**44.53**	**100.00**

LPG Stream		
Component	**MM (lb/lb-mol)**	**Wt%**
ethane	0.02	0.04
propane	28.14	54.97
i-butane	4.29	8.38
n-butane	10.34	20.20
i-pentane	2.45	4.79
n-pentane	2.95	5.76
n-hexane	3.00	5.86
TOTAL:	**51.19**	**100.00**

CLIENT	Sunoco Pipeline, L.P. (SPLP)	JOB NUMBER	112IC05958.20	[168]
SUBJECT:	Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Product Analysis Specification			
BASED ON	SPLP Product Analyses	DRAWING NUMBER	Not Applicable	

BY	CHECKED BY		DATE
VJPlachy	AMO'Bradovich		4/19/2016

Calculations (continued):

3. Calculate the VOC Wt% of in Butane and Propane Streams.
   a. Butane Stream

$$Wt\%_{ButaneVOC} = \sum Wt\% \text{ for components with carbon atoms of } C_3 \text{ or higher}$$
$$= (Wt\%_{propane}) + (Wt\%_{i\text{-}butane}) + (Wt\%_{n\text{-}butane}) + (Wt\%_{i\text{-}pentane})$$
$$= \| \ 1.50 + 43.67 + 53.60 + 1.23 \ \| wt\% = 100.00 \text{ wt\% VOC}$$

   b. Propane Stream

$$Wt\%_{PropaneVOC} = \sum Wt\% \text{ for components with carbon atoms of } C_3 \text{ or higher}$$
$$= (Wt\%_{propane}) + (Wt\%_{i\text{-}butane})$$
$$= \| \ 94.09 + 4.56 \ \| wt\% = 98.65 \text{ wt\% VOC}$$

   c. LPG Stream

$$Wt\%_{LPGVOC} = \sum Wt\% \text{ for components with carbon atoms of } C_3 \text{ or higher}$$
$$= (Wt\%_{propane}) + (Wt\%_{i\text{-}butane}) + (Wt\%_{n\text{-}butane}) + (Wt\%_{i\text{-}pentane}) + (Wt\%_{n\text{-}pentane}) + (Wt\%_{n\text{-}hexane})$$
$$= \| \ 54.97 + 8.38 + 20.20 + 4.79 + 5.76 + 5.86 \ \| wt\% = 99.96 \text{ wt\% VOC}$$
$$Wt\%_{LPGHAP} = \text{Wt\% of Hexane}$$
$$= 5.86 \text{ wt\% HAP}$$

Butane Stream		
Component	**MM (lb/lb-mol)**	**Wt%**
propane	0.88	1.50
i-butane	25.57	43.67
n-butane	31.38	53.60
i-pentane	0.72	1.23
TOTAL VOCs:		**100.00**

Propane Stream		
Component	**MM (lb/lb-mol)**	**Wt%**
ethane	0.60	N/A
propane	41.90	94.09
i-butane	2.03	4.56
TOTAL VOCs:		**98.65**

LPG Stream		
Component	**MM (lb/lb-mol)**	**Wt%**
ethane	0.02	0.04
propane	28.14	54.97
i-butane	4.29	8.38
n-butane	10.34	20.20
i-pentane	2.45	4.79
n-pentane	2.95	5.76
n-hexane	3.00	5.86
TOTAL VOCs:		**99.96**
TOTAL HAPs:		**5.86**

CLIENT: Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER: 112IC05958.20	[169]
SUBJECT: Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Combustion Source's Hazardous Air Pollutant (HAP) Emission Factor Estimate			
BASED ON: Emission Calculation Workbooks		DRAWING NUMBER: Not Applicable	
BY: VJPlachy	CHECKED BY: AMO'Bradovich	APPROVED BY:	DATE: 8/29/2016

Objective: Develop emission factors for Hazardous Air Pollutants (HAPs) based on AP-42 Section 1.4, Tables 1.4-3 and 1.4-4, and Section 3.3 Table 3.3-2.

Inputs and Assumptions: AP-42; Section 1.4; Tables 1.4-3 and 1.4-4
Source: http://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

AP-42, Section 1.4, Tables 1.4-3 and 1.4-4 Emission Factors for Speciated Organic Compounds from Natural Gas Combustion

Individual HAP	Emission Factor (EF) (lb/MMscf)
2-Methylnaphthalene	2.40E-05
3-Methylchloranthrene	1.80E-06
7,12-Dimethylbenz(a)anthracene	1.60E-05
Acenaphthene	1.80E-06
Acenaphthylene	1.80E-06
Anthracene	2.40E-06
Benz(a)anthracene	1.80E-06
Benzene	2.10E-03
Benzo(a)pyrene	1.20E-06
Benzo(b)fluoranthene	1.80E-06
Benzo(g,h,i)perylene	1.20E-06
Benzo(k)fluoranthene	1.80E-06
Chrysene	1.80E-06
Dibenzo(a,h)anthracene	1.20E-06
Dichlorobenzene	1.20E-03
Fluoranthene	3.00E-06
Fluorene	2.80E-06
Formaldehyde	7.50E-02
Hexane	1.80E+00
Indeno(1,2,3-cd)pyrene	1.80E-06
Naphthalene	6.10E-04
Phenanathrene	1.70E-05
Pyrene	5.00E-06
Toluene	3.40E-03
Arsenic	2.00E-04
Beryllium	1.20E-05
Cadmium	1.10E-03
Chromium	1.40E-03
Cobalt	8.40E-05
Manganese	3.80E-04
Mercury	2.60E-04
Nickel	2.10E-03
Selenium	2.40E-05
TOTAL ($HAP_{individual-total}$):	**1.89E+00**

Calculations: Total ($HAP_{individual-total}$) = Sum of the individual HAP constituents

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[170]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Conversion Factors, Physical Properties, and Abbreviations / Acronyms used in the emission estimate calculation workbooks.			
BASED ON SPLP Equipment Data / Specifications / Reference Material		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 8/29/2016

Objective: Consolidate the inputs of conversion factors, emission factors, acronyms, and abbreviations that are used throughout the emission estimations associated with potential emission sources for midstream operations.

Inputs and Assumptions:

1. Miscellaneous Conversion Factors (CF):

   1 lb-mol = 379.5 scf

   Basis: Ideal gas law conversion factor (CF_{ideal}):

   1 mole of any ideal gas at standard conditions occupies a volume of 379.5 cubic feet (cf).

   10,000 = ppm H_2S = 1 mole % H_2S = 627 grains H_2S per 100 scf

   Source: AP-42 Chapter 5.3 Table 5.3.1; footnote d.

   https://www3.epa.gov/ttn/chief/ap42/ch05/final/c05s03.pdf

2. CO_2e Global Warming Potential EFs (EF_{GWP})

CO_2	CH_4	N_2O
1	25	298

CO_2e emission rates use the following carbon equivalence factors: 25 for CH_4 and 298 for N_2O from 40 CFR Part 98, Subpart A, Table A-1.

http://www.ecfr.gov/cgi-bin/text-idx?SID=7cd55ec5ecd5f06bf94c50d3452a94c3&mc=true&node=pt40.21.98&rgn=div5%20-%20ap40.21.98_19.1#ap40.21.98_19.1

3. Flare Emission Factors (EFs)

NO_X[a]	CO[a]	VOC[a]	$PM/PM_{10}/PM_{2.5}$[e]	SO_X[b]	HAPs	CO_2 butane[c]	CO_2 propane[c]	CH_4[d]	N_2O[d]
(lb/MMBtu)				(ppmw)		(kg/MMBtu)			
0.068	0.31	0.57	0.12	30	TBD	64.77	62.87	0.003	0.0006

Footnotes:

a. NO_X, CO, and VOC emission factor (EF) source is AP-42; Chapter 13.5 for Industrial Flares, Table 13.5-1 and 13.5-2, dated: April 2015.
   https://www3.epa.gov/ttn/chief/ap42/ch13/final/C13S05_4-20-15.pdf

b. Provided by SPLP

c. Gas heat content (Btu/scf) for butane and propane (kg/MMBtu) is based on the higher heating values (HHV) presented in 40 CFR Part 98 Subpart C, Table C-1.

d. CH_4 and N_2O emission factors (kg/MMBtu) are based on the default emission factors presented in 40 CFR Part 98 Subpart C, Table C-2 for "Petroleum (All fuel types in Table C-1)."
   http://www.ecfr.gov/cgi-bin/text-idx?SID=7cd55ec5ecd5f06bf94c50d3452a94c3&mc=true&node=pt40.21.98&rgn=div5%20-%20ap40.21.98_19.1%20-%20ap40.21.98_138.1%20-%20ap40.21.98_138.1

e. PM emission factor for the temporary flare is based on Table 6-4 (for average smoking flares) of Research Triangle Institute's Emission Estimation Protocol for Petroleum Refineries prepared for USEPA in the site below. The emission factor is based on the LHV. PM emissions for the enclosed flare are assumed to be negligible because it is considered to be 100% smokeless.
   https://www3.epa.gov/ttnchie1/efpac/protocol/Emission_Estimation_Protocol_for_Petroleum_Refinerie_052011.pdf

NOTES:

AP-42 VOC EF is only applicable to emission estimates for VOCs from the pilot gas, that is, VOC emissions from the captured gas that are sent to the flare from GC, Pumps, and RV emissions are based on the flare's DRE.

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[171]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Conversion Factors, Physical Properties, and Abbreviations / Acronyms used in the emission estimate calculation workbook			
BASED ON SPLP Equipment Data / Specifications / Reference Material		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 8/29/2016

Inputs and Assumptions (Continued):

4. Sources of standard operating scenario emission to the flare can include: GC(s), Pump Seal(s), and/or Relief Valves that are connected to the flare header.

5. Sources of maintenances emission to the flare can include evaluation of the following equipment: filter(s), pig launcher(s), pig receiver(s), and/or prover(s).

6. Physical Properties:

Source: http://www.lenntech.com/calculators/molecular/molecular-weight-calculator.htm

i-butane	= $n\text{-}C_4H_{10}$	= 58.12	lb/lb mol (g/g mol)	
n-butane	= $i\text{-}C_4H_{10}$	= 58.12	lb/lb mol (g/g mol)	
carbon	= C	= 12.01	lb/lb mol (g/g mol)	
carbon monoxide	= CO	= 28.01	lb/lb mol (g/g mol)	Calculated
ethane	= C_2H_6	= 30.07	lb/lb mol (g/g mol)	
methane	= CH_4	= 16.04	lb/lb mol (g/g mol)	
n-hexane	= C_6H_{14}	= 86.17	lb/lb mol (g/g mol)	
hydrogen	= H	= 1.01	lb/lb mol (g/g mol)	
nitrogen	= N	= 14.01	lb/lb mol (g/g mol)	
nitrogen dioxide	= N_2O	= 44.02	lb/lb mol (g/g mol)	Calculated
oxygen	= O	= 16.00	lb/lb mol (g/g mol)	
i-pentane	= $i\text{-}C_5H_{12}$	= 72.15	lb/lb mol (g/g mol)	
n-pentane	= $n\text{-}C_5H_{12}$	= 72.15	lb/lb mol (g/g mol)	
propane	= C_3H_8	= 44.10	lb/lb mol (g/g mol)	
sulfur	= S	= 32.07	lb/lb mol (g/g mol)	
sulfur dioxide	= SO_2	= 64.07	lb/lb mol (g/g mol)	Calculated

7. Higher heating value (HHV) and Lower heating value:

a. propane

$HHV_{propane}$ = 2,516 Btu/scf

Source: http://www.altenergy.com/downloads/pdf_public/propdatapdf.pdf

$LHV_{propane}$ = 2,315 Btu/scf

Source: GPA 2145-09 http://www.elmiraohio.com/Gasifier%20Docs/GPA%20std%202145.pdf

= 19,567 Btu/lb

Source: The density of propane at atmospheric conditions taken from the National Institute of Standards and Technology website of isothermal properties for propane.

http://webbook.nist.gov/cgi/fluid.cgi?ID=C74986&TUnit=F&PUnit=atm&DUnit=lbm%2Fft3&HUnit=Btu%2Flbm&WUnit=ft%2Fs&VisUnit=cP&STUnit=lb%2Fft&Type=IsoTherm&RefState=DEF&Action=Page

b. butane

HHV_{butane} = 0.103 MMBtu/gal default HHV

40 CFR Part 98 Subpart C, Table C-1 value used with the Volume of butane vapor/gallon @ 60°F.

Source: http://www.ecfr.gov/cgi-bin/text-idx?SID=9da8a4fcd9db970a85466ea8928596cb&mc=true&node=sp40.21.98.c&rgn=div6#ap40.21.98_138.1

Vol_{butane} = 31.75 scf/gal at 60°F

Source: http://www.aeropres.com/files/physical%20properties.pdf

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[172]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Conversion Factors, Physical Properties, and Abbreviations / Acronyms used in the emission estimate calculation workbooks.			
BASED ON SPLP Equipment Data / Specifications / Reference Material		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 8/29/2016

Inputs and Assumptions (Continued):

7. b. Higher heating value (HHV) and Lower heating value (LHV) (continued):

HHV_{butane} = 3,244 Btu/scf | 0.103 MMBtu / gal | gal / 31.75 scf | 1E+06 Btu / 1 MMBtu

Source: http://www.altenergy.com/downloads/pdf_public/propdatapdf.pdf

LHV_{butane} = 3,011 Btu/scf

Source: GPA 2145-09 http://www.elmiraohio.com/Gasifier%20Docs/GPA%20std%202145.pdf

= 18,998 Btu/lb

Source: The density of butane at atmospheric conditions taken from the National Institute of Standards and Technology website of isothermal properties for butane.
http://webbook.nist.gov/cgi/fluid.cgi?ID=C106978&TUnit=F&PUnit=atm&DUnit=lbm%2Fft3&HUnit=Btu%2Flbm&WUnit=ft%2Fs&VisUnit=lbm%2Fft*s&STUnit=lb%2Fft&Type=IsoTherm&RefState=DEF&Action=Page

8. Conversion factors (CF):

				Source:
1 bhp	=	0.746	kW	http://www.convertunits.com/from/horsepower/to/kilowatt
1 °F	=	460.67	°R	http://www.convertunits.com/from/Fahrenheit/to/Rankine
1 atm	=	14.7	psi	http://www.convertunits.com/from/atm/to/psi
1 day	=	24	hours	http://www.convertunits.com/from/day/to/hour
1 %	=	1E+04	ppmw	http://www.rapidtables.com/convert/number/PPM_to_Percent.htm
1 DecEq	=	100	%	http://www.calculatorsoup.com/calculators/math/percent-to-decimal-calculator.php
1 g	=	0.002205	lb	http://www.convertunits.com/from/grams/to/pounds
1 grain	=	0.000143	lb	http://www.convert-me.com/en/convert/weight/grain.html
1 hp-hr	=	7,000	Btu	Source: AP-42, Table 3.3-1; footnote a.
1 hr	=	60	minutes	http://www.convertunits.com/from/hours/to/minutes
1 kg	=	1,000	g	http://www.convertunits.com/from/kilograms/to/grams
1 kg/m^3	=	0.008345	lb/gal	http://convert-to.com/conversion/density/convert-kg-per-m3-to-lb-per-gal.html
1 lb	=	453.6	g	http://www.convertunits.com/from/pounds/to/grams
1 lb	=	0.4536	kg	http://www.convertunits.com/from/pounds/to/kilograms
1 lb	=	8.34	gal@60°F	http://www.engineeringtoolbox.com/water-density-specific-weight-d_595.html
1 MMBtu	=	1E+06	Btu	http://www.convertunits.com/from/million+British+thermal+unit/to/British+thermal+unit
1 MMscf	=	1E+06	scf	http://www.convertunits.com/from/million+cubic+feet/to/cubic+feet
1 pascal	=	0.000010	atm	http://www.convertunits.com/from/pascal/to/atmosphere+[standard]
1 ppmw	=	0.0001	wt%	http://www.rapidtables.com/convert/number/PPM_to_Percent.htm
1 ft^3 / scf	=	28,317	cc	http://www.convertunits.com/from/cubic+feet/to/cubic+centimeters
1 ton	=	2,000	lb	http://www.convertunits.com/from/ton+[short,+US]/to/pounds
1 yr	=	8,760	hrs	Calculated: (24 hours/day) * (365 days/year)

9. Abbreviations / Acronyms

%	= percent
Ann	= annual
AOH	= annual operating hours
cc	= cubic centimeter
CF	= conversion factor
CH_4	= methane
CO	= carbon monoxide

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20	[173]
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Conversion Factors, Physical Properties, and Abbreviations / Acronyms used in the emission estimate calculation workbook			
BASED ON SPLP Equipment Data / Specifications / Reference Material		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 8/29/2016

Inputs and Assumptions (Continued):

9. Abbreviations / Acronyms (Continued)

CO_2e = carbon dioxide equivalent
dec = decimal
DecEq = Decimal Equivalent
EC = equipment count
EF = emission factor
eq = equivalent
ER = Emission Rate
FR = flow rate
ft = feet
ft^3 = cubic feet
g = gram
GC = gas chromatograph
HAP = hazardous air pollutant
HHV = higher heating value
hr = hour
kg = kilogram
kg/MMBtu = kilograms per million British thermal units
lb = pound
lb/MMBtu = pounds per million British thermal units
lb/MMscf = pounds per million standard cubic feet
lb/scf = pounds per standard cubic feet
lb-mol = pound mole
LPG = liquid petroleum gas
LHV = lower heating value
Max Daily = maximum daily
Max Hourly = maximum hourly
MM = molar mass
mol = mole
MW = molecular weight
n = moles
N/A = Pollutant is Not Applicable to this source
N/A E = This equipment is not applicable to this station
N/C = Not Calculated
N_2O = nitrogen dioxide
NOx = oxides of nitrogen
OSF = operating service factor
P = pressure
PM = particulate matter
PM_{10} = particles with an aerodynamic diameter less than or equal to 10 micrometers
$PM_{2.5}$ = particles with an aerodynamic diameter less than or equal to 2.5 micrometers
ppmw = parts per million by weight
propane = C_3H_8
psi = pounds per square inch
psia = pounds per square inch absolute

CLIENT Sunoco Pipeline, L.P. (SPLP)		JOB NUMBER 112IC05958.20 [174]	
SUBJECT Middletown Station (98% DRE) Request for Determination (RFD) -- Proposed Equipment Conversion Factors, Physical Properties, and Abbreviations / Acronyms used in the emission estimate calculation workbooks.			
BASED ON SPLP Equipment Data / Specifications / Reference Material		DRAWING NUMBER Not Applicable	
BY VJPlachy	CHECKED BY AMO'Bradovich		DATE 8/29/2016

Inputs and Assumptions (Continued):

9. Abbreviations / Acronyms (Continued)

psig = pounds per square inch gauge
$R_{specific}$ = Ideal gas law constant specific to units
RV = relief valve
S = sulfur
scf = standard cubic feet
SG_O = specific gravity of the oil
SO_2 = sulfur dioxide
SO_x = oxides of sulfur
T = temperature
t = ton
TBD = To Be Determined
TF = Total Fugitives
tpy = tons per year
USEPA = United States Environmental Protection Agency
V = volume
VS = valve seat
VOC = volatile organic compound
wt = weight
yr = year

Hartline, Darrell

From: SION, LAUREN N <LAUREN.SION@energytransfer.com>
Sent: Wednesday, August 09, 2017 10:42 AM
To: Hartline, Darrell
Subject: RE: Air Quality Permit Responsible Officials

Yes- Mark Martin should also be the Responsible Offical there if you do not already have that information.

Thanke,

Lauren Sion
Energy Transfer Partners
Office: (412) 784-3474
Cell: (313) 706-9455

From: Hartline, Darrell [mailto:dahartline@pa.gov]
Sent: Wednesday, August 09, 2017 10:41 AM
To: SION, LAUREN N <LAUREN.SION@energytransfer.com>
Subject: RE: Air Quality Permit Responsible Officials

Thanks Lauren. Will you be the Permit Contact Person for Cornwall?

Thanks,
Darrell Hartline

From: SION, LAUREN N [mailto:LAUREN.SION@energytransfer.com]
Sent: Wednesday, August 09, 2017 10:14 AM
To: Hartline, Darrell <dahartline@pa.gov>
Subject: RE: Air Quality Permit Responsible Officials

Darrell-

I will be the permit contact for all of these facilities:

Lauren Sion
Environmental Specialist
(412) 784-3474

The Responsible Official for Beckersville, Blainsport, and Middletown is Mark Martin:

Mark A. Martin
Operations Supervisor
(610) 670-3278

The Responsible Official for Doylesburg and Mt. Union is Jim Tidd:

James W. Tidd
Operations Supervisor
(724) 630-2462

Please let me know if you need any more information.

Thank you,

Lauren Sion
Energy Transfer Partners
Office: (412) 784-3474
Cell: (313) 706-9455

From: WERNER, JED A
Sent: Wednesday, August 09, 2017 9:46 AM
To: SION, LAUREN N <LAUREN.SION@energytransfer.com>
Cc: O'TOOLE, RONALD J <RONALD.OTOOLE@energytransfer.com>
Subject: Fwd: Air Quality Permit Responsible Officials

Lauren

Can you please provide this information to Darrell

Thanks

Jed

Sent from my iPhone

Begin forwarded message:

> **From:** "Hartline, Darrell" <dahartline@pa.gov>
> **Date:** August 9, 2017 at 9:40:49 AM EDT
> **To:** "WERNER, JED A" <JED.WERNER@energytransfer.com>
> **Subject: Air Quality Permit Responsible Officials**
>
> Jed,
>
> Are the Responsible Officials or Permit Contact Person for Doylesburg, Middletown, Mt. Union, Beckersville and Blainsport going to change? If so, please provide their name, job title and telephone number.
>
> Thanks,
> Darrell Hartline

From: WERNER, JED A [mailto:JED.WERNER@energytransfer.com]
Sent: Wednesday, September 20, 2017 2:57 PM
To: Hartline, Darrell <dahartline@pa.gov>
Subject: RE: Mariner East II Pump Stations Status Update

Yes

From: Hartline, Darrell [mailto:dahartline@pa.gov]
Sent: Wednesday, September 20, 2017 2:56 PM
To: WERNER, JED A <JED.WERNER@energytransfer.com>
Subject: RE: Mariner East II Pump Stations Status Update

Thanks Jed for your prompt response. Is the flare knockout tank installed at each of these sites?

From: WERNER, JED A [mailto:JED.WERNER@energytransfer.com]
Sent: Wednesday, September 20, 2017 2:39 PM
To: Hartline, Darrell <dahartline@pa.gov>
Cc: SION, LAUREN N <LAUREN.SION@energytransfer.com>; O'TOOLE, RONALD J <RONALD.OTOOLE@energytransfer.com>
Subject: RE: Mariner East II Pump Stations Status Update

Darrell,

Here is the information for the new sources installed for Mt Union, Middletown, and Beckersville Pump Stations. The equipment is installed, but will not be in service until the MEII system is put in service. The only source that is currently in service is the 30 MMBtu/hr Enclosed Flare at Middletown.

Mt. Union
Pig Launcher (20 in) – installed, to be used upon start-up of MEII
Pig Receiver (20 in) – installed, to be used upon start-up of MEII

Middletown
Mainline Booster Pumps (2-4,500 hp) - installed, to be used upon start-up of MEII
Pig Launcher (20 in) - installed, to be used upon start-up of MEII
Pig Receiver (20 in) - installed, to be used upon start-up of MEII
Filter - installed, to be used upon start-up of MEII
Prover - installed, to be used upon start-up of MEII
Enclosed Flare (30 MMBtu/hr) – installed, in use

Beckersville
Pig Launcher (20 in) – installed, to be used upon start-up of MEII
Pig Receiver (20 in) – installed, to be used upon start-up of MEII

Please let me know if you need any additional information.

Thanks

Jed

From: Hartline, Darrell [mailto:dahartline@pa.gov]
Sent: Wednesday, September 20, 2017 8:04 AM
To: WERNER, JED A <JED.WERNER@energytransfer.com>
Subject: Mariner East II Pump Stations Status Update

Hi Jed,

I know the ME II pipeline is still being installed. We would like an update on the status of the installation of the equipment and modifications outlined in the Request for Determinations for Mt. Union, Middletown and Beckersville.

Thanks,
Darrell Hartline

Private and confidential as detailed here. If you cannot access hyperlink, please e-mail sender.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
AIR QUALITY PROGRAM

STATE ONLY OPERATING PERMIT

Issue Date: Effective Date:

Expiration Date:

In accordance with the provisions of the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, as amended, and 25 Pa. Code Chapter 127, the Owner, [and Operator if noted] (hereinafter referred to as permittee) identified below is authorized by the Department of Environmental Protection (Department) to operate the air emission source(s) more fully described in this permit. This Facility is subject to all terms and conditions specified in this permit. Nothing in this permit relieves the permittee from its obligations to comply with all applicable Federal, State and Local laws and regulations.

The regulatory or statutory authority for each permit condition is set forth in brackets. All terms and conditions in this permit are federally enforceable unless otherwise designated.

State Only Permit No: 22-03094

Federal Tax Id - Plant Code: 23-3102656-18

Owner Information

Name: SUNOCO PIPELINE LP
Mailing Address: 525 FRITZTOWN RD
SINKING SPRING, PA 19608-1509

Plant Information

Plant: SUNOCO PIPELINE LP/MIDDLETOWN
Location: 22 Dauphin County 22920 Londonderry Township
SIC Code: 4619 Trans. & Utilities - Pipelines, Nec

Responsible Official

Name: MARK A. MARTIN
Title: OPERATIONS SUPERVISOR
Phone (610) 670 - 3278

Permit Contact Person

Name: LAUREN SION
Title: ENVIRONMENTAL SPECIALIST
Phone: (412) 784 - 3474

[Signature] _____
WILLIAM R. WEAVER, SOUTHCENTRAL REGION AIR PROGRAM MANAGER

SECTION A. Table of Contents

Section A. Facility/Source Identification

Section B. General State Only Requirements

Section C. Site Level State Only Requirements

Section D. Source Level State Only Requirements

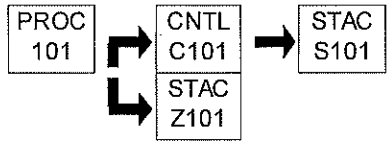
Note: These same sub-sections are repeated for each source!

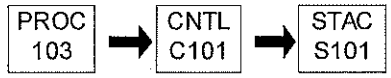
Section E. Source Group Restrictions

SECTION A. Site Inventory List

Source ID	Source Name	Capacity/Throughput	Fuel/Material
101	PUMP STATION SEAL LEAKS		
103	MAINTENANCE OPERATIONS		
C101	ENCLOSED FLARE		
S101	ENCLOSED FLARE STACK		
Z101	FUGITIVE EMISSIONS		

PERMIT MAPS





SECTION B. General State Only Requirements

#001 [25 Pa. Code § 121.1]

Definitions.

Words and terms that are not otherwise defined in this permit shall have the meanings set forth in Section 3 of the Air Pollution Control Act (35 P.S. § 4003) and in 25 Pa. Code § 121.1.

#002 [25 Pa. Code § 127.446]

Operating Permit Duration.

(a) This operating permit is issued for a fixed term of five (5) years and shall expire on the date specified on Page 1 of this permit.

(b) The terms and conditions of the expired permit shall automatically continue pending issuance of a new operating permit, provided the permittee has submitted a timely and complete application and paid applicable fees required under 25 Pa. Code Chapter 127, Subchapter I and the Department is unable, through no fault of the permittee, to issue or deny a new permit before the expiration of the previous permit.

#003 [25 Pa. Code §§ 127.412, 127.413, 127.414, 127.446 & 127.703(b)&(c)]

Permit Renewal.

(a) The permittee shall submit a timely and complete application for renewal of the operating permit to the appropriate Regional Air Program Manager. The application for renewal of the operating permit shall be submitted at least six (6) months and not more than 18 months before the expiration date of this permit.

(b) The application for permit renewal shall include the current permit number, a description of any permit revisions that occurred during the permit term, and any applicable requirements that were promulgated and not incorporated into the permit during the permit term. An application is complete if it contains sufficient information to begin processing the application, has the applicable sections completed and has been signed by a responsible official.

(c) The permittee shall submit with the renewal application a fee for the processing of the application and an additional annual administrative fee as specified in 25 Pa. Code § 127.703(b) and (c). The fees shall be made payable to "The Commonwealth of Pennsylvania - Clean Air Fund" and shall be for the amount specified in the following schedule specified in 25 Pa. Code § 127.703(b) and (c).

(1) Three hundred dollars for applications filed during the 2000-2004 calendar years.

(2) Three hundred seventy-five dollars for applications filed for the calendar years beginning in 2005.

(d) The renewal application shall also include submission of proof that the local municipality and county, in which the facility is located, have been notified in accordance with 25 Pa. Code § 127.413.

(e) The application for renewal of the operating permit shall also include submission of supplemental compliance review forms in accordance with the requirements of 25 Pa. Code § 127.412(b) and § 127.412(j).

(f) The permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the permit application, shall promptly submit such supplementary facts or corrected information as necessary to address any requirements that become applicable to the source after the permittee submits a complete application, but prior to the date the Department takes action on the permit application.

#004 [25 Pa. Code § 127.703]

Operating Permit Fees under Subchapter I.

(a) The permittee shall pay fees according to the following schedule specified in 25 Pa. Code § 127.703(b):

(1) Three hundred dollars for applications filed during the 2000-2004 calendar years.

(2) Three hundred seventy-five dollars for applications filed for the calendar years beginning in 2005.

This fee schedule shall apply to the processing of an application for an operating permit as well as the extension,

modification, revision, renewal, and re-issuance of each operating permit or part thereof.

(b) The permittee shall pay an annual operating permit administrative fee according to the fee schedule established in 25 Pa. Code § 127.703(c).

(1) Two hundred fifty dollars for applications filed during the 1995-1999 calendar years.

(2) Three hundred dollars for applications filed during the 2000-2004 calendar years.

(3) Three hundred seventy-five dollars for applications filed during the years beginning in 2005.

(c) The applicable fees shall be made payable to "The Commonwealth of Pennsylvania - Clean Air Fund".

#005 [25 Pa. Code §§ 127.450 (a)(4) and 127.464]

Transfer of Operating Permits.

(a) This operating permit may not be transferred to another person, except in cases of transfer-of-ownership that are documented and approved by the Department.

(b) In accordance with 25 Pa. Code § 127.450(a)(4), a change in ownership of the source shall be treated as an administrative amendment if the Department determines that no other change in the permit is required and a written agreement has been submitted to the Department identifying the specific date of the transfer of permit responsibility, coverage and liability between the current and the new permittee and a compliance review form has been submitted to, and the permit transfer has been approved by, the Department.

(c) This operating permit is valid only for those specific sources and the specific source locations described in this permit.

#006 [25 Pa. Code § 127.441 and 35 P.S. § 4008]

Inspection and Entry.

(a) Upon presentation of credentials and other documents as may be required by law, the permittee shall allow the Department or authorized representatives of the Department to perform the following:

(1) Enter at reasonable times upon the permittee's premises where a source is located or emissions related activity is conducted, or where records are kept under the conditions of this permit;

(2) Have access to and copy, at reasonable times, any records that are kept under the conditions of this permit;

(3) Inspect at reasonable times, any facilities, equipment including monitoring and air pollution control equipment, practices, or operations regulated or required under this permit;

(4) Sample or monitor, at reasonable times, any substances or parameters, for the purpose of assuring compliance with the permit or applicable requirements as authorized by the Clean Air Act, the Air Pollution Control Act, or the regulations promulgated under the Acts.

(b) Pursuant to 35 P.S. § 4008, no person shall hinder, obstruct, prevent or interfere with the Department or its personnel in the performance of any duty authorized under the Air Pollution Control Act or regulations adopted thereunder including denying the Department access to a source at this facility. Refusal of entry or access may constitute grounds for permit revocation and assessment of criminal and/or civil penalties.

(c) Nothing in this permit condition shall limit the ability of the EPA to inspect or enter the premises of the permittee in accordance with Section 114 or other applicable provisions of the Clean Air Act.

#007 [25 Pa. Code §§ 127.441 & 127.444]

Compliance Requirements.

(a) The permittee shall comply with the conditions of this operating permit. Noncompliance with this permit constitutes

a violation of the Clean Air Act and the Air Pollution Control Act and is grounds for one or more of the following:

(1) Enforcement action

(2) Permit termination, revocation and reissuance or modification

(3) Denial of a permit renewal application

(b) A person may not cause or permit the operation of a source which is subject to 25 Pa. Code Article III unless the source(s) and air cleaning devices identified in the application for the plan approval and operating permit and the plan approval issued for the source is operated and maintained in accordance with specifications in the applications and the conditions in the plan approval and operating permit issued by the Department. A person may not cause or permit the operation of an air contamination source subject to 25 Pa. Code Chapter 127 in a manner inconsistent with good operating practices.

(c) For purposes of Sub-condition (b) of this permit condition, the specifications in applications for plan approvals and operating permits are the physical configurations and engineering design details which the Department determines are essential for the permittee's compliance with the applicable requirements in this State-Only permit. Nothing in this sub-condition shall be construed to create an independent affirmative duty upon the permittee to obtain a predetermination from the Department for physical configuration or engineering design detail changes made by the permittee.

#008 [25 Pa. Code § 127.441]

Need to Halt or Reduce Activity Not a Defense.

It shall not be a defense for the permittee in an enforcement action that it was necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

#009 [25 Pa. Code §§ 127.442(a) & 127.461]

Duty to Provide Information.

(a) The permittee shall submit reports to the Department containing information the Department may prescribe relative to the operation and maintenance of each source at the facility.

(b) The permittee shall furnish to the Department, in writing, information that the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. Upon request, the permittee shall also furnish to the Department copies of records that the permittee is required to maintain in accordance with this permit.

#010 [25 Pa. Code § 127.461]

Revising an Operating Permit for Cause.

This operating permit may be terminated, modified, suspended or revoked and reissued if one or more of the following applies:

(1) The permittee constructs or operates the source subject to the operating permit so that it is in violation of the Air Pollution Control Act, the Clean Air Act, the regulations thereunder, a plan approval, a permit or in a manner that causes air pollution.

(2) The permittee fails to properly or adequately maintain or repair an air pollution control device or equipment attached to or otherwise made a part of the source.

(3) The permittee has failed to submit a report required by the operating permit or an applicable regulation.

(4) The EPA determines that the permit is not in compliance with the Clean Air Act or the regulations thereunder.

#011 [25 Pa. Code §§ 127.450 & 127.462]

Operating Permit Modifications

(a) The permittee is authorized to make administrative amendments, minor operating permit modifications and

significant operating permit modifications, under this permit, as outlined below:

(b) Administrative Amendments. The permittee shall make administrative operating permit amendments (as defined in 25 Pa. Code § 127.450(a)), according to procedures specified in § 127.450 unless precluded by the Clean Air Act or its regulations.

(c) Minor Operating Permit Modifications. The permittee shall make minor operating permit modifications (as defined 25 Pa. Code § 121.1) in accordance with 25 Pa. Code § 127.462.

(d) Permit modifications which do not qualify as minor permit modifications under 25 Pa. Code § 127.541 will be treated as a significant operating permit revision subject to the public notification procedures in §§ 127.424 and 127.425.

#012 [25 Pa. Code § 127.441]

Severability Clause.

The provisions of this permit are severable, and if any provision of this permit is determined by a court of competent jurisdiction to be invalid or unenforceable, such a determination will not affect the remaining provisions of this permit.

#013 [25 Pa. Code § 127.449]

De Minimis Emission Increases.

(a) This permit authorizes de minimis emission increases in accordance with 25 Pa. Code § 127.449 so long as the permittee provides the Department with seven (7) days prior written notice before commencing any de minimis emissions increase. The written notice shall:

(1) Identify and describe the pollutants that will be emitted as a result of the de minimis emissions increase.

(2) Provide emission rates expressed in tons per year and in terms necessary to establish compliance consistent with any applicable requirement.

(b) The Department may disapprove or condition de minimis emission increases at any time.

(c) Except as provided below in (d), the permittee is authorized to make de minimis emission increases (expressed in tons per year) up to the following amounts without the need for a plan approval or prior issuance of a permit modification:

(1) Four tons of carbon monoxide from a single source during the term of the permit and 20 tons of carbon monoxide at the facility during the term of the permit.

(2) One ton of NOx from a single source during the term of the permit and 5 tons of NOx at the facility during the term of the permit.

(3) One and six-tenths tons of the oxides of sulfur from a single source during the term of the permit and 8.0 tons of oxides of sulfur at the facility during the term of the permit.

(4) Six-tenths of a ton of PM10 from a single source during the term of the permit and 3.0 tons of PM10 at the facility during the term of the permit. This shall include emissions of a pollutant regulated under Section 112 of the Clean Air Act unless precluded by the Clean Air Act, the regulations thereunder or 25 Pa. Code Article III.

(5) One ton of VOCs from a single source during the term of the permit and 5.0 tons of VOCs at the facility during the term of the permit. This shall include emissions of a pollutant regulated under Section 112 of the Clean Air Act unless precluded by the Clean Air Act, the regulations thereunder or 25 Pa. Code Article III.

(6) Other sources and classes of sources determined to be of minor significance by the Department.

(d) In accordance with § 127.14, the permittee is authorized to install the following minor sources without the need for a plan approval or permit modification:

(1) Air conditioning or ventilation systems not designed to remove pollutants generated or released from other sources.

(2) Combustion units rated at 2,500,000 or less Btu per hour of heat input.

(3) Combustion units with a rated capacity of less than 10,000,000 Btu per hour heat input fueled by natural gas supplied by a public utility or by commercial fuel oils which are No. 2 or lighter, viscosity less than or equal to 5.82 c St, and which meet the sulfur content requirements of 25 Pa. Code §123.22 (relating to combustion units). For purposes of this permit, commercial fuel oil shall be virgin oil which has no reprocessed, recycled or waste material added.

(4) Space heaters which heat by direct heat transfer.

(5) Laboratory equipment used exclusively for chemical or physical analysis.

(6) Other sources and classes of sources determined to be of minor significance by the Department.

(e) This permit does not authorize de minimis emission increases if the emissions increase would cause one or more of the following:

(1) Increase the emissions of a pollutant regulated under Section 112 of the Clean Air Act except as authorized in Subparagraphs (c)(4) and (5) of this permit condition.

(2) Subject the facility to the prevention of significant deterioration requirements in 25 Pa. Code Chapter 127, Subchapter D and/or the new source review requirements in Subchapter E.

(3) Violate any applicable requirement of this permit, the Air Pollution Control Act, the Clean Air Act, or the regulations promulgated under either of the acts.

(f) Emissions authorized under this permit condition shall be included in the monitoring, recordkeeping and reporting requirements of this permit.

(g) Except for de minimis emission increases, installation of minor sources made pursuant to this permit condition and Plan Approval Exemptions under 25 Pa. Code § 127.14 (relating to exemptions), the permittee is prohibited from making changes or engaging in activities that are not specifically authorized under this permit without first applying for a plan approval. In accordance with § 127.14(b), a plan approval is not required for the construction, modification, reactivation, or installation of the sources creating the de minimis emissions increase.

(h) The permittee may not meet de minimis emission threshold levels by offsetting emission increases or decreases at the same source.

#014 [25 Pa. Code § 127.3]

Operational Flexibility.

The permittee is authorized to make changes within the facility in accordance with the regulatory provisions outlined in 25 Pa. Code § 127.3 (relating to operational flexibility) to implement the operational flexibility requirements provisions authorized under Section 6.1(i) of the Air Pollution Control Act and the operational flexibility terms and conditions of this permit. The provisions in 25 Pa. Code Chapter 127 which implement the operational flexibility requirements include the following:

(1) Section 127.14 (relating to exemptions)

(2) Section 127.447 (relating to alternative operating scenarios)

(3) Section 127.448 (relating to emissions trading at facilities with Federally enforceable emissions caps)

(4) Section 127.449 (relating to de minimis emission increases)

(5) Section 127.450 (relating to administrative operating permit amendments)

SECTION B. General State Only Requirements

(6) Section 127.462 (relating to minor operating permit modifications)

(7) Subchapter H (relating to general plan approvals and general operating permits)

#015 [25 Pa. Code § 127.11]

Reactivation

(a) The permittee may not reactivate a source that has been out of operation or production for at least one year unless the reactivation is conducted in accordance with a plan approval granted by the Department or in accordance with reactivation and maintenance plans developed and approved by the Department in accordance with 25 Pa. Code § 127.11a(a).

(b) A source which has been out of operation or production for more than five (5) years but less than 10 years may be reactivated and will not be considered a new source if the permittee satisfies the conditions specified in 25 Pa. Code § 127.11a(b).

#016 [25 Pa. Code § 127.36]

Health Risk-based Emission Standards and Operating Practice Requirements.

(a) When needed to protect public health, welfare and the environment from emissions of hazardous air pollutants from new and existing sources, the permittee shall comply with the health risk-based emission standards or operating practice requirements imposed by the Department, except as precluded by §§ 6.6(d)(2) and (3) of the Air Pollution Control Act [35 P.S. § 4006.6(d)(2) and (3)].

(b) A person challenging a performance or emission standard established by the Department has the burden to demonstrate that performance or emission standard does not meet the requirements of Section 112 of the Clean Air Act.

#017 [25 Pa. Code § 121.9]

Circumvention.

No person may permit the use of a device, stack height which exceeds good engineering practice stack height, dispersion technique or other technique which, without resulting in reduction of the total amount of air contaminants emitted, conceals or dilutes an emission of air contaminants which would otherwise be in violation of 25 Pa. Code Article III, except that with prior approval of the Department, the device or technique may be used for control of malodors.

#018 [25 Pa. Code §§ 127.402(d) & 127.442]

Reporting Requirements.

(a) The permittee shall comply with the applicable reporting requirements of the Clean Air Act, the regulations thereunder, the Air Pollution Control Act and 25 Pa. Code Article III including Chapters 127, 135 and 139.

(b) The permittee shall submit reports to the Department containing information the Department may prescribe relative to the operation and maintenance of any air contamination source.

(c) Reports, test data, monitoring data, notifications and requests for renewal of the permit shall be submitted to the:

Regional Air Program Manager
PA Department of Environmental Protection
(At the address given in the permit transmittal letter, or otherwise notified)

(d) Any records or information including applications, forms, or reports submitted pursuant to this permit condition shall contain a certification by a responsible official as to truth, accuracy and completeness. The certifications submitted under this permit shall require a responsible official of the facility to certify that based on information and belief formed after reasonable inquiry, the statements and information in the documents are true, accurate and complete.

(e) Any records, reports or information submitted to the Department shall be available to the public except for such

records, reports or information which meet the confidentiality requirements of § 4013.2 of the Air Pollution Control Act and §§ 112(d) and 114(c) of the Clean Air Act. The permittee may not request a claim of confidentiality for any emissions data generated for the facility.

#019 [25 Pa. Code §§ 127.441(c) & 135.5]

Sampling, Testing and Monitoring Procedures.

(a) The permittee shall comply with the monitoring, recordkeeping or reporting requirements of 25 Pa. Code Chapter 139 and the other applicable requirements of 25 Pa. Code Article III and additional requirements related to monitoring, reporting and recordkeeping required by the Clean Air Act and the regulations thereunder including the Compliance Assurance Monitoring requirements of 40 CFR Part 64, where applicable.

(b) Unless alternative methodology is required by the Clean Air Act and regulations adopted thereunder, sampling, testing and monitoring required by or used by the permittee to demonstrate compliance with any applicable regulation or permit condition shall be conducted in accordance with the requirements of 25 Pa. Code Chapter 139.

#020 [25 Pa. Code §§ 127.441(c) and 135.5]

Recordkeeping.

(a) The permittee shall maintain and make available, upon request by the Department, the following records of monitored information:

(1) The date, place (as defined in the permit) and time of sampling or measurements.

(2) The dates the analyses were performed.

(3) The company or entity that performed the analyses.

(4) The analytical techniques or methods used.

(5) The results of the analyses.

(6) The operating conditions as existing at the time of sampling or measurement.

(b) The permittee shall retain records of any required monitoring data and supporting information for at least five (5) years from the date of the monitoring, sample, measurement, report or application. Supporting information includes the calibration data and maintenance records and original strip-chart recordings for continuous monitoring instrumentation, and copies of reports required by the permit.

(c) The permittee shall maintain and make available to the Department upon request, records including computerized records that may be necessary to comply with the reporting, recordkeeping and emission statement requirements in 25 Pa. Code Chapter 135 (relating to reporting of sources). In accordance with 25 Pa. Code Chapter 135, § 135.5, such records may include records of production, fuel usage, maintenance of production or pollution control equipment or other information determined by the Department to be necessary for identification and quantification of potential and actual air contaminant emissions.

#021 [25 Pa. Code § 127.441(a)]

Property Rights.

This permit does not convey any property rights of any sort, or any exclusive privileges.

#022 [25 Pa. Code § 127.447]

Alternative Operating Scenarios.

The permittee is authorized to make changes at the facility to implement alternative operating scenarios identified in this permit in accordance with 25 Pa. Code § 127.447.

SECTION C. Site Level Requirements

I. RESTRICTIONS.

Emission Restriction(s).

 # 001 [25 Pa. Code §121.7]
Prohibition of air pollution.
No person may permit air pollution as that term is defined in the Air Pollution Control Act (35 P.S. Section 4003).

 # 002 [25 Pa. Code §123.1]
Prohibition of certain fugitive emissions
No person may permit the emission into the outdoor atmosphere of fugitive air contaminant from a source other than the following:

(a) construction or demolition of buildings or structures;

(b) grading, paving and maintenance of roads and streets;

(c) use of roads and streets. Emissions from material in or on trucks, railroad cars and other vehicular equipment are not considered as emissions from use of roads and streets;

(d) clearing of land;

(e) stockpiling of materials;

(f) open burning operations, as specified in 25 Pa. Code § 129.14;

(g) blasting in open pit mines. Emissions from drilling are not considered as emissions from blasting;

(h) coke oven batteries, provided the fugitive air contaminants emitted from any coke oven battery comply with the standards for visible fugitive emissions in 25 Pa. Code §§ 123.44 and 129.15 (relating to limitations of visible fugitive air contaminants from operation of any coke oven battery; and coke pushing operations); and

(i) sources and classes of sources other than those identified in (a)-(h), above, for which the permittee has obtained a determination from the Department that fugitive emissions from the source, after appropriate control, meet the following requirements:

(1) the emissions are of minor significance with respect to causing air pollution; and

(2) the emissions are not preventing or interfering with the attainment or maintenance of any ambient air quality standard.

 # 003 [25 Pa. Code §123.2]
Fugitive particulate matter
The permittee shall not allow the emission of fugitive particulate matter into the outdoor atmosphere from a source specified in Section C, Condition #002, if the emissions are visible at the point the emissions pass outside the person's property.

 # 004 [25 Pa. Code §123.31]
Limitations
The permittee shall not allow the emission into the outdoor atmosphere of any malodorous air contaminants from any source in such a manner that the malodors are detectable outside the property of the person on whose land the source is being operated.

 # 005 [25 Pa. Code §123.41]
Limitations
The permittee shall not allow the emission into the outdoor atmosphere of visible air contaminants in such a manner that the opacity of the emission is either of the following:

(a) Equal to or greater than 20% for a period or periods aggregating more than three (3) minutes in any one hour.

(b) Equal to or greater than 60% at any time.

SECTION C. Site Level Requirements

 # 006 [25 Pa. Code §123.42]
Exceptions
The emission limitation of 25 Pa. Code Section 123.41, shall not apply when:

(a) The presence of uncombined water is the only reason for failure of the emission to meet the limitations.

(b) The emission results from the operation of equipment used solely to train and test persons in observing the opacity of visible emissions.

(c) The emission results from sources specified in Section C, Condition #002, subsections (a) - (i).

 # 007 [25 Pa. Code §129.14]
Open burning operations
(a) The permittee shall not conduct open burning of materials in such a manner that:

(1) The emissions are visible, at any time, at the point such emissions pass outside the property of the person on whose land the open burning is being conducted.

(2) Malodorous air contaminants from the open burning are detectable outside the property of the person on whose land the open burning is being conducted.

(3) The emissions interfere with the reasonable enjoyment of life and property.

(4) A fire set in conjunction with the production of agricultural commodities in their unmanufactured state on the premises of the farm operation.

(5) The emissions cause damage to vegetation or property.

(6) The emissions are or may be deleterious to human or animal health.

(b) Exceptions. The requirements of Subsection (a) do not apply where the open burning operations result from:

(1) A fire set to prevent or abate a fire hazard, when approved by the Department and set by or under the supervision of a public official.

(2) Any fire set for the purpose of instructing personnel in fire fighting, when approved by the Department.

(3) A fire set for the prevention and control of disease or pests, when approved by the Department.

(4) A fire set solely for recreational or ceremonial purposes.

(5) A fire set solely for cooking food.

(c) This permit does not constitute authorization to burn solid waste pursuant to section 610 (3) of the Solid Waste Management Act 35 P.S. Section 6018.610 (3), or any other provision of the Solid Waste Management Act.

II. TESTING REQUIREMENTS.

 # 008 [25 Pa. Code §127.441]
Operating permit terms and conditions.
(a). If at any time the Department has cause to believe that air contaminant emissions from any source(s) listed in Section A, of this Permit, may be in excess of the limitations specified in this Permit, or established pursuant to, any applicable rule or regulation contained in 25 Pa. Code Article III, the permittee shall be required to conduct whatever tests are deemed necessary by the Department to determine the actual emission rate(s).

(b). Such testing shall be conducted in accordance with the provisions of 25 Pa. Code Chapter 139, when applicable, and in accordance with any restrictions or limitations established by the Department at such time as it notifies the permittee that testing is required.

III. MONITORING REQUIREMENTS.

 # 009 [25 Pa. Code §123.43]
Measuring techniques
Visible emissions may be measured using either of the following:

(a) A device approved by the Department and maintained to provide accurate opacity measurements.

(b) Observers, trained and qualified to measure plume opacity with the naked eye or with the aid of any device(s) approved by the Department.

 # 010 [25 Pa. Code §127.441]
Operating permit terms and conditions.
The permittee shall calculate the total emissions of VOCs for the entire facility on a 12-month rolling sum basis.

 # 011 [25 Pa. Code §127.441]
Operating permit terms and conditions.
(a) The permittee shall monitor the facility weekly for the following:

(1) odors which may be objectionable (as per 25 Pa. Code §123.31);
(2) visible emissions (as per 25 Pa. Code §§123.41 and 123.42); and
(3) fugitive emissions (as per 25 Pa. Code §§ 123.1 and 123.2).

(b) Objectionable odors, fugitive emissions, and visible emissions that are caused or may be caused by operations at the site shall:

(1) be investigated;
(2) be reported to the facility management, or individual(s) designated by the permittee;
(3) have appropriate corrective action taken (for emissions that originate on-site); and
(4) be recorded in a permanent written log.
(5) for any observed problems, a first attempt at equipment repair must be made within 15 days of discovery, and DEP must be notified if the final repair is not completed in 30 days.

(c) After six (6) months of weekly monitoring, and upon the permittee's request, the Department will determine the feasibility of decreasing the frequency of monitoring to monthly.

(d) The Department reserves the right to change the above monitoring requirements at any time, based on but not limited to: the review of the compliance certification, complaints, monitoring results, and/or Department findings.

IV. RECORDKEEPING REQUIREMENTS.

 # 012 [25 Pa. Code §127.441]
Operating permit terms and conditions.
The permittee shall maintain records of all the facility's increases of emissions from the following categories:

(a). Deminimus increases without notification to the Department.
(b). Deminimus increases with notification to the Department, via letter.
(c). Increases resulting from a Request for Determination (RFD) to the Department.
(d). Increases resulting from the issuance of a plan approval and subsequent operating permit.

 # 013 [25 Pa. Code §127.441]
Operating permit terms and conditions.
The permittee shall compile and record the total emissions of VOCs for the entire facility on a 12-month rolling sum basis.

SECTION C. Site Level Requirements

 # 014 [25 Pa. Code §127.441]
Operating permit terms and conditions.

The permittee shall maintain a record of all monitoring of fugitive emissions, visible emissions and odors, including those that deviate from the conditions found in this permit. The record of deviations shall contain, at a minimum, the following items:

(a) date, time, and location of the incident(s);
(b) the cause of the event; and
(c) the corrective action taken, if necessary, to abate the situation and prevent future occurrences.

V. REPORTING REQUIREMENTS.

 # 015 [25 Pa. Code §127.441]
Operating permit terms and conditions.

The permittee shall report malfunctions to the Department which result in, or may possibly result in, the emission of air contaminants in excess of the limitations specified in this permit, or regulation contained in 25 Pa. Code Article III. Malfunctions shall be reported as follows:

(a) Any malfunction which poses an imminent danger to the public health, safety, welfare, and environment, shall be immediately reported to the Department by telephone. The telephone report of such malfunctions shall occur no later than two (2) hours after the incident. The permittee shall submit a written report of instances of such malfunctions to the Department within three (3) days of the telephone report.

(b) Unless otherwise required by this permit, any other malfunction that is not subject to the reporting requirement of subsection (a) above, shall be reported to the Department, in writing, within five (5) days of malfunction discovery.

(c) Telephone reports can be made to the Air Quality Program at (717) 705-4702 during normal business hours or to the Department's Emergency Hotline (866) 825-0208 at any time.

(d) Written reports of malfunctions shall describe, at a minimum, the following:
(1). The malfunction(s).
(2). The emission(s).
(3). The duration.
(4). Any corrective action taken.

 # 016 [25 Pa. Code §127.441]
Operating permit terms and conditions.

[Additional authority for this permit condition is also derived from 40 CFR Part 68.]

(a). If required by Section 112(r) of the Clean Air Act, the permittee shall develop and implement an accidental release program consistent with requirements of the Clean Air Act, 40 C.F.R. Part 68 (relating to chemical accident prevention provisions) and the Federal Chemical Safety Information, Site Security and Fuels Regulatory Relief Act (P.L. 106-40).

(b). The permittee shall prepare and implement a Risk Management Plan (RMP) which meets the requirements of Section 112(r) of the Clean Air Act, 40 C.F.R. Part 68 and the Federal Chemical Safety Information, Site Security and Fuels Regulatory Relief Act when a regulated substance listed in 40 C.F.R. § 68.130 is present in a process in more than the threshold quantity at a facility. The permittee shall submit the RMP to the federal Environmental Protection Agency according to the following schedule and requirements:

(1). The permittee shall submit the first RMP to a central point specified by EPA no later than the latest of the following:

(i). Three years after the date on which a regulated substance is first listed under 40 C.F.R. § 68.130; or,
(ii). The date on which a regulated substance is first present above a threshold quantity in a process.

(2). The permittee shall submit any additional relevant information requested by the Department or EPA concerning the RMP and shall make subsequent submissions of RMPs in accordance with 40 C.F.R. § 68.190.

(3). The permittee shall certify that the RMP is accurate and complete in accordance with the requirements of 40 C.F.R. Part 68, including a checklist addressing the required elements of a complete RMP.

(c). As used in this permit condition, the term "process" shall be as defined in 40 C.F.R. § 68.3. The term "process" means any activity involving a regulated substance including any use, storage, manufacturing, handling, or on-site movement of such substances or any combination of these activities. For purposes of this definition, any group of vessels that are interconnected, or separate vessels that are located such that a regulated substance could be involved in a potential release, shall be considered a single process.

(d). If this facility is subject to 40 C.F.R. Part 68, as part of the certification required under this permit, the permittee shall:

(1). Submit a compliance schedule for satisfying the requirements of 40 C.F.R. Part 68 by the date specified in 40 C.F.R. § 68.10(a); or,

(2). Certify that this facility is in compliance with all requirements of 40 C.F.R. Part 68 including the registration and submission of the RMP.

(e). If this facility is subject to 40 C.F.R. Part 68, the permittee shall maintain records supporting the implementation of an accidental release program for five (5) years in accordance with 40 C.F.R. § 68.200.

(f). When this facility is subject to the accidental release program requirements of Section 112(r) of the Clean Air Act and 40 C.F.R. Part 68, appropriate enforcement action will be taken by the Department if the permittee fails to register and submit the RMP or a revised plan pursuant to 40 C.F.R. Part 68.

 # 017 [25 Pa. Code §135.3]
Reporting

[Additional authority for this permit condition is also derived from 25 Pa. Code § 127.441.]

If the permittee has been previously advised by the Department to submit a source report, the permittee shall submit by March 1, of each year, a source report for the preceding calendar year. The report shall include information from all previously reported sources, new sources which were first operated during the preceding calendar year, and sources modified during the same period which were not previously reported, including those sources listed in the Miscellaneous Section of this permit.

The permittee may request an extension of time from the Department for the filing of a source report, and the Department may grant the extension for reasonable cause.

VI. WORK PRACTICE REQUIREMENTS.

 # 018 [25 Pa. Code §123.1]
Prohibition of certain fugitive emissions

The permittee shall take all reasonable actions to prevent particulate matter from becoming airborne from any source specified in Section C, Condition #002(a) -(i). These actions shall include, but are not limited to, the following:

(a) Use, where possible, of water or chemicals for control of dust in the demolition of buildings or structures, construction operations, the grading of roads, or the clearing of land.

(b) Application of asphalt, oil, water, or suitable chemicals on dirt roads, material stockpiles, and other surfaces, which may give rise to airborne dusts.

(c) Paving and maintenance of roadways.

(d) Prompt removal of earth or other material from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water, or other means.

 # 019 [25 Pa. Code §127.441]
Operating permit terms and conditions.

The permittee shall immediately, upon discovery, implement measures, which may include the application for the installation of an air cleaning device(s), if necessary, to reduce the air contaminant emissions to within applicable limitations, if at any time the operation of the source(s) identified in Section A, of this permit, is causing the emission of air contaminants in excess of the limitations specified in, or established pursuant to, 25 Pa. Code Article III or any other applicable rule promulgated under the Clean Air Act.

 # 020 [25 Pa. Code §127.444]
Compliance requirements.

The permittee shall operate and maintain all sources and any air cleaning devices identified in this operating permit in accordance with the manufacturers' recommendations/specifications, as well as in a manner consistent with good operating practices.

VII. ADDITIONAL REQUIREMENTS.

 # 021 [25 Pa. Code §127.441]
Operating permit terms and conditions.

Nothing herein shall be construed to supersede, amend, or authorize violation of the provisions of any valid and applicable local law, ordinance, or regulation, or any court order, provided that said local law, ordinance, or regulation, or court order is not preempted by the Air Pollution Control Act, Act of January 8, 1960, P.L. 2119 (1959), as amended, 35 P.S. §4001 et seq., and the rules and regulations promulgated thereunder. It is the applicant's responsibility, separate and apart from the application process, to obtain any authorizations, permits, approvals, or licenses that the applicant might need in order to perform the construction permitted by this plan approval, including access, ownership, or lease of the subject parcel or parcels of property. The Department incurs no enforcement obligations with respect to this condition.

 # 022 [25 Pa. Code §127.441]
Operating permit terms and conditions.

The potential fugitive plus stack emissions from this facility, after appropriate control as prescribed in this permit, have been estimated as follows: 0.09 tpy of NOx, 0.41 tpy of CO, 1.84 tpy of VOCs, 0.05 tpy HAPs, 0.02 tpy of Methane and 187 tpy of GHGs. The Department has determined these emissions remaining after appropriate control are of minor significance with regard to causing air pollution, and will not prevent or interfere with the attainment or maintenance of an ambient air quality standard.

VIII. COMPLIANCE CERTIFICATION.

No additional compliance certifications exist except as provided in other sections of this permit including Section B (relating to State Only General Requirements).

IX. COMPLIANCE SCHEDULE.

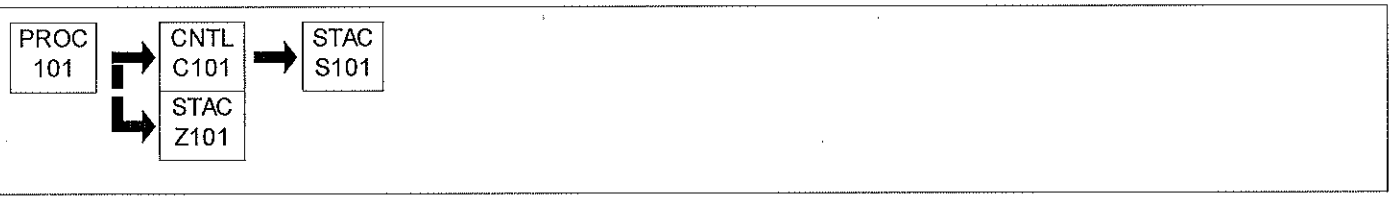
No compliance milestones exist.

SECTION D. Source Level Requirements

Source ID: 101 Source Name: PUMP STATION SEAL LEAKS

Source Capacity/Throughput:

Conditions for this source occur in the following groups: GRP 01



I. RESTRICTIONS.

No additional requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

II. TESTING REQUIREMENTS.

No additional testing requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

III. MONITORING REQUIREMENTS.

No additional monitoring requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

IV. RECORDKEEPING REQUIREMENTS.

No additional record keeping requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

V. REPORTING REQUIREMENTS.

No additional reporting requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

VI. WORK PRACTICE REQUIREMENTS.

No additional work practice requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

VII. ADDITIONAL REQUIREMENTS.

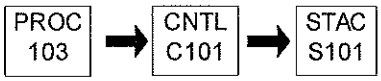
No additional requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

SECTION D. Source Level Requirements

Source ID: 103 Source Name: MAINTENANCE OPERATIONS

Source Capacity/Throughput:

Conditions for this source occur in the following groups: GRP 01



I. RESTRICTIONS.

No additional requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

II. TESTING REQUIREMENTS.

No additional testing requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

III. MONITORING REQUIREMENTS.

No additional monitoring requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

IV. RECORDKEEPING REQUIREMENTS.

No additional record keeping requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

V. REPORTING REQUIREMENTS.

No additional reporting requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

VI. WORK PRACTICE REQUIREMENTS.

No additional work practice requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

VII. ADDITIONAL REQUIREMENTS.

No additional requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements) and/or Section E (Source Group Restrictions).

SECTION E. Source Group Restrictions.

Group Name: GRP 01

Group Description: Pump Station & Maintenance

Sources included in this group

ID	Name
101	PUMP STATION SEAL LEAKS
103	MAINTENANCE OPERATIONS

I. RESTRICTIONS.

Emission Restriction(s).

 # 001 [25 Pa. Code §127.441]

Operating permit terms and conditions.

The enclosed flare shall be operated with no visible emissions and no visible flame.

Fuel Restriction(s).

 # 002 [25 Pa. Code §127.441]

Operating permit terms and conditions.

The permittee shall burn only propane, butane, ethane or a mixture of these in the enclosed flare.

 # 003 [25 Pa. Code §127.441]

Operating permit terms and conditions.

The enclosed flare pilot light shall burn propane gas.

II. TESTING REQUIREMENTS.

No additional testing requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements).

III. MONITORING REQUIREMENTS.

No additional monitoring requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements).

IV. RECORDKEEPING REQUIREMENTS.

 # 004 [25 Pa. Code §127.441]

Operating permit terms and conditions.

When the enclosed flare is not operational, the permittee shall record the downtime and the associated emissions.

 # 005 [25 Pa. Code §127.441]

Operating permit terms and conditions.

The permittee shall maintain detailed records of all maintenance performed on the enclosed flare. The permittee shall retain these records for a minimum of five (5) years and shall make them available to the department upon its request.

V. REPORTING REQUIREMENTS.

No additional reporting requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements).

VI. WORK PRACTICE REQUIREMENTS.

 # 006 [25 Pa. Code §127.441]

Operating permit terms and conditions.

The permittee shall maintain a system to notify the operator immediately when the enclosed flare is not operational.

SECTION E. Source Group Restrictions.

VII. ADDITIONAL REQUIREMENTS.

No additional requirements exist except as provided in other sections of this permit including Section B (State Only General Requirements).

SECTION F. Alternative Operation Requirements.

No Alternative Operations exist for this State Only facility.

SECTION G. Emission Restriction Summary.

No emission restrictions listed in this section of the permit.

SECTION H. Miscellaneous.

****** End of Report ******