

Documentation File for API Publication 2519— Evaporation Loss from Internal Floating–Roof Tanks

API PUBLICATION 2519D
FIRST EDITION, MARCH 1993

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005



Documents

Document Sharing Hub

Documentation File for API Publication 2519— Evaporation Loss from Internal Floating–Roof Tanks

Measurement Coordination

API PUBLICATION 2519D
FIRST EDITION, MARCH 1993

**American
Petroleum
Institute**



Documents
Document Sharing Hub

SPECIAL NOTES

1. API PUBLICATIONS NECESSARILY ADDRESS PROBLEMS OF A GENERAL NATURE. WITH RESPECT TO PARTICULAR CIRCUMSTANCES, LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS SHOULD BE REVIEWED.
2. API IS NOT UNDERTAKING TO MEET THE DUTIES OF EMPLOYERS, MANUFACTURERS, OR SUPPLIERS TO WARN AND PROPERLY TRAIN AND EQUIP THEIR EMPLOYEES, AND OTHERS EXPOSED, CONCERNING HEALTH AND SAFETY RISKS AND PRECAUTIONS, NOR UNDERTAKING THEIR OBLIGATIONS UNDER LOCAL, STATE, OR FEDERAL LAWS.
3. INFORMATION CONCERNING SAFETY AND HEALTH RISKS AND PROPER PRECAUTIONS WITH RESPECT TO PARTICULAR MATERIALS AND CONDITIONS SHOULD BE OBTAINED FROM THE EMPLOYER, THE MANUFACTURER OR SUPPLIER OF THAT MATERIAL, OR THE MATERIAL SAFETY DATA SHEET.
4. NOTHING CONTAINED IN ANY API PUBLICATION IS TO BE CONSTRUED AS GRANTING ANY RIGHT, BY IMPLICATION OR OTHERWISE, FOR THE MANUFACTURE, SALE, OR USE OF ANY METHOD, APPARATUS, OR PRODUCT COVERED BY LETTERS PATENT. NEITHER SHOULD ANYTHING CONTAINED IN THE PUBLICATION BE CONSTRUED AS INSURING ANYONE AGAINST LIABILITY FOR INFRINGEMENT OF LETTERS PATENT.
5. GENERALLY, API STANDARDS ARE REVIEWED AND REVISED, REAFFIRMED, OR WITHDRAWN AT LEAST EVERY FIVE YEARS. SOMETIMES A ONE-TIME EXTENSION OF UP TO TWO YEARS WILL BE ADDED TO THIS REVIEW CYCLE. THIS PUBLICATION WILL NO LONGER BE IN EFFECT FIVE YEARS AFTER ITS PUBLICATION DATE AS AN OPERATIVE API STANDARD OR, WHERE AN EXTENSION HAS BEEN GRANTED, UPON REPUBLICATION. STATUS OF THE PUBLICATION CAN BE ASCERTAINED FROM THE API AUTHORIZING DEPARTMENT [TELEPHONE (202) 682-8000]. A CATALOG OF API PUBLICATIONS AND MATERIALS IS PUBLISHED ANNUALLY AND UPDATED QUARTERLY BY API, 1220 L STREET, N.W., WASHINGTON, D.C. 20005.

FOREWORD

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any federal, state, or municipal regulation with which this publication may conflict.

Suggested revisions are invited and should be submitted to the director of the Measurement Coordination, Industry Services Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

Copyright American Petroleum Institute
Provided by IHS under license with API
No reproduction or networking permitted without license from IHS

Documentation File for
API Publication 2519, "Evaporation
Loss from Internal Floating-Roof Tanks"

Section A - Basic Data

- A.1 API Data Base (Extensive Computer Print-Out)
 - A.1.1 Summary of Average Test Tank Results
 - A.1.2 Test Tank Temperature Data
 - A.1.3 Test Tank Flow Rate and Concentration Data
 - A.1.4 Vapor Pressure Calculations
 - A.1.5 Selected Equilibrium Flow Rate/Concentration Data
 - A.1.6 Statistical Analysis of Windspeed Significance
 - A.1.7 Statistical Analysis of Data-Averaging Techniques
- A.2 Contractor - Reported Data Base
- A.3 Comparison of API/Contractor - Reported Data Bases

Section B - Data Analysis/Parameter Evaluation

- B.1 Evaluation of Vapor Pressure Functions
- B.2 Development of Product Factor
- B.3 Development of Rim Seal Loss Factors
- B.4 Development of Fitting Loss Factors
- B.5 Development of Deck Seam Loss Factors
- B.6 Analysis of Field Tank Data

Section C - Related Reports (Copies of reports available on request for a copy fee from address given below.)

Section D - Pictures/Drawings of Test Equipment (Pictures available for inspection by contacting American Petroleum Institute at address given below.)

American Petroleum Institute
Measurement Coordination Department
1220 L St., N.W.
Washington, DC. 20005

- A.1 API Data Base* (Extensive Computer Print-out)
 - A.1.1 Summary of Average Test Tank Results
 - A.1.2 Test Tank Temperature Data
 - A.1.3 Test Tank Flow Rate and Concentration Data
 - A.1.4 Vapor Pressure Calculations
 - A.1.5 Selected Equilibrium Flow Rate/Concentration Data
 - A.1.6 Statistical Analysis of Windspeed Significance
 - A.1.7 Statistical Analysis of Data-Averaging Techniques

* The API Data Base is on an extensive computer printout. It is on file at the American Petroleum Institute. For further information on the printout contact:

Director, Measurement Coordination
American Petroleum Institute
1220 L St., N.W.
Washington, D.C. 20005
202-682-8145

A.1.1 SUMMARY OF AVERAGE TEST TANK RESULTS

Table A.1.1-1 presents a summary of emissions calculated for all potentially relevant tank tests. Tests which Chicago Bridge & Iron (CBI) reported as being void, and those tests in which equilibrium conditions were not obtained are excluded from Table A.1.1-1. Some of the data in Table A.1.1-1 were not used in subsequent calculations discussed in sections B.1, B.2, B.3, or B.5 because of other conditions during the test which precluded them from being useful. Because, as noted below, the data analysis indicated that the emissions were essentially independent of wind speed a single average emission value was determined for each test as recorded in Table A.1.1-1.

The data from which the emissions were calculated were obtained by CBI under a contract with the American Petroleum Institute (API), Committee on Evaporation Loss Measurement (CELM). At the request of the CELM 2519 Steering Committee CBI made copies of all of their raw data sheets and sent them to the Union Oil CELM representative for computer analysis. Lists of the computerized raw data are contained in Sections A.1.2 and A.1.3. To convert the raw data into emissions it is necessary to calculate the true vapor pressure (TVP) during each test. The method and data used to obtain the TVP is described in Section A.1.4. To ensure that emissions from various tests can be compared it is necessary to be sure that the data points used to calculate the emissions were obtained under equilibrium conditions. The methods used by the CELM committee to select data points representative of equilibrium conditions is described in Section A.1.5.

To determine whether wind is a significant variable for an emission correlation equation two statistical techniques were used. The first technique assumed a linear correlation between emissions (E) and wind speed (V) of the form $E = kV^n$ and used a linear regression analysis to determine the values of k and n. This analysis indicated that n was approximately 0.0 for the majority of the tests and that the inclusion of the term V^n in the equation did not significantly improve the ability to predict the emissions. This technique is documented in Section A.1.6. A second technique used was a one way analysis of variance of emissions for wind speeds <20 mph, wind speeds >20 mph, and for all wind speeds. This analysis revealed that for most tests in each of the above 3 categories there was at least one wind speed for which the emissions were statistically different from the rest of the group. However, plots of all of the test results revealed that for the majority of the tests most of the data fell within the 90% confidence limits of the emissions averaged over all wind speeds. The 90% confidence limits of the emissions for data at windspeeds <20 mph and at windspeeds >20 mph overlap the 90% confidence limits for all

windspeeds and the plots indicated no consistent trend of emissions with wind speed. Thus it was concluded that internal floating roof tank emissions are essentially independent of wind speed and that a single average value for the emissions determined during a given test can be used as representative of the emissions for that given condition. This second analysis technique is discussed in detail in Section A.1.7.

Sections A.1.2 through A.1.7 contain a substantial volume of computer printout and computer plots, which are available for review at API headquarters in Washington, D.C.



TABLE A.1.1-1: SUMMARY OF EMISSIONS CALCULATED BY API FOR ALL POTENTIALLY RELEVANT TESTS

CBI ^a TEST NUMBER	TRUE VAPOR PRESSURE (PSIA) ^b		MOLECULAR WEIGHT P/PM ^c	AVERAGE EMISSIONS	
	AVERAGE	NOMINAL		P/DAY ^d	PM/DAY ^e
API-1	4.56	5.00	47.1	13.4	0.283
API-2	3.60	5.00	51.0	21.6	0.423
API-3	5.08	5.00	47.3	14.6	0.309
API-4	4.33	5.00	48.0	21.5	0.449
API-5	4.75	5.00	47.6	63.3	1.33
API-7	5.14	5.00	47.7	10.7	0.224
API-8	5.00	5.00	47.4	20.8	0.439
API-12	0.40	0.50	76.5	1.39	0.0181
API-13	0.38	0.50	111.	6.71	0.0605
API-14	0.45	0.50	110.	7.35	0.0668
API-13R	0.48	0.50	110.	6.24	0.0567
API-13,13R	0.42	0.50	111.	6.53	0.059
API-14R	0.46	0.50	110.	21.6	0.196
API-14,14R	0.46	0.50	110.	17.5	0.159
API-16	3.70	5.00	46.1	42.7	0.926
API-17	5.13	5.00	45.9	3.21	0.0698
API-18	4.95	5.00	45.9	5.05	0.110
API-19	4.90	5.00	45.9	6.13	0.134
API-19A	4.92	5.00	45.9	6.75	0.147
API-21A	2.98	5.00	47.5	4.79	0.101
API-21B	2.72	5.00	47.5	4.23	0.0891
API-21C	2.67	5.00	47.5	4.32	0.0909
API-21AR	2.64	5.00	47.5	8.14	0.171
API-21A,AR	2.84	5.00	47.5	6.13	0.129
API-21BR	2.60	5.00	47.5	6.65	0.140
API-21B,BR	2.69	5.00	47.5	4.84	0.102
API-21CR	2.61	5.00	47.5	6.30	0.133
API-21C,CR	2.65	5.00	47.5	5.11	0.108
API-22A	4.21	5.00	45.8	6.493	0.142
API-22BI	4.25	5.00	45.8	7.57	0.165
API-22D	3.80	5.00	45.8	5.69	0.124
API-22B	3.78	5.00	45.8	8.05	0.176
API-22BI,B	3.90	5.00	45.8	7.936	0.173
API-22C	3.77	5.00	45.8	9.65	0.211
API-21E	3.61	5.00	45.8	5.88	0.128
API-23	7.05	5.00	45.8	3.27	0.0714
API-24	6.84	5.00	45.8	5.48	0.120
API-25	6.85	5.00	45.8	4.97	0.108
API-26A	3.72	5.00	46.3	5.42	0.117
API-26B	2.40	5.00	48.5	6.21	0.128
API-27A	0.73	0.50	61.0	1.83	0.030
API-27B	0.73	0.50	61.0	1.19	0.0196
API-27C	0.73	0.50	61.0	3.37	0.0553
API-28	0.72	0.50	62.0	1.04	0.0167

TABLE A.1.1-1: SUMMARY OF EMISSIONS CALCULATED BY API FOR ALL
POTENTIALLY RELEVANT TESTS (continued)

CBI ^a TEST NUMBER	TRUE VAPOR PRESSURE (PSIA) ^b		MOLECULAR WEIGHT P/PM ^c	AVERAGE EMISSIONS	
	AVERAGE	NOMINAL		P/DAY ^d	PM/DAY ^e
API-30	0.29	0.50	105.	3.32	0.0316
API-29R	0.29	0.50	105.	15.0	0.143
API-31	0.28	0.50	108.	3.86	0.0357
API-31A	0.27	0.50	108.	2.77	0.0256
API-32	1.92	2.50	86.2	2.00	0.0232
API-33	2.12	2.50	86.2	2.64	0.0306
API-33A	2.28	2.50	86.2	2.17	0.0251
API-34	2.35	2.50	86.2	2.73	0.0317
API-34A	2.34	2.50	86.2	2.99	0.0347
API-35	4.07	5.00	47.5	1.74	0.0366
API-36	4.01	5.00	47.5	1.70	0.0359
API-37	4.02	5.00	47.5	1.41	0.0297
API-38	3.97	5.00	47.6	1.59	0.0334
API-39	3.91	5.00	47.2	2.32	0.0492
API-39R	5.61	5.00	46.8	1.81	0.0387
API-40	5.67	5.00	46.8	1.41	0.0301
API-41	5.25	5.00	46.8	0.722	0.0154
API-42	5.21	5.00	46.8	0.825	0.0176
API-43	5.02	5.00	46.5	1.25	0.0269
API-44	5.38	5.00	46.4	0.69	0.0149
API-45	5.24	5.00	46.4	0.322	0.00693
API-46	5.13	5.00	46.5	0.431	0.00928
API-47	4.87	5.00	46.5	0.79	0.0170
API-48	4.64	5.00	46.6	1.15	0.0246
API-49	4.49	5.00	46.6	0.877	0.0188
API-50	0.60	0.50	87.0	0.371	0.00426
API-51	0.60	0.50	87.5	3.41	0.0390
API-52	5.51	5.00	48.0	1.81	0.0376
API-53P	5.52	5.00	48.0	1.95	0.0407
API-54	5.45	5.00	48.0	1.92	0.0400
API-53	5.31	5.00	48.0	1.79	0.0372
API-53P, 53	5.47	5.00	48.0	1.92	0.0399
API-55	5.40	5.00	48.1	0.749	0.0156
API-56	5.47	5.00	48.2	1.63	0.0338
API-57	5.50	5.00	48.2	1.66	0.0345
API-58	5.48	5.00	48.2	2.09	0.0433
API-52R	5.53	5.00	48.0	2.09	0.0435
API-52, 52R	5.52	5.00	48.0	1.92	0.0400
API-59	4.35	5.00	48.6	2.61	0.0536
API-60	4.39	5.00	49.0	2.81	0.0574
API-61	4.46	5.00	49.0	3.38	0.0690
API-62	2.96	5.00	52.0	3.37	0.0649

TABLE A.1.1-1: SUMMARY OF EMISSIONS CALCULATED BY API FOR ALL POTENTIALLY RELEVANT TESTS (continued)

CBI ^a TEST NUMBER	TRUE VAPOR PRESSURE (PSIA) ^b		MOLECULAR WEIGHT P/PM ^c	AVERAGE EMISSIONS	
	AVERAGE	NOMINAL		P/DAY ^d	PM/DAY ^e
API-63R	0.88	0.50	75.5	0.702	0.00930
API-64	0.55	0.50	105.	0.911	0.00867
API-65	3.30	2.50	86.2	2.09	0.0242
API-66	3.21	2.50	86.2	3.26	0.0378
API-66R	3.30	2.50	86.2	2.77	0.0322
API-65R	3.34	2.50	86.2	3.51	0.0407
API-65A	3.31	2.50	86.2	3.59	0.0417
API-67A	0.43	0.50	97.5	0.759	0.00779
API-67	0.36	0.50	112.	0.559	0.00500
API-68	2.96	2.50	86.2	0.903	0.0105
API-69	2.95	2.50	86.2	0.617	0.00715
API-70	6.22	5.00	46.3	0.935	0.0202
API-71	6.19	5.00	46.3	1.14	0.0247
API-72	2.38	5.00	51.2	2.05	0.040
API-73	5.97	5.00	46.6	2.17	0.0466
API-73A	5.83	5.00	46.6	2.92	0.0628
API-74	5.58	5.00	46.6	2.92	0.0627
API-75	5.55	5.00	46.7	3.41	0.0730
API-76	5.34	5.00	46.8	2.38	0.0509
API-76R	5.25	5.00	46.8	2.03	0.0433
API-76,76R	5.31	5.00	46.8	2.26	0.0484
API-77	5.08	5.00	47.1	1.96	0.0417

a. CBI = Chicago Bridge & Iron.

b. Average true vapor pressure (TVP) is the average TVP during the time the test was being conducted. Nominal TVP is the TVP at which the emissions were calculated using the P^{*} function to normalize the measured hydrocarbon concentration to the concentration expected at the nominal TVP. The TVP is expressed in pounds per square inch absolute (PSIA).

c. P/PM = POUNDS PER POUND-MOLE.

d. P/DAY = POUNDS PER DAY.

e. PM/DAY = POUND-MOLE PER DAY.



Documents

Document Sharing Hub

API Publication 2519
Documentation File

Section A.3 - Comparison of API/Contractor - Reported Data Bases

Copyright American Petroleum Institute
Provided by IHS under license with API
No reproduction or networking permitted without license from IHS

R. L. RUSSELL
MAY 28 1982

DEFINITION OF ABBREVIATIONS IN TABLES 1 THRU 6

CBI = CHICAGO BRIDGE & IRON. API = AMERICAN PETROLEUM INSTITUTE

NO. = NUMBER.

N = TOTAL NUMBER OF POINTS. NOTE: IN EVERY CASE THERE ARE TWO GROUPS OF EMISSION VALUES I.E. AT EACH WIND SPEED THERE ARE 3 DETERMINATIONS OF EMISSIONS DETERMINED AT 0.5 HOUR INTERVALS. THEREFORE THE DEGREES OF FREEDOM USED TO CALCULATE THE STANDARD DEVIATION AND THE CONFIDENCE INTERVAL FOR THE AVERAGE EMISSIONS WAS $(N/3) - 1$.

AVE. EMIS. = AVE. = AVERAGE EMISSIONS FOR THE RANGE OF WIND SPEEDS INDICATED.

STD. DEV. = SD DV = STANDARD DEVIATION OF THE AVERAGE EMISSIONS.

95% CI = 95% CONFIDENCE INTERVAL FOR THE AVERAGE EMISSIONS.

90% CI = 90% CONFIDENCE INTERVAL FOR THE AVERAGE EMISSIONS.

EMIS. = EMISSIONS MIN = MINIMUM MAX = MAXIMUM MW = MOLECULAR WEIGHT (LB/LB-MOLE)

DEFINITION OF SYMBOLS USED TO INDICATE UNITS:

PSIA = POUNDS PER SQUARE INCH ABSOLUTE

P/PH = POUNDS PER POUND-MOLE

P/DAY = POUNDS PER DAY

PM/DAY = POUND-MOLE PER DAY

TABLE 1 CONTAINS THE CBI TEST NUMBERS, THE AVERAGE TYP. THE TYP TO WHICH THE DATA IS NORMALIZED, THE MOLECULAR WEIGHT OF THE VAPORS PASSING THROUGH THE HECKMANN ANALYZER, THE NUMBER OF POINTS, THE AVERAGE EMISSIONS IN POUNDS PER DAY, THE 95% AND 90% CONFIDENCE INTERVALS FOR THE AVERAGE FOR EACH TEST USING THE DATA FOR ALL WIND SPEEDS, FOR WIND SPEEDS >20 MPH, AND FOR WIND SPEEDS < OR = 20 MPH.

TABLE 2 CONTAINS THE SAME INFORMATION AS TABLE 1 EXCEPT THAT THE EMISSIONS AND CONFIDENCE INTERVALS ARE EXPRESSED IN POUND-MOLES PER DAY.

TABLES 3A, 3B, 3C CONTAIN THE SAME INFORMATION AS TABLE 1 PLUS THE RANGE OF THE EMISSIONS BASED ON THE 95% AND 90% CONFIDENCE INTERVALS PLUS THE EMISSION RANGE BASED ON THE ACTUAL DATA FOR ALL WIND SPEEDS (3A), WIND SPEEDS >20 MPH (3B), AND WIND SPEEDS < OR = 20 MPH (3C).

TABLES 4A, 4B, 4C CONTAIN THE SAME INFORMATION AS TABLE 2 PLUS THE RANGE OF THE EMISSIONS BASED ON THE 95% AND 90% CONFIDENCE INTERVALS PLUS THE EMISSION RANGE BASED ON THE ACTUAL DATA FOR ALL WIND SPEEDS (4A), WIND SPEEDS >20 MPH (4B), AND WIND SPEEDS < OR = 20 MPH (4C).

TABLE 5 SHOWS A COMPARISON BETWEEN THE AVERAGE TYP, NORMALIZED TYP, AVERAGE EMISSIONS IN POUNDS PER DAY, AND AVERAGE EMISSIONS IN POUND-MOLES PER DAY AS DETERMINED BY THE API-2519 STEERING COMMITTEE AND AS GIVEN IN CBI'S FINAL REPORT.

TABLE 6 DESCRIBES THE GENERAL METHODS USED TO CALCULATE THE INFORMATION SHOWN IN TABLES 1 THROUGH 4.

NOTE: IN ALL OF THE TABLES THE NUMBERS ARE GIVEN TO THREE (3) SIGNIFICANT FIGURES. IN GENERAL TRAILING ZEROS ARE NOT SHOWN, I.E. A NUMBER SUCH AS 0.41 IS 0.410 AND A NUMBER 0.5 IS 0.400 TO 3 SIGNIFICANT FIGURES.



TABLE 1

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

CBI TEST NO.	TYP	NORM	HW	USING_DATA_F03_ALL_WIND_SPEEDS				USING_DATA_F03_WIND_SPEEDS_220_MPH				USING_DATA_F03_WIND_SPEEDS_20_MPH			
				AVE R2DAY	95% CI -R2DAY--	90% CI -R2DAY--	N	AVE R2DAY	95% CI -R2DAY--	90% CI -R2DAY--	N	AVE R2DAY	95% CI -R2DAY--	90% CI -R2DAY--	N
API-1	4.56	5.00	47.1	15	2.45	1.92	18	13.4	6.12	3.04	12	12	1.7	1.7	12
API-2	3.60	5.00	51.3	15	12.5	9.58	15	21.6	56.1	27.9	9	15.1	12.5	8.51	9
API-3	5.08	5.00	47.3	12	0.993	0.734	5	14.6	6.34	3	6	14.3	5.61	2.79	6
API-4	4.33	5.00	49.3	18	8.94	7.01	12	26.7	14.1	10.5	6	15.2	22.3	11.1	6
API-5	4.75	5.00	47.6	12	134	99.4	3	195	2.49	1.59	9	21.1	12.4	6.43	9
API-7	5.14	5.00	47.7	--	--	--	--	--	--	--	--	10.7	3.46	2.35	--
API-8	5.00	5.00	47.4	9	6.99	4.57	6	22.4	9.33	4.49	3	17.7	3.46	2.35	3
API-12	0.40	0.50	76.5	15	0.665	0.511	9	1.78	0.504	0.274	5	0.303	0.9	0.398	5
API-13	0.38	0.50	111.	18	1.19	0.829	9	7.56	2.36	1.6	9	5.87	0.953	0.647	9
API-14	0.45	0.50	110.	6	7.85	3.9	3	7.35	0.91	0.327	3	6.73	0.15	0.102	3
API-13R	0.48	0.50	110.	12	1.74	1.29	3	7.82	0.595	0.472	9	5.71	0.898	0.609	9
API-13A13R	0.42	0.50	111.	30	0.773	0.627	12	7.53	1.25	0.925	19	5.79	0.361	0.283	19
API-14R	0.46	0.50	110.	15	12.5	9.5	9	28.3	12.4	8.44	6	11.4	29.7	14.3	6
API-14A14R	0.46	0.50	110.	21	9.95	7.31	12	23.3	17.5	12.9	9	9.83	9.72	5.92	9
API-16	3.70	5.00	46.1	--	--	--	--	--	--	--	--	42.7	109	53.7	--
API-17	5.13	5.00	46.9	15	1.04	0.793	9	3.67	1.94	1.25	5	2.51	2.53	1.26	5
API-18	4.95	5.00	46.9	18	0.703	0.551	9	5.53	0.511	0.415	9	4.58	1.54	1.04	9
API-19	4.90	5.00	45.9	21	0.71	0.771	9	6.59	1.39	0.737	12	5.9	2.09	1.55	12
API-19A	4.92	5.00	45.9	24	1.53	1.31	9	6.53	5.24	3.56	15	5.52	0.529	0.406	15
API-21A	2.9H	5.00	47.5	--	--	--	--	--	--	--	--	4.79	1.35	0.919	--
API-21B	2.72	5.00	47.5	--	--	--	--	--	--	--	--	4.23	0.947	0.67	--
API-21C	2.67	5.00	47.5	--	--	--	--	--	--	--	--	4.32	0.574	0.593	--
API-21AR	2.64	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--
API-21AAR	2.84	5.00	47.5	15	2.64	2.03	6	8.14	18.1	9	9	4.79	1.35	0.918	9
API-21BR	2.60	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--
API-21BR	2.69	5.00	47.5	12	1.99	1.47	3	6.55	0.59	0.462	9	4.23	0.987	0.67	9
API-21CR	2.61	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--
API-21CR	2.65	5.00	47.5	15	1.65	1.27	5	6.3	13.1	6.52	9	4.32	0.574	0.593	9
API-22A	4.25	5.00	46.9	--	--	--	--	--	--	--	--	6.49	2.04	1.39	--
API-22B1	4.25	5.00	46.9	--	--	--	--	--	--	--	--	7.57	0.439	0.278	--
API-22C	3.80	5.00	45.9	--	--	--	--	--	--	--	--	5.59	1.61	0.8	--
API-22B	3.70	5.00	45.9	--	--	--	--	--	--	--	--	8.35	1.32	1.31	--
API-22B1,3	3.90	5.00	45.9	--	--	--	--	--	--	--	--	7.93	1.08	0.795	--
API-22C	3.77	5.00	45.9	--	--	--	--	--	--	--	--	9.65	2.14	1.45	--
API-21C	3.61	5.00	45.9	12	4.81	3.56	6	9.29	18	8.95	6	3.46	1.4	0.696	6
API-23	7.05	5.00	45.9	24	0.301	0.241	12	3.29	0.419	0.31	12	3.27	0.767	0.567	12
API-24	6.04	5.00	46.9	14	0.826	0.635	6	6.15	4.34	2.01	9	5.02	0.336	0.229	9
API-25	5.85	5.00	46.3	21	1.32	1.05	6	6.3	5.29	2.62	15	4.23	0.988	0.759	15
API-26A	3.72	5.00	46.3	21	0.575	0.457	6	5.34	10.2	5.09	15	5.45	0.622	0.477	15
API-26B	2.40	5.00	46.5	15	0.972	0.87	6	6.25	6.15	3.05	9	6.19	2.15	1.46	9
API-27A	0.73	0.50	61.3	15	0.254	0.194	6	2.35	0.234	0.101	9	1.59	0.109	0.0741	9
API-27B	0.73	0.50	61.3	--	--	--	--	--	--	--	--	1.19	0.471	0.348	--
API-27C	0.73	0.50	61.3	12	3.26	2.41	6	5.34	10.5	5.25	6	1.7	1.44	0.715	6
API-28	0.72	0.50	62.3	27	0.1	0.0371	9	0.976	0.11	0.0749	19	1.07	0.159	0.125	19



FINAL INTERNAL FLOATING ROOF EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

AVA **Documents**
Document Sharing Hub

TABLE 1 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS										USING DATA FOR WIND SPEEDS--220-MPH-----									
CBI TEST	AVE TYP	PSIA	TYP	NORM	MH	E25A	USING DATA--FOR--ALL--WIND--SPEEDS			USING DATA--FOR--WIND--SPEEDS--220-MPH			USING DATA--FOR--WIND--SPEEDS--220-MPH			USING DATA--FOR--WIND--SPEEDS--220-MPH			90% CI -E25A-
							AVE	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI	95% CI	
							EMISSIONS	-E25A-	-E25A-	-E25A-	-E25A-	-E25A-	-E25A-	-E25A-	-E25A-	-E25A-	-E25A-	-E25A-	
API-63R	0.08	0.50	0.50	0.50	105.5	75.5	0.702	0.124	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.114
API-64	0.55	0.50	0.50	0.50	105.5	75.5	0.911	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0745	0.0917
API-65	3.30	2.50	2.50	2.50	96.2	86.2	2.09	0.0971	0.0971	0.0971	0.0971	0.0971	0.0971	0.0971	0.0971	0.0971	0.0971	0.0971	0.104
API-66	3.21	2.50	2.50	2.50	86.2	86.2	2.25	1.32	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	7.5
API-66R	3.30	2.50	2.50	2.50	86.2	86.2	2.77	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.265
API-65R	3.34	2.50	2.50	2.50	86.2	86.2	3.51	0.203	0.203	0.203	0.203	0.203	0.203	0.203	0.203	0.203	0.203	0.203	0.48
API-65A	3.31	2.50	2.50	2.50	86.2	86.2	3.59	0.347	0.347	0.347	0.347	0.347	0.347	0.347	0.347	0.347	0.347	0.347	1.06
API-67A	0.43	0.50	0.50	0.50	97.5	77.5	0.759	0.201	0.201	0.201	0.201	0.201	0.201	0.201	0.201	0.201	0.201	0.201	0.254
API-67	0.36	0.50	0.50	0.50	112.5	92.5	0.559	0.0539	0.0539	0.0539	0.0539	0.0539	0.0539	0.0539	0.0539	0.0539	0.0539	0.0539	0.0411
API-68	2.76	2.50	2.50	2.50	86.2	86.2	0.903	0.0611	0.0611	0.0611	0.0611	0.0611	0.0611	0.0611	0.0611	0.0611	0.0611	0.0611	0.0741
API-69	2.95	2.50	2.50	2.50	86.2	86.2	0.617	0.0842	0.0842	0.0842	0.0842	0.0842	0.0842	0.0842	0.0842	0.0842	0.0842	0.0842	0.115
API-70	6.22	5.00	5.00	5.00	46.3	46.3	0.935	0.212	0.212	0.212	0.212	0.212	0.212	0.212	0.212	0.212	0.212	0.212	0.258
API-71	6.19	5.00	5.00	5.00	46.3	46.3	1.14	0.514	0.514	0.514	0.514	0.514	0.514	0.514	0.514	0.514	0.514	0.514	0.925
API-72	2.38	5.00	5.00	5.00	51.2	51.2	--	--	--	--	--	--	--	--	--	--	--	--	--
API-73	5.97	5.00	5.00	5.00	46.5	46.5	2.17	0.833	0.833	0.833	0.833	0.833	0.833	0.833	0.833	0.833	0.833	0.833	0.345
API-73A	5.03	5.00	5.00	5.00	46.6	46.6	2.92	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.285	0.579
API-74	5.56	5.00	5.00	5.00	46.5	46.5	2.42	0.724	0.724	0.724	0.724	0.724	0.724	0.724	0.724	0.724	0.724	0.724	0.497
API-75	5.55	5.00	5.00	5.00	46.7	46.7	3.41	1.06	0.305	0.305	0.305	0.305	0.305	0.305	0.305	0.305	0.305	0.305	0.0933
API-76	5.34	5.00	5.00	5.00	46.9	46.9	2.39	0.341	0.341	0.341	0.341	0.341	0.341	0.341	0.341	0.341	0.341	0.341	0.458
API-76R	5.35	5.00	5.00	5.00	46.3	46.3	2.03	0.349	0.349	0.349	0.349	0.349	0.349	0.349	0.349	0.349	0.349	0.349	0.39
API-76.76R	5.31	5.00	5.00	5.00	46.3	46.3	2.25	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.269	0.326
API-77	5.08	5.00	5.00	5.00	47.1	47.1	1.95	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.314	0.0064



FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

[illegible]

TABLE 2 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

CBI TEST	AVE TVP	PSIA	TVP	NORH	MW	USING DATA FOR WIND SPEEDS 1-20 MPH				USING DATA FOR WIND SPEEDS 20-40 MPH				USING DATA FOR WIND SPEEDS 40-60 MPH				USING DATA FOR WIND SPEEDS 60-80 MPH			
						USING DATA FOR WIND SPEEDS 1-20 MPH				USING DATA FOR WIND SPEEDS 20-40 MPH				USING DATA FOR WIND SPEEDS 40-60 MPH				USING DATA FOR WIND SPEEDS 60-80 MPH			
						AVE	EMIS	PSI/DAY	N	95% CI	PSI/DAY	N	95% CI	PSI/DAY	N	95% CI	PSI/DAY	N	95% CI		
API-30	0.29	5.50	105.	18	0.0316	0.00292	0.00229	9	0.0319	0.00595	9	0.0319	0.00595	9	0.0319	0.00595	9	0.0319	0.00595		
API-29R	0.29	5.50	105.	18	0.0316	0.00292	0.00229	9	0.0319	0.00595	9	0.0319	0.00595	9	0.0319	0.00595	9	0.0319	0.00595		
API-31	0.28	5.50	108.	27	0.0357	0.00508	0.00652	12	0.0344	0.0169	12	0.0344	0.0169	12	0.0344	0.0169	12	0.0344	0.0169		
API-31A	0.27	5.50	108.	12	0.0256	0.0144	0.0135	6	0.0321	0.0354	6	0.0321	0.0354	6	0.0321	0.0354	6	0.0321	0.0354		
API-32	1.02	2.50	65.2	19	0.0232	0.00561	0.0044	9	0.0233	0.00604	9	0.0233	0.00604	9	0.0233	0.00604	9	0.0233	0.00604		
API-33	2.12	2.50	96.2	24	0.0251	0.00476	0.00331	12	0.0259	0.00455	12	0.0259	0.00455	12	0.0259	0.00455	12	0.0259	0.00455		
API-33A	2.35	2.50	96.2	15	0.0317	0.00566	0.00435	9	0.035	0.00455	9	0.035	0.00455	9	0.035	0.00455	9	0.035	0.00455		
API-34	2.35	2.50	86.2	15	0.0317	0.00566	0.00435	9	0.035	0.00455	9	0.035	0.00455	9	0.035	0.00455	9	0.035	0.00455		
API-34A	2.34	2.50	86.2	19	0.0347	0.00543	0.00426	6	0.0339	0.0171	6	0.0339	0.0171	6	0.0339	0.0171	6	0.0339	0.0171		
API-35	4.07	5.00	47.5	18	0.0366	0.0066	0.00518	6	0.0399	0.0195	6	0.0399	0.0195	6	0.0399	0.0195	6	0.0399	0.0195		
API-36	4.01	5.00	47.5	19	0.0359	0.0101	0.00739	6	0.0458	0.0355	6	0.0458	0.0355	6	0.0458	0.0355	6	0.0458	0.0355		
API-37	4.02	5.00	47.5	18	0.0297	0.00365	0.00236	6	0.0324	0.0075	6	0.0324	0.0075	6	0.0324	0.0075	6	0.0324	0.0075		
API-36	3.97	5.00	47.6	19	0.0334	0.00449	0.00351	6	0.0339	0.0075	6	0.0339	0.0075	6	0.0339	0.0075	6	0.0339	0.0075		
API-39	3.91	5.00	47.2	18	0.0492	0.00727	0.0057	5	0.0535	0.0335	5	0.0535	0.0335	5	0.0535	0.0335	5	0.0535	0.0335		
API-39R	5.61	5.00	46.8	5	0.0387	0.00729	0.0053	3	0.0429	0.0075	3	0.0429	0.0075	3	0.0429	0.0075	3	0.0429	0.0075		
API-40	5.67	5.00	46.8	12	0.0301	0.0113	0.00839	3	0.0457	0.024	3	0.0457	0.024	3	0.0457	0.024	3	0.0457	0.024		
API-41	5.25	5.00	46.8	19	0.0154	0.0044	0.0035	6	0.0151	0.0075	6	0.0151	0.0075	6	0.0151	0.0075	6	0.0151	0.0075		
API-42	5.21	5.00	46.8	19	0.0176	0.00129	0.00101	6	0.0181	0.00191	6	0.0181	0.00191	6	0.0181	0.00191	6	0.0181	0.00191		
API-43	5.02	5.00	45.5	19	0.0269	0.00431	0.00338	6	0.0294	0.0056	6	0.0294	0.0056	6	0.0294	0.0056	6	0.0294	0.0056		
API-44	5.38	5.00	45.4	12	0.0149	0.00101	0.00074	5	0.0144	0.0019	5	0.0144	0.0019	5	0.0144	0.0019	5	0.0144	0.0019		
API-45	5.24	5.00	46.4	21	0.00693	0.00121	0.00083	5	0.00638	0.00135	5	0.00638	0.00135	5	0.00638	0.00135	5	0.00638	0.00135		
API-46	5.13	5.00	46.5	18	0.00928	0.00122	0.00083	5	0.00839	0.00135	5	0.00839	0.00135	5	0.00839	0.00135	5	0.00839	0.00135		
API-47	4.87	5.00	46.5	24	0.017	0.00192	0.00154	9	0.0171	0.0074	9	0.0171	0.0074	9	0.0171	0.0074	9	0.0171	0.0074		
API-48	4.64	5.00	46.6	15	0.0246	0.00514	0.00421	5	0.0294	0.0071	5	0.0294	0.0071	5	0.0294	0.0071	5	0.0294	0.0071		
API-49	4.49	5.00	46.6	18	0.0188	0.00174	0.00136	6	0.0197	0.00191	6	0.0197	0.00191	6	0.0197	0.00191	6	0.0197	0.00191		
API-50	3.60	3.50	87.0	24	0.00426	0.00142	0.00114	9	0.00595	0.00252	9	0.00595	0.00252	9	0.00595	0.00252	9	0.00595	0.00252		
API-51	0.60	3.50	87.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
API-52	5.51	5.00	49.0	18	0.0176	0.00305	0.00233	5	0.0145	0.0106	5	0.0145	0.0106	5	0.0145	0.0106	5	0.0145	0.0106		
API-53P	5.52	5.00	49.0	21	0.0407	0.00668	0.0053	9	0.0473	0.0246	9	0.0473	0.0246	9	0.0473	0.0246	9	0.0473	0.0246		
API-54	5.45	5.00	49.0	19	0.04	0.00505	0.00395	6	0.0431	0.0202	6	0.0431	0.0202	6	0.0431	0.0202	6	0.0431	0.0202		
API-55	5.31	5.00	49.0	5	0.0372	0.00515	0.00361	3	0.0375	0.0221	3	0.0375	0.0221	3	0.0375	0.0221	3	0.0375	0.0221		
API-53P.53	5.47	5.00	49.0	27	0.0399	0.00495	0.00339	12	0.0453	0.0247	12	0.0453	0.0247	12	0.0453	0.0247	12	0.0453	0.0247		
API-56	5.40	5.00	49.1	19	0.0156	0.00349	0.00274	9	0.0165	0.012	9	0.0165	0.012	9	0.0165	0.012	9	0.0165	0.012		
API-56	5.47	5.00	49.2	12	0.0334	0.00511	0.00334	6	0.036	0.023	6	0.036	0.023	6	0.036	0.023	6	0.036	0.023		
API-57	5.50	5.00	49.2	9	0.0345	0.00391	0.00256	5	0.0335	0.02	5	0.0335	0.02	5	0.0335	0.02	5	0.0335	0.02		
API-56	5.48	5.00	49.2	12	0.0413	0.00379	0.00233	6	0.0477	0.0265	6	0.0477	0.0265	6	0.0477	0.0265	6	0.0477	0.0265		
API-52R	5.53	5.00	49.0	12	0.0435	0.00379	0.00233	6	0.0477	0.0265	6	0.0477	0.0265	6	0.0477	0.0265	6	0.0477	0.0265		
API-52S.52R	5.57	5.00	49.0	30	0.04	0.00445	0.00337	12	0.0435	0.0231	12	0.0435	0.0231	12	0.0435	0.0231	12	0.0435	0.0231		
API-59	4.35	5.00	49.6	27	0.0136	0.00495	0.00339	9	0.0199	0.0177	9	0.0199	0.0177	9	0.0199	0.0177	9	0.0199	0.0177		
API-60	4.39	5.00	49.3	14	0.0474	0.00445	0.00339	5	0.0517	0.0249	5	0.0517	0.0249	5	0.0517	0.0249	5	0.0517	0.0249		
API-61	4.42	5.00	49.3	19	0.029	0.0129	0.00839	6	0.0331	0.0191	6	0.0331	0.0191	6	0.0331	0.0191	6	0.0331	0.0191		
API-62	2.56	5.00	42.0	24	0.0049	0.00645	0.00339	9	0.0064	0.00133	9	0.0064	0.00133	9	0.0064	0.00133	9	0.0064	0.00133		

TABLE 2 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

CBI TEST	USING DATA FOR WIND SPEEDS 1-20 MPH				USING DATA FOR WIND SPEEDS 20-40 MPH				USING DATA FOR WIND SPEEDS 40-60 MPH			
	AVE	95% CI	90% CI	95% CI	AVE	95% CI	90% CI	95% CI	AVE	95% CI	90% CI	95% CI
API-63R	0.80	0.50	0.50	0.50	0.80	0.50	0.50	0.50	0.80	0.50	0.50	0.50
API-64	0.55	0.50	0.50	0.50	0.55	0.50	0.50	0.50	0.55	0.50	0.50	0.50
API-65	3.30	2.50	2.50	2.50	3.30	2.50	2.50	2.50	3.30	2.50	2.50	2.50
API-66	3.21	2.50	2.50	2.50	3.21	2.50	2.50	2.50	3.21	2.50	2.50	2.50
API-66R	3.30	2.50	2.50	2.50	3.30	2.50	2.50	2.50	3.30	2.50	2.50	2.50
API-65R	3.34	2.50	2.50	2.50	3.34	2.50	2.50	2.50	3.34	2.50	2.50	2.50
API-65A	3.31	2.50	2.50	2.50	3.31	2.50	2.50	2.50	3.31	2.50	2.50	2.50
API-67A	0.43	0.50	0.50	0.50	0.43	0.50	0.50	0.50	0.43	0.50	0.50	0.50
API-67	0.36	0.50	0.50	0.50	0.36	0.50	0.50	0.50	0.36	0.50	0.50	0.50
API-68	2.96	2.50	2.50	2.50	2.96	2.50	2.50	2.50	2.96	2.50	2.50	2.50
API-69	2.95	2.50	2.50	2.50	2.95	2.50	2.50	2.50	2.95	2.50	2.50	2.50
API-70	6.22	5.00	5.00	5.00	6.22	5.00	5.00	5.00	6.22	5.00	5.00	5.00
API-71	6.19	5.00	5.00	5.00	6.19	5.00	5.00	5.00	6.19	5.00	5.00	5.00
API-72	2.38	5.00	5.00	5.00	2.38	5.00	5.00	5.00	2.38	5.00	5.00	5.00
API-73	5.97	5.00	5.00	5.00	5.97	5.00	5.00	5.00	5.97	5.00	5.00	5.00
API-73A	5.93	5.00	5.00	5.00	5.93	5.00	5.00	5.00	5.93	5.00	5.00	5.00
API-74	5.50	5.00	5.00	5.00	5.50	5.00	5.00	5.00	5.50	5.00	5.00	5.00
API-75	5.55	5.00	5.00	5.00	5.55	5.00	5.00	5.00	5.55	5.00	5.00	5.00
API-76	5.34	5.00	5.00	5.00	5.34	5.00	5.00	5.00	5.34	5.00	5.00	5.00
API-76R	5.25	5.00	5.00	5.00	5.25	5.00	5.00	5.00	5.25	5.00	5.00	5.00
API-76, 76R	5.31	5.00	5.00	5.00	5.31	5.00	5.00	5.00	5.31	5.00	5.00	5.00
API-77	5.04	5.00	5.00	5.00	5.04	5.00	5.00	5.00	5.04	5.00	5.00	5.00

TABLE 3.

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

A---USING_DATA_538_ALL_WIND_SPEEDS

CBI TEST	NORM	TVP	PSIA	AVE	N	MM	PZRM	STD. DEV.	95% CI PZDAY	95% CI PZDAY	RANGE OF EMISSIONS BASED ON				RANGE OF EMISSIONS BASED ON				RANGE OF EMISSIONS BASED ON			
											MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
API-1	5.00	4.56	5.00	47.1	18	13.4	0.952	1.72	1.72	1.72	10.9	15.8	10.9	15.8	11.4	15.3	11.4	15.3	10.9	15.8	11.4	15.3
API-2	5.00	3.60	5.00	51.0	15	21.6	4.49	12.5	9.58	9.58	9.1	34	12	34	12	31.2	12	31.2	10.8	35.7	10.8	35.7
API-3	5.00	5.08	5.00	47.3	12	14.6	0.312	0.993	0.734	0.734	13.6	15.6	13.6	15.6	13.9	15.3	13.9	15.3	13.9	15.4	13.9	15.4
API-4	5.00	4.33	5.00	49.0	18	21.5	3.48	8.94	7.01	7.01	12.6	32.5	12.6	32.5	14.5	29.5	14.5	29.5	13.5	37.8	13.5	37.8
API-5	5.00	4.75	5.00	47.6	12	63.3	42.2	134.	99.4	99.4	-71.1	199	-71.1	199	-30.1	163	-30.1	163	16.4	190.	16.4	190.
API-6	5.00	5.14	5.00	47.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-8	5.00	5.00	5.00	47.4	9	20.8	1.5	5.99	4.67	4.67	13.9	27.7	13.9	27.7	16.1	25.5	16.1	25.5	17.7	23.1	17.7	23.1
API-12	5.00	0.40	5.00	76.5	15	1.39	0.24	0.666	0.511	0.511	0.722	2.05	0.722	2.05	0.977	1.9	0.977	1.9	0.74	1.79	0.74	1.79
API-13	5.00	0.38	5.00	111.	18	6.71	0.451	1.19	0.929	0.929	5.53	7.9	5.53	7.9	5.79	7.64	5.79	7.64	5.6	8.66	5.6	8.66
API-14	5.00	0.45	5.00	110.	6	7.35	0.618	7.95	3.9	3.9	-5.01	15.2	-5.01	15.2	3.45	11.2	3.45	11.2	5.73	7.95	5.73	7.95
API-13R	5.00	0.48	5.00	110.	12	6.24	0.547	1.74	1.29	1.29	4.5	7.98	4.5	7.98	4.95	7.53	4.95	7.53	5.3	7.82	5.3	7.82
API-13.13R	5.00	0.42	5.00	111.	30	6.53	0.342	3.773	0.527	0.527	5.75	7.3	5.75	7.3	5.9	7.15	5.9	7.15	5.3	8.66	5.3	8.66
API-14R	5.00	0.46	5.00	110.	15	21.6	4.5	12.5	9.5	9.5	9.05	34.1	9.05	34.1	12	31.2	12	31.2	9.13	33	9.13	33
API-14.14R	5.00	0.46	5.00	110.	21	17.5	4.07	9.95	7.91	7.91	7.55	27.5	7.55	27.5	9.6	25.4	9.6	25.4	6.73	33	6.73	33
API-16	5.00	3.70	5.00	46.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-17	5.00	5.13	5.00	45.9	15	3.21	0.374	1.04	0.798	0.798	2.17	4.25	2.17	4.25	2.41	4	2.41	4	2.31	4.32	2.31	4.32
API-18	5.00	4.95	5.00	45.9	18	5.05	0.274	0.703	0.551	0.551	4.35	5.76	4.35	5.76	4.5	5.6	4.5	5.6	4.17	5.79	4.17	5.79
API-19	5.00	4.90	5.00	45.9	21	6.13	0.397	0.971	0.771	0.771	5.15	7.1	5.15	7.1	5.36	6.9	5.36	6.9	4.79	7.72	4.79	7.72
API-19A	5.00	4.92	5.00	45.9	24	6.75	0.609	1.63	1.31	1.31	5.11	8.38	5.11	8.38	5.44	8.05	5.44	8.05	5.2	11	5.2	11
API-21A	5.00	2.98	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21B	5.00	2.72	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21C	5.00	2.67	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21AR	5.00	2.64	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21A.4R	5.00	2.84	5.00	47.5	15	6.13	0.951	2.64	2.03	2.03	3.49	9.77	3.49	9.77	4.1	8.16	4.1	8.16	4.2	9.56	4.2	9.56
API-21BR	5.00	2.60	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21B.4R	5.00	2.69	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21CR	5.00	2.61	5.00	47.5	12	4.94	0.625	1.99	1.47	1.47	2.85	6.83	2.85	6.83	3.37	6.31	3.37	6.31	3.79	6.65	3.79	6.65
API-21C.4R	5.00	2.65	5.00	47.5	15	5.11	0.595	1.55	1.27	1.27	3.45	5.76	3.45	5.76	3.94	6.38	3.94	6.38	3.96	7.33	3.96	7.33
API-22A	5.00	4.21	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22B1	5.00	4.25	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22D	5.00	3.40	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22U	5.00	3.78	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22B1.3	5.00	3.90	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22C	5.00	3.77	5.00	45.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21C	5.00	3.61	5.00	45.8	12	5.84	1.51	4.91	3.56	3.56	1.07	13.7	1.07	13.7	2.32	9.43	2.32	9.43	3.35	9.71	3.35	9.71
API-23	5.00	7.05	5.00	45.8	24	3.27	0.127	0.301	0.241	0.241	2.97	3.57	2.97	3.57	3.03	3.51	3.03	3.51	2.71	3.83	2.71	3.83
API-24	5.00	6.84	5.00	45.8	15	5.44	0.299	0.825	0.535	0.535	4.65	6.3	4.65	6.3	4.94	6.11	4.94	6.11	4.94	6.47	4.94	6.47
API-25	5.00	6.85	5.00	45.8	21	4.97	0.541	1.32	1.05	1.05	3.64	6.29	3.64	6.29	3.92	6.02	3.92	6.02	2.86	7.22	2.86	7.22
API-26A	5.00	3.72	5.00	46.3	21	5.42	0.235	0.575	0.457	0.457	4.65	6	4.65	6	4.97	5.89	4.97	5.89	4.54	6.21	4.54	6.21
API-26B	5.00	2.40	5.00	46.5	15	6.21	0.314	0.572	0.47	0.47	5.34	7.08	5.34	7.08	5.54	6.99	5.54	6.99	5.55	7.17	5.55	7.17
API-27A	5.00	0.73	5.00	61.0	15	1.93	0.3941	0.294	0.294	0.294	1.57	2.09	1.57	2.09	1.63	2.03	1.63	2.03	1.63	2.07	1.63	2.07
API-27U	5.00	0.73	5.00	61.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-27C	5.00	0.73	5.00	61.0	12	3.37	1.02	3.26	2.41	2.41	0.117	5.53	0.117	5.53	0.965	5.78	0.965	5.78	1.59	5.87	1.59	5.87
API-28	5.00	0.72	5.00	62.0	27	1.04	0.3444	0.1	0.3407	0.3407	0.037	1.14	0.037	1.14	0.957	1.12	0.957	1.12	0.86	1.25	0.86	1.25



FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

AVA Documents
Document Sharing Hub

TABLE 3 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

503385-6817-774-8C3-VI00-GRISN---V

TABLE 3 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

BASED ON DATA FROM 1993-1994 SPEEDS 220-250 MPH

CBI TEST NO.	AVE TYP	PSIA	NORM TYP	HM	N	AVE EMISSIONS	STD. DEV.	95% CI	90% CI	RANGE OF EMISSIONS BASED ON 95% CI				RANGE OF EMISSIONS BASED ON 90% CI				RANGE OF EMISSIONS BASED ON 90% CI				RANGE OF EMISSIONS BASED ON 90% CI			
										MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
API-1	4.56	5.00	5.00	47.1	6	16.1	0.491	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-2	3.60	5.00	5.00	51.0	6	31.3	0.442	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-3	5.08	5.00	5.00	47.3	6	14.9	0.475	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-4	4.33	5.00	5.00	48.0	12	24.7	0.444	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-5	4.75	5.00	5.00	47.6	3	19.0	0.578	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-7	5.14	5.00	5.00	47.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-8	5.00	5.00	5.00	47.4	6	22.4	0.711	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-12	0.40	5.00	5.00	76.5	9	1.78	0.00938	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-13	0.38	5.00	5.00	111.	9	7.56	0.549	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-14	0.45	5.00	5.00	110.	3	7.96	0.112	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-13R	0.40	5.00	5.00	110.	3	7.02	0.152	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-13,13R	0.42	5.00	5.00	110.	12	7.63	0.393	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-14R	0.46	5.00	5.00	110.	9	28.3	2.09	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-14,14R	0.46	5.00	5.00	110.	12	23.3	5.49	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-16	3.70	5.00	5.00	46.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-17	5.13	5.00	5.00	45.9	9	3.67	0.427	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-18	4.95	5.00	5.00	45.9	9	5.53	0.142	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-19	4.90	5.00	5.00	45.9	9	6.58	0.252	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-19A	4.92	5.00	5.00	45.9	9	8.63	1.22	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-21A	2.98	5.00	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21B	2.72	5.00	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21C	2.67	5.00	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21AR	2.64	5.00	5.00	47.5	6	8.14	1.42	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-21A,AR	2.64	5.00	5.00	47.5	6	8.14	1.42	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-21BR	2.60	5.00	5.00	47.5	3	6.65	0.158	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-21B,6R	2.69	5.00	5.00	47.5	3	6.65	0.158	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-21CR	2.61	5.00	5.00	47.5	6	6.3	1.03	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-21C,CR	2.65	5.00	5.00	47.5	6	6.3	1.03	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-22A	4.21	5.00	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22B	4.25	5.00	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22B1	4.25	5.00	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22B1,3	3.78	5.00	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22C	3.77	5.00	5.00	45.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22E	3.61	5.00	5.00	45.8	6	8.29	1.42	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-23	7.05	5.00	5.00	45.8	12	3.28	0.132	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-24	6.14	5.00	5.00	45.8	6	6.15	0.314	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-25	6.15	5.00	5.00	45.8	6	6.0	0.416	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-26A	3.72	5.00	5.00	46.3	6	5.34	0.805	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-26B	3.40	5.00	5.00	46.3	6	6.25	0.416	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-27A	0.73	5.00	5.00	61.0	6	2.06	0.0151	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-27B	0.73	5.00	5.00	61.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
API-27C	0.73	5.00	5.00	61.0	6	5.04	0.812	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4
API-28	0.72	5.00	5.00	62.0	9	0.976	0.0045	5.12	3.04	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4	-24.9	31.4



TABLE 3 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS																
*****USING DATA FROM FILE SPEEDS_220.H2R*****																
CBI TEST	AVE TVP	NORM TVP	MM RZBY-	N	AVE EMISS RZDAY	STD. DEV. RZDAY	95% CI		90% CI		RANGE OF EMISSIONS BASED ON 95% CI				RANGE OF EMISS. BASED ON DATA MIN. MAX.	
							MIN. RZDAY	MAX. RZDAY	MIN. RZDAY	MAX. RZDAY	MIN. RZDAY	MAX. RZDAY	MIN. RZDAY	MAX. RZDAY		
API-29R	0.29	0.50	105.	9	3.35	0.17	0.729	0.495	19.4	46.3	-10.9	46.3	3.01	3.53		
API-31	0.28	0.50	109.	12	3.71	0.572	1.52	1.35	1.89	5.53	-1.59	37.1	4.47	25.3		
API-31A	0.27	0.50	108.	6	3.47	0.301	3.42	1.9	7.29	5.06	1.57	5.37	3.16	3.77		
API-32	1.92	2.50	86.2	9	2.05	0.121	0.521	0.353	1.53	2.57	1.7	2.91	1.9	2.29		
API-33	2.12	2.50	86.2	3	2.64	0.0912	0.393	0.266	2.25	3.03	2.37	2.91	2.59	3.02		
API-33A	2.28	2.50	86.2	12	2.32	0.297	0.945	0.699	1.39	3.27	1.52	3.02	1.8	3.03		
API-34	2.35	2.50	86.2	9	3.02	0.0349	0.3379	0.257	2.93	3.06	2.99	3.04	3	3.03		
API-34A	2.34	2.50	86.2	6	2.91	0.116	1.48	0.734	1.43	4.39	2.18	3.04	2.79	3.03		
API-35	4.07	5.00	47.5	6	1.09	0.0073	0.3928	0.461	1.0	1.99	1.55	1.94	1.59	1.9		
API-36	4.01	5.00	47.5	6	2.17	0.237	3.32	1.5	-0.42	5.19	0.576	3.67	1.94	2.41		
API-37	4.02	5.00	47.5	6	1.54	0.201	2.55	1.27	-1.01	4.09	0.269	2.8	1.34	1.74		
API-38	3.97	5.00	47.2	6	1.61	0.201	3.57	1.77	-1.95	5.19	-1.65	3.38	1.33	1.89		
API-39	3.91	5.00	47.2	6	2.53	0.124	1.50	0.786	0.945	4.11	1.74	3.31	2.4	2.65		
API-39R	5.61	5.00	46.8	3	2.01	0.30959	0.3374	0.254	1.97	2.04	1.98	2.03	2	2.01		
API-40	5.67	5.00	46.8	3	1.91	0.261	1.12	0.762	0.793	3.03	1.14	2.67	1.64	2.17		
API-41	5.25	5.00	46.8	6	0.706	0.0253	0.329	0.163	0.379	1.03	0.544	0.869	0.581	0.732		
API-42	5.21	5.00	46.8	6	0.849	0.0705	0.395	0.445	-0.467	1.75	0.404	1.29	0.779	0.92		
API-43	5.02	5.00	46.5	6	1.37	0.0937	1.19	0.592	0.175	2.56	0.774	1.96	1.27	1.46		
API-44	5.38	5.00	46.4	6	0.668	0.0153	0.191	0.0964	0.474	0.852	0.571	0.764	3.652	0.683		
API-45	5.24	5.00	46.4	6	0.296	0.0232	0.295	0.146	0.03125	5.531	0.15	3.43	0.273	0.319		
API-46	4.87	5.00	46.5	6	0.405	0.0461	0.585	0.291	-1	1.07	0.194	0.776	0.439	0.531		
API-47	4.87	5.00	46.5	9	0.793	0.3793	0.344	0.233	0.449	1.14	0.56	1.03	0.634	0.684		
API-48	4.64	5.00	46.6	6	1.37	0.209	2.56	1.32	-1.23	4.03	0.3497	2.59	1.16	1.58		
API-49	4.49	5.00	46.6	6	0.87	0.0594	0.981	0.438	-0.113	1.75	0.432	1.31	0.9	0.939		
API-50	0.60	0.50	87.0	9	0.218	0.0507	0.219	0.149	0.299	0.737	0.369	0.666	0.457	0.619		
API-51	5.51	5.00	48.0	6	2	0.409	5.2	2.59	-3.2	7.2	-5.86	4.98	1.59	2.41		
API-52	5.52	5.00	48.0	6	2.3	0.3513	0.221	0.15	2.03	2.52	2.15	2.45	2.19	2.35		
API-53P	5.45	5.00	48.0	9	1.92	0.303	3.55	1.91	-1.93	5.77	0.103	3.94	1.62	2.23		
API-54	5.31	5.00	48.0	3	1.81	0.30471	0.3232	0.3137	1.77	1.83	1.79	1.92	1.9	1.81		
API-55	5.47	5.00	48.1	12	2.17	0.128	0.407	0.201	1.77	2.59	1.37	2.47	2.35	2.35		
API-56	5.47	5.00	48.2	6	0.799	0.134	0.575	0.391	0.222	1.39	0.408	1.19	0.658	1.07		
API-57	5.47	5.00	48.2	6	1.74	0.0647	1.39	0.535	0.059	2.81	1.2	2.27	1.55	1.82		
API-58	5.50	5.00	48.2	6	1.66	0.0759	0.955	0.479	0.698	2.63	1.15	2.14	1.59	1.74		
API-59	5.48	5.00	48.2	6	2.3	0.101	1.20	0.635	1.02	3.59	1.57	2.94	2.2	2.4		
API-60	5.53	5.00	48.0	6	2.14	0.221	2.5	1.39	-1.22	4.99	0.769	3.57	1.96	2.4		
API-61	5.52	5.00	48.6	12	2.09	0.197	0.527	0.464	1.45	2.72	1.53	2.55	1.59	2.41		
API-62	4.35	5.00	49.0	9	2.91	0.2	0.36	0.144	2.05	3.77	2.33	3.5	2.64	3.3		
API-63	4.39	5.00	49.0	6	3.02	0.37	4.7	2.14	-1.67	7.72	0.589	5.36	2.55	3.39		
API-64	4.46	5.00	49.0	9	3.69	0.287	1.23	0.337	2.45	4.93	2.56	4.53	3.32	4.26		
API-65	2.96	5.00	52.0	6	3.33	0.00543	0.057	0.343	3.25	3.4	1.29	3.36	3.32	3.33		



FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS



TABLE 3 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CRT DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

C4--USING DATA--E3R--P1X3--SPECIES--S--US--E--20--228													RANGE OF EMISSIONS BASED ON				RANGE OF EMISSIONS BASED ON DATA--			
CBI TEST	AVE TVP	NORM TVP	MW 229.9	N	AVE EMISSIONS P2DAY	STD. DEV. P2DAY	95% CI		90% CI		25% CI		90% CI		25% CI		MIN. MAX.		MIN. MAX.	
							-P2DAY-	+P2DAY+	-P2DAY-	+P2DAY+	-P2DAY-	+P2DAY+	-P2DAY-	+P2DAY+	-P2DAY-	+P2DAY+	-P2DAY-	+P2DAY+	-P2DAY-	+P2DAY+
API-1	4.76	5.00	47.1	12	12	0.534	1.7	12.5	1.26	9.51	10.3	2.57	27.5	10.7	13.2	10.7	13.2	10.7	13.2	
API-2	3.60	5.00	51.0	9	15.1	2.91	12.5	12.5	9.51	9.51	2.57	27.5	5.6	23.6	10.8	20.7	10.8	20.7		
API-3	5.08	5.00	47.3	6	14.3	5.441	5.51	5.51	2.79	2.79	8.71	19.9	11.5	23.6	13.9	14.8	13.5	17		
API-4	4.33	5.00	48.0	6	15.2	1.76	22.3	22.3	11.1	11.1	-7.09	37.5	4.14	26.3	13.5	17	13.5	17		
API-5	4.75	5.00	47.6	9	21.1	2.96	12.4	12.4	9.43	9.43	8.69	33.5	12.7	29.5	15.4	26.3	15.4	26.3		
API-7	5.14	5.00	47.7	9	10.7	0.895	3.45	3.45	2.35	2.35	7.23	14.2	4.34	13	9.17	11.9	9.17	11.9		
API-8	5.00	5.00	47.4	3	17.7	0.151	3.592	3.592	0.47	0.47	17	17.3	17.3	19.2	17.6	17.9	17.6	17.9		
API-12	0.40	0.50	76.5	6	0.903	0.053	3.4	3.4	0.398	0.398	0.0241	1.5	0.405	1.2	0.74	0.866	0.74	0.866		
API-13	0.38	0.50	111.	9	5.87	0.222	3.953	3.953	0.647	0.647	4.92	6.92	5.22	6.52	5.6	6.31	5.6	6.31		
API-14	0.45	0.50	110.	3	6.73	0.035	3.15	3.15	0.102	0.102	6.59	6.59	6.03	6.83	6.69	6.76	6.69	6.76		
API-13R	0.48	0.50	110.	9	5.71	0.239	3.393	3.393	0.603	0.603	4.92	6.92	5.51	6.32	5.3	5.97	5.3	5.97		
API-13,13R	0.42	0.50	110.	18	5.79	0.14	3.361	3.361	0.249	0.249	5.43	6.15	5.51	6.07	5.3	6.31	5.3	6.31		
API-14R	0.46	0.50	110.	6	11.4	2.25	29.7	29.7	14.3	14.3	-17.3	40.1	-2.98	25.6	9.13	13.6	9.13	13.6		
API-16	3.70	5.00	46.1	6	9.53	2.03	9.72	9.72	5.92	5.92	1.11	15.5	3.91	15.9	6.73	13.6	6.73	13.6		
API-16	3.70	5.00	46.1	6	42.7	0.51	109	109	53.7	53.7	-65.5	151	-11.1	55.4	34.2	51.2	34.2	51.2		
API-17	5.13	5.00	45.9	6	2.51	0.199	2.53	2.53	1.26	1.26	-0.268	5.04	1.25	3.76	2.31	2.71	2.31	2.71		
API-18	4.95	5.00	45.9	9	4.58	0.357	1.54	1.54	1.04	1.04	3.04	6.11	3.54	5.62	4.17	5.29	4.17	5.29		
API-19	4.90	5.00	45.9	12	5.0	0.67	2.59	2.59	1.55	1.55	3.7	7.56	4.25	7.34	4.79	7.22	4.79	7.22		
API-19A	4.92	5.00	45.9	15	5.62	0.171	3.529	3.529	0.406	0.406	5.09	6.15	5.21	5.02	5.2	6.23	5.2	6.23		
API-21A	2.98	5.00	47.5	9	4.79	0.314	1.35	1.35	0.318	0.318	3.44	6.15	3.97	5.71	4.2	5.27	4.2	5.27		
API-21B	2.72	5.00	47.5	9	4.23	0.229	3.097	3.097	0.67	0.67	3.25	3.25	3.56	4.9	3.79	4.56	3.79	4.56		
API-21C	2.67	5.00	47.5	9	4.32	0.231	3.074	3.074	0.593	0.593	3.44	5.19	3.73	4.91	3.96	4.67	3.96	4.67		
API-21AR	2.64	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
API-21A,AS	2.64	5.00	47.5	9	4.79	0.314	1.35	1.35	0.318	0.318	3.44	6.15	3.97	5.71	4.2	5.27	4.2	5.27		
API-21B,AS	2.60	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
API-21C,AS	2.61	5.00	47.5	9	4.23	0.229	3.067	3.067	0.67	0.67	3.25	3.25	3.56	4.9	3.79	4.56	3.79	4.56		
API-21C,CR	2.61	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
API-22A	4.21	5.00	45.8	9	6.32	0.293	3.374	3.374	0.593	0.593	3.44	5.19	3.73	4.91	3.96	4.67	3.96	4.67		
API-22B	4.25	5.00	45.8	3	7.57	0.0951	2.04	2.04	1.39	1.39	4.45	8.54	5.11	7.98	5.57	7.15	5.57	7.15		
API-22D	3.60	5.00	45.8	6	5.69	0.127	1.51	1.51	0.9	0.9	7.15	7.15	7.29	7.55	7.16	7.64	7.16	7.64		
API-22B	3.73	5.00	45.8	9	4.05	0.447	1.32	1.32	1.31	1.31	6.12	9.97	6.74	9.35	5.57	5.82	5.57	5.82		
API-22B,13	3.90	5.00	45.8	12	7.03	0.434	1.34	1.34	1.31	1.31	6.85	9	7.13	9.72	7.25	8.79	7.25	8.79		
API-22C	3.77	5.00	45.8	9	9.64	0.495	2.14	2.14	1.95	1.95	6.95	11.9	9.2	11.1	9.55	10.2	9.55	10.2		
API-21E	3.61	5.00	45.8	6	4.44	0.11	1.4	1.4	0.96	0.96	7.51	9.2	11.1	9.55	10.2	10.2	10.2	10.2		
API-23	7.05	5.00	45.8	12	1.27	0.041	3.297	3.297	0.67	0.67	2.55	4.06	2.76	4.15	3.35	3.57	3.35	3.57		
API-24	6.84	5.00	45.8	9	5.02	0.0742	3.335	3.335	0.240	0.240	4.63	4.63	4.93	5.25	4.94	5.19	4.94	5.19		
API-25	6.05	5.00	45.8	15	4.24	0.356	3.343	3.343	0.769	0.769	3.25	3.25	3.49	4.99	2.96	4.85	2.96	4.85		
API-26A	3.72	5.00	46.3	15	5.45	0.356	3.343	3.343	0.767	0.767	4.03	4.03	4.94	5.03	4.83	6.21	4.83	6.21		
API-26B	2.40	5.00	46.4	6	6.14	0.6	2.15	2.15	1.46	1.46	4.03	4.03	4.72	7.64	5.55	7.17	5.55	7.17		
API-27A	0.73	0.50	61.0	9	1.66	0.055	3.154	3.154	0.771	0.771	1.47	1.70	1.51	1.76	1.63	1.72	1.63	1.72		
API-27E	0.73	0.50	61.0	12	1.75	0.104	3.164	3.164	0.765	0.765	1.57	1.57	1.54	1.54	3.999	1.63	3.999	1.63		
API-27C	0.73	0.50	61.0	6	1.7	0.115	3.154	3.154	0.771	0.771	1.47	1.70	1.51	1.76	1.63	1.72	1.63	1.72		
API-26	6.72	0.50	62.0	15	1.37	0.0315	3.154	3.154	0.771	0.771	1.47	1.70	1.51	1.76	1.63	1.72	1.63	1.72		

TABLE 3 (CONTINUED)

FINAL INTERVAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CRT DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

CBI TEST	AVE TYP	NORM TYP	PM P251	U	AVL E200	STD. DEV.	35K CI -P200	90K CI -P200	RANGE OF EMISSIONS BASED ON 35K-90K DATA				RANGE OF EMISSIONS BASED ON DATA 41K-90K			
									MIN.	MAX.	41K -P200	MAX. -P200	MIN.	MAX. -P200	41K -P200	MAX. -P200
API-30	0.29	0.50	105.	9	12.3	0.203	0.504	0.504	2.81	25.5	4.16	2.59	2.81	25.5	2.98	15.4
API-29R	0.29	0.50	105.	9	12.3	0.203	0.504	0.504	2.81	25.5	4.16	2.59	2.81	25.5	2.98	15.4
API-31	0.27	0.50	108.	15	3.97	0.550	1.55	1.19	2.42	5.52	2.78	5.16	2.42	5.52	1.79	4.81
API-31A	0.27	0.50	108.	6	2.07	0.504	1.57	3.31	5.6	9.74	-1.74	5.98	5.6	9.74	1.46	2.67
API-32	1.92	2.50	46.2	9	1.95	0.4	1.72	1.17	0.228	3.67	0.781	3.12	0.228	3.67	1.21	2.58
API-33	2.12	2.50	46.2	--	--	--	--	--	--	--	--	--	--	--	--	--
API-33A	2.29	2.50	46.2	12	2.01	0.19	0.505	0.449	1.41	2.62	1.56	2.46	1.41	2.62	1.64	2.54
API-34	2.35	2.50	46.2	6	2.3	0.353	0.584	0.34	1.62	2.99	1.96	2.54	1.62	2.99	2.25	2.36
API-34A	2.34	2.50	46.2	12	3.03	0.281	0.395	0.502	2.14	3.93	2.37	3.59	2.14	3.93	2.66	3.86
API-35	4.07	5.00	47.5	12	1.66	0.175	0.561	0.415	1.1	2.22	1.24	2.07	1.1	2.22	1.25	2.04
API-36	4.01	5.00	47.5	12	1.47	0.147	0.469	0.347	1	1.94	1.12	1.92	1	1.94	1.19	1.72
API-37	4.02	5.00	47.5	12	1.35	0.325	0.334	0.3023	1.25	1.43	1.29	1.41	1.25	1.43	1.28	1.39
API-38	3.97	5.00	47.6	12	1.58	0.3627	0.4	0.148	1.34	1.78	1.43	1.73	1.34	1.78	1.4	1.67
API-39	3.91	5.00	47.2	13	2.22	0.174	0.565	0.418	1.55	2.79	1.9	2.54	1.55	2.79	1.73	2.57
API-39R	3.61	5.00	46.8	3	1.62	0.3063	0.329	0.32	1.53	1.55	1.6	1.64	1.53	1.55	1.61	1.62
API-40	5.67	5.00	46.8	9	1.74	0.3773	0.375	0.3014	1.12	1.36	1.16	1.32	1.12	1.36	1.2	1.3
API-41	5.45	5.00	46.8	12	0.729	0.337	0.375	0.557	0.54	0.805	0.574	0.795	0.54	0.805	0.576	0.798
API-42	5.21	5.00	46.8	12	0.813	0.302	0.364	0.376	0.48	0.877	0.765	0.96	0.48	0.877	0.772	0.688
API-43	5.02	5.00	46.5	12	1.19	0.132	0.323	0.239	0.78	1.51	0.952	1.43	0.78	1.51	1	1.44
API-44	5.24	5.00	46.4	15	0.332	0.311	0.141	0.372	0.67	0.853	0.541	0.782	0.67	0.853	0.7	0.723
API-45	5.13	5.00	46.5	12	0.434	0.3117	0.337	0.375	0.87	0.418	0.245	0.398	0.87	0.418	0.268	0.408
API-47	4.87	5.00	46.5	15	0.759	0.3457	0.127	0.375	0.631	0.442	0.377	0.432	0.631	0.442	0.385	0.432
API-48	4.64	5.00	46.6	12	1.03	0.3413	0.133	0.3983	0.632	1.17	0.935	1.13	0.632	1.17	0.911	1.09
API-49	4.43	5.00	46.6	12	0.601	0.3607	0.13	0.398	0.752	1.31	0.785	0.977	0.752	1.31	0.769	0.959
API-50	0.60	0.50	47.5	15	0.252	0.3412	0.114	0.378	0.159	0.347	0.194	0.37	0.159	0.347	0.179	0.422
API-51	0.40	0.50	47.5	16	3.41	0.565	1.46	1.14	1.95	4.67	2.27	4.55	1.95	4.67	1.65	5.07
API-52	5.51	5.00	48.0	12	1.71	0.3747	0.251	0.195	1.55	1.96	1.53	1.9	1.55	1.96	1.91	1.91
API-53P	5.52	5.00	48.0	12	1.7	0.3657	0.273	0.302	1.42	1.97	1.49	1.9	1.42	1.97	1.52	1.87
API-54	5.45	5.00	48.0	12	1.32	0.3023	0.264	0.195	1.65	2.18	1.72	2.11	1.65	2.18	1.7	2.07
API-53	5.31	5.00	48.0	3	1.77	0.3247	0.102	0.391	1.55	1.37	1.7	1.84	1.55	1.37	1.75	1.79
API-53P	5.47	5.00	48.1	15	1.71	0.363	0.133	0.145	1.52	1.89	1.57	1.86	1.52	1.89	1.52	1.87
API-55	5.40	5.00	48.2	9	0.699	0.3103	0.13	0.395	0.59	0.829	0.511	0.788	0.59	0.829	0.665	0.75
API-56	5.47	5.00	48.2	6	1.52	0.3745	0.131	0.302	0.613	2.53	1.92	2.03	0.613	2.53	1.44	1.6
API-57	5.50	5.00	48.2	3	1.65	0.3745	0.131	0.302	0.613	2.53	1.92	2.03	0.613	2.53	1.44	1.6
API-58	5.43	5.00	48.2	6	1.97	0.17	0.374	0.376	1.55	3.39	1.12	2.53	1.55	3.39	1.75	1.99
API-52R	5.52	5.00	48.0	6	1.99	0.3345	0.134	0.115	1.65	2.43	1.77	2.21	1.65	2.43	1.96	2.03
API-52R	5.52	5.00	48.0	15	1.0	0.3771	0.1	0.167	1.6	2	1.65	1.96	1.6	2	1.53	2.03
API-59	4.95	5.00	48.1	15	0.65	0.3753	0.183	0.167	1.6	2.43	1.77	2.21	1.6	2.43	1.96	2.03
API-60	4.99	5.00	48.0	9	0.77	0.377	0.17	0.167	1.6	2.43	1.77	2.21	1.6	2.43	1.96	2.03
API-61	4.96	5.00	48.0	9	0.77	0.377	0.17	0.167	1.6	2.43	1.77	2.21	1.6	2.43	1.96	2.03
API-62	4.96	5.00	48.0	15	0.77	0.377	0.17	0.167	1.6	2.43	1.77	2.21	1.6	2.43	1.96	2.03

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS



TABLE 4

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CSI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

A.---USING DATA E31-ALL-WIND-SECS

CSI TEST	AVE TVP	AVE PSIA	NORM TVP	MW	N	AVE EMIS PSY/DAY	STO. DEV.	95% CI PSY/DAY	90% CI PSY/DAY	RANGE OF EMISSIONS BASED ON				RANGE OF EMIS. BASED ON DATA			
										MIN.	MAX.	95% CI MIN.	95% CI MAX.	MIN.	MAX.	95% CI MIN.	95% CI MAX.
API-1	4.56	5.00	47.1	18	0.283	0.0202	0.0319	0.0407	0.0335	0.232	0.335	0.243	0.324	0.228	0.353	0.229	0.353
API-2	3.60	5.00	51.0	15	0.423	0.0081	0.245	0.168	0.179	0.568	0.235	0.235	0.511	0.212	0.7	0.293	0.325
API-3	5.08	5.00	47.3	12	0.309	0.0066	0.321	0.3155	0.288	0.33	0.293	0.324	0.595	0.293	0.766	0.291	0.766
API-4	4.33	5.00	48.3	18	0.449	0.0725	0.196	0.146	0.252	0.635	0.203	0.342	0.344	0.344	3.99	0.344	3.99
API-5	4.75	5.00	47.5	12	1.33	0.087	2.92	-1.19	4.15	---	---	---	---	---	---	---	---
API-7	5.14	5.00	47.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-8	5.00	5.00	47.4	9	0.439	0.0333	0.145	0.0985	0.294	0.584	0.341	0.538	0.374	0.487	0.374	0.487	0.487
API-12	0.40	0.50	76.5	15	0.0181	0.03313	0.0397	0.03069	0.03944	0.0268	0.0115	0.0249	0.03967	0.0234	0.03967	0.0234	0.03967
API-13	0.33	0.50	111.	18	0.0405	0.00415	0.0107	0.00837	0.0490	0.0712	0.0521	0.0689	0.3505	0.078	0.3505	0.078	0.3505
API-14	0.45	0.50	110.	6	0.0669	0.00551	0.0113	0.0355	-0.0855	0.138	0.0313	0.102	0.3512	0.0724	0.3512	0.0724	0.3512
API-13R	0.48	0.50	110.	12	0.0567	0.03499	0.0159	0.0117	0.0439	0.0725	0.045	0.0695	0.0492	0.0711	0.045	0.0695	0.0492
API-13R	0.42	0.50	111.	30	0.059	0.03307	0.02695	0.03563	0.352	0.0659	0.0534	0.0646	0.3482	0.078	0.3482	0.078	0.3482
API-14R	0.45	0.50	110.	15	0.196	0.0409	0.114	0.0873	0.3924	0.31	0.109	0.293	0.393	0.3	0.393	0.3	0.393
API-14R	0.46	0.50	110.	21	0.159	0.037	0.0395	0.0319	0.3596	0.25	0.0472	0.231	0.3612	0.3	0.3612	0.3	0.3612
API-16	3.70	5.00	46.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-17	5.13	5.00	45.9	15	0.0698	0.00616	0.0227	0.0174	0.0472	0.0925	0.0524	0.0872	0.3502	0.0941	0.3502	0.0941	0.3502
API-18	4.95	5.00	45.9	13	0.11	0.00596	0.0153	0.012	0.0489	0.125	0.0981	0.122	0.3939	0.126	0.3939	0.126	0.3939
API-19	4.70	5.00	45.9	21	0.134	0.00865	0.0212	0.0168	0.112	0.155	0.117	0.15	0.104	0.169	0.104	0.169	0.169
API-19A	4.92	5.00	45.9	24	0.147	0.015	0.0355	0.0205	0.111	0.192	0.119	0.175	0.113	0.239	0.113	0.239	0.239
API-21A	2.98	5.00	47.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-21B	2.72	5.00	47.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-21C	2.67	5.00	47.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-21AR	2.64	5.00	47.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-21A,AR	2.64	5.00	47.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-21BR	2.60	5.00	47.5	15	0.129	0.02	0.0356	0.0427	0.0734	0.185	0.0863	0.172	0.3984	0.201	0.3984	0.201	0.3984
API-21BR	2.60	5.00	47.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-21B,AR	2.69	5.00	47.5	12	0.102	0.0132	0.0419	0.031	0.06	0.144	0.0709	0.133	0.3799	0.14	0.3799	0.14	0.3799
API-21CR	2.61	5.00	47.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-21C,CR	2.65	5.00	47.5	15	0.108	0.0125	0.0340	0.03267	0.0728	0.142	0.0809	0.134	0.3935	0.154	0.3935	0.154	0.3935
API-22A	4.21	5.00	45.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-22B	4.25	5.00	45.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-22B	3.80	5.00	45.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-22B	3.78	5.00	45.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-22B,61	3.90	5.00	45.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-22C	3.77	5.00	45.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-22C	3.01	5.00	45.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-23	7.05	5.00	45.9	24	0.0714	0.00270	0.0355	0.03777	0.0233	0.233	0.0506	0.206	0.0731	0.212	0.0731	0.212	0.212
API-23	6.84	5.00	45.9	15	0.12	0.0065	0.0319	0.0139	0.102	0.138	0.106	0.133	0.109	0.0837	0.109	0.0837	0.0837
API-24	6.84	5.00	45.9	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-25	6.84	5.00	45.9	21	0.108	0.0114	0.0209	0.023	0.0796	0.137	0.0855	0.131	0.0825	0.159	0.0825	0.159	0.159
API-26A	3.72	5.00	46.1	21	0.117	0.00507	0.0114	0.00986	0.105	0.14	0.107	0.127	0.098	0.134	0.107	0.134	0.134
API-26B	4.40	5.00	46.1	15	0.126	0.00649	0.0114	0.0130	0.11	0.146	0.114	0.142	0.115	0.148	0.115	0.148	0.148
API-26B	4.40	5.00	46.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-27A	6.73	5.00	61.0	15	0.63	0.03153	0.03424	0.03025	0.0256	0.0463	0.0268	0.0333	0.0268	0.034	0.0268	0.034	0.034
API-27B	6.73	5.00	61.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---
API-27C	6.73	5.00	61.0	12	0.0453	0.0163	0.0334	0.03095	0.03192	0.109	0.0156	0.048	0.0261	0.0963	0.0156	0.0963	0.0963
API-28	0.72	0.50	62.0	27	0.0167	71-4	0.03161	0.0313	0.0151	0.0183	0.0154	0.018	0.0139	0.0202	0.018	0.0139	0.0202



TABLE 4 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

A---USING DATA---E31-ALC---E111-SECE23

CBI TEST	AVE TVP	AVE E31A	TVP	NDCM	W	Y	AVE E31A	DEV.	STC.	RANGE OF EMISSIONS BASED ON 25% CL				RANGE OF EMISSIONS BASED ON 50% CL				RANGE OF EMISSIONS BASED ON DATA			
										MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
API-29R	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.0316	0.0316	0.0316	0.0316	0.0316	0.0316	0.0316	0.0316	0.0316	0.0316	0.0316	0.0316	0.0316	0.0316
API-31	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.0337	0.0337	0.0337	0.0337	0.0337	0.0337	0.0337	0.0337	0.0337	0.0337	0.0337	0.0337	0.0337	0.0337
API-31A	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.0256	0.0256	0.0256	0.0256	0.0256	0.0256	0.0256	0.0256	0.0256	0.0256	0.0256	0.0256	0.0256	0.0256
API-32	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232
API-33	2.12	2.12	2.12	2.12	2.12	2.12	2.12	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232
API-33A	2.28	2.28	2.28	2.28	2.28	2.28	2.28	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232	0.0232
API-34	2.35	2.35	2.35	2.35	2.35	2.35	2.35	0.0317	0.0317	0.0317	0.0317	0.0317	0.0317	0.0317	0.0317	0.0317	0.0317	0.0317	0.0317	0.0317	0.0317
API-34A	2.34	2.34	2.34	2.34	2.34	2.34	2.34	0.0367	0.0367	0.0367	0.0367	0.0367	0.0367	0.0367	0.0367	0.0367	0.0367	0.0367	0.0367	0.0367	0.0367
API-35	4.07	4.07	4.07	4.07	4.07	4.07	4.07	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366	0.0366
API-36	4.01	4.01	4.01	4.01	4.01	4.01	4.01	0.0369	0.0369	0.0369	0.0369	0.0369	0.0369	0.0369	0.0369	0.0369	0.0369	0.0369	0.0369	0.0369	0.0369
API-37	4.02	4.02	4.02	4.02	4.02	4.02	4.02	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297
API-38	3.97	3.97	3.97	3.97	3.97	3.97	3.97	0.0334	0.0334	0.0334	0.0334	0.0334	0.0334	0.0334	0.0334	0.0334	0.0334	0.0334	0.0334	0.0334	0.0334
API-39	3.91	3.91	3.91	3.91	3.91	3.91	3.91	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492	0.0492
API-39R	5.01	5.01	5.01	5.01	5.01	5.01	5.01	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307
API-40	5.67	5.67	5.67	5.67	5.67	5.67	5.67	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301
API-41	5.25	5.25	5.25	5.25	5.25	5.25	5.25	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154	0.0154
API-42	5.21	5.21	5.21	5.21	5.21	5.21	5.21	0.0176	0.0176	0.0176	0.0176	0.0176	0.0176	0.0176	0.0176	0.0176	0.0176	0.0176	0.0176	0.0176	0.0176
API-43	5.02	5.02	5.02	5.02	5.02	5.02	5.02	0.0269	0.0269	0.0269	0.0269	0.0269	0.0269	0.0269	0.0269	0.0269	0.0269	0.0269	0.0269	0.0269	0.0269
API-44	5.38	5.38	5.38	5.38	5.38	5.38	5.38	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149	0.0149
API-45	5.24	5.24	5.24	5.24	5.24	5.24	5.24	0.00693	0.00693	0.00693	0.00693	0.00693	0.00693	0.00693	0.00693	0.00693	0.00693	0.00693	0.00693	0.00693	0.00693
API-46	5.13	5.13	5.13	5.13	5.13	5.13	5.13	0.00928	0.00928	0.00928	0.00928	0.00928	0.00928	0.00928	0.00928	0.00928	0.00928	0.00928	0.00928	0.00928	0.00928
API-47	4.87	4.87	4.87	4.87	4.87	4.87	4.87	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017
API-48	4.64	4.64	4.64	4.64	4.64	4.64	4.64	0.0246	0.0246	0.0246	0.0246	0.0246	0.0246	0.0246	0.0246	0.0246	0.0246	0.0246	0.0246	0.0246	0.0246
API-49	4.49	4.49	4.49	4.49	4.49	4.49	4.49	0.0186	0.0186	0.0186	0.0186	0.0186	0.0186	0.0186	0.0186	0.0186	0.0186	0.0186	0.0186	0.0186	0.0186
API-50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042
API-51	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042	0.0042
API-52	5.51	5.51	5.51	5.51	5.51	5.51	5.51	0.0376	0.0376	0.0376	0.0376	0.0376	0.0376	0.0376	0.0376	0.0376	0.0376	0.0376	0.0376	0.0376	0.0376
API-53	5.52	5.52	5.52	5.52	5.52	5.52	5.52	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407
API-54	5.45	5.45	5.45	5.45	5.45	5.45	5.45	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372	0.0372
API-55	5.47	5.47	5.47	5.47	5.47	5.47	5.47	0.0399	0.0399	0.0399	0.0399	0.0399	0.0399	0.0399	0.0399	0.0399	0.0399	0.0399	0.0399	0.0399	0.0399
API-56	5.40	5.40	5.40	5.40	5.40	5.40	5.40	0.0338	0.0338	0.0338	0.0338	0.0338	0.0338	0.0338	0.0338	0.0338	0.0338	0.0338	0.0338	0.0338	0.0338
API-57	5.40	5.40	5.40	5.40	5.40	5.40	5.40	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355
API-58	5.40	5.40	5.40	5.40	5.40	5.40	5.40	0.0433	0.0433	0.0433	0.0433	0.0433	0.0433	0.0433	0.0433	0.0433	0.0433	0.0433	0.0433	0.0433	0.0433
API-59	5.41	5.41	5.41	5.41	5.41	5.41	5.41	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446
API-60	5.40	5.40	5.40	5.40	5.40	5.40	5.40	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446
API-61	5.40	5.40	5.40	5.40	5.40	5.40	5.40	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446
API-62	5.40	5.40	5.40	5.40	5.40	5.40	5.40	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446	0.0446

TABLE 4 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE C91 DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

CBI TEST	AVE TVP	PSIA	TVP	NORM	MM	N	AVE EMIS	STD. DEV.	95% CI	RANGE OF EMISSIONS BASED ON 95% CI				RANGE OF EMISSIONS BASED ON DATA			
										MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
API-63R	0.88	0.50	75.5	0.50	75.5	12	0.0093	0.00164	0.00765	0.0109	0.00808	0.0105	0.0137	0.00808	0.0137	0.0104	0.0137
API-64	0.55	0.50	105.	0.50	105.	27	0.0067	0.00164	0.00506	0.00938	0.00808	0.00938	0.0109	0.00808	0.0109	0.0104	0.0137
API-65	3.30	2.50	86.2	2.50	86.2	21	0.0242	0.0055	0.0225	0.0259	0.0225	0.0259	0.0274	0.0225	0.0274	0.0259	0.0274
API-66	3.21	2.50	86.2	2.50	86.2	15	0.0378	0.0055	0.0361	0.0395	0.0361	0.0395	0.0410	0.0361	0.0410	0.0395	0.0410
API-66R	3.30	2.50	86.2	2.50	86.2	33	0.0322	0.0055	0.0305	0.0339	0.0305	0.0339	0.0354	0.0305	0.0354	0.0339	0.0354
API-65R	3.34	2.50	86.2	2.50	86.2	15	0.0407	0.0055	0.0390	0.0424	0.0390	0.0424	0.0439	0.0390	0.0439	0.0424	0.0439
API-65A	3.31	2.50	86.2	2.50	86.2	12	0.0417	0.0055	0.0400	0.0434	0.0400	0.0434	0.0459	0.0400	0.0459	0.0434	0.0459
API-67A	0.43	0.50	97.5	0.50	97.5	27	0.00779	0.00164	0.00615	0.00938	0.00615	0.00938	0.0109	0.00615	0.0109	0.0104	0.0137
API-67	0.36	0.50	112.	0.50	112.	15	0.005	0.00164	0.00336	0.00664	0.00336	0.00664	0.00828	0.00336	0.00828	0.00664	0.00828
API-68	2.90	2.50	86.2	2.50	86.2	18	0.0105	0.0055	0.00885	0.01215	0.00885	0.01215	0.0137	0.00885	0.0137	0.01215	0.0137
API-69	2.95	2.50	86.2	2.50	86.2	35	0.00715	0.0055	0.00550	0.00880	0.00550	0.00880	0.0104	0.00550	0.0104	0.00880	0.0104
API-70	6.27	5.00	46.3	5.00	46.3	21	0.0202	0.0055	0.0186	0.0218	0.0186	0.0218	0.0234	0.0186	0.0234	0.0218	0.0234
API-71	6.19	5.00	46.3	5.00	46.3	9	0.0247	0.0055	0.0231	0.0263	0.0231	0.0263	0.0279	0.0231	0.0279	0.0263	0.0279
API-72	2.38	5.00	51.2	5.00	51.2	15	0.0066	0.0055	0.00500	0.00820	0.00500	0.00820	0.0098	0.00500	0.0098	0.00820	0.0098
API-73	5.97	5.00	46.6	5.00	46.6	15	0.0426	0.0055	0.0410	0.0432	0.0410	0.0432	0.0458	0.0410	0.0458	0.0432	0.0458
API-73A	5.83	5.00	46.5	5.00	46.5	12	0.0428	0.0055	0.0412	0.0444	0.0412	0.0444	0.0470	0.0412	0.0470	0.0444	0.0470
API-74	5.58	5.00	46.5	5.00	46.5	18	0.0627	0.0055	0.0611	0.0643	0.0611	0.0643	0.0679	0.0611	0.0679	0.0643	0.0679
API-75	5.55	5.00	46.7	5.00	46.7	12	0.073	0.0055	0.0714	0.0746	0.0714	0.0746	0.0782	0.0714	0.0782	0.0746	0.0782
API-76	5.34	5.00	46.9	5.00	46.9	24	0.0409	0.0055	0.0393	0.0425	0.0393	0.0425	0.0451	0.0393	0.0451	0.0425	0.0451
API-76R	5.25	5.00	46.3	5.00	46.3	12	0.0433	0.0055	0.0417	0.0459	0.0417	0.0459	0.0485	0.0417	0.0485	0.0459	0.0485
API-76.76R	5.31	5.00	46.8	5.00	46.8	35	0.0404	0.0055	0.0388	0.0420	0.0388	0.0420	0.0446	0.0388	0.0446	0.0420	0.0446
API-77	5.08	5.00	47.1	5.00	47.1	15	0.0417	0.0055	0.0401	0.0433	0.0401	0.0433	0.0459	0.0401	0.0459	0.0433	0.0459

TABLE 4 (CONTINUED)

FINAL INTERNAL FLOODING ROOF TANK EMISSION RESULTS BASED ON THE CRT DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

CBI TEST	AVE TYP	AVE PSIA	VTP	VTP MM	AVE PSIA	STD. DEV.	90% CI PSI/DAV	90% CI PSI/DAV	RANGE OF EMISSIONS BASED ON				RANGE OF EMISSIONS (BASED ON DATA)			
									MIN.	MAX.	90% CI PSI/DAV	90% CI PSI/DAV	MIN.	MAX.	90% CI PSI/DAV	90% CI PSI/DAV
API-1	4.56	5.00	47.1	6	0.343	0.0102	0.13	0.13	0.213	0.473	0.278	0.407	0.278	0.407	0.332	0.353
API-2	3.60	5.00	51.0	6	0.613	0.0066	1.1	0.547	1.17	1.71	0.0663	1.15	0.0663	1.15	0.527	0.7
API-3	5.08	5.00	47.3	6	0.315	0.01	0.128	0.3634	0.187	0.443	0.251	0.379	0.251	0.379	0.305	0.325
API-4	4.33	5.00	48.0	12	0.515	0.0025	0.235	0.216	0.22	0.809	0.297	0.732	0.297	0.732	0.339	0.786
API-5	4.75	5.00	47.6	3	3.99	0.0122	0.5523	0.0355	3.93	4.04	3.95	4.02	3.95	4.02	3.98	4
API-6	5.00	5.00	47.7	5	0.472	0.015	0.131	0.3047	0.291	0.662	0.377	0.566	0.377	0.566	0.437	0.467
API-12	0.40	3.50	76.5	9	0.0232	1.23E-4	5.28E-4	3.54E-4	0.0227	0.0239	0.0229	0.0236	0.0229	0.0236	0.023	0.0234
API-13	0.38	3.50	111.	9	0.0681	0.00496	0.212	0.314	0.269	0.693	0.0537	0.0525	0.0537	0.0525	0.078	0.078
API-14	0.45	0.50	110.	3	0.0724	0.00102	0.30433	0.30237	0.358	0.0763	0.3694	0.0754	0.3694	0.0754	0.0735	0.0735
API-13R	0.44	3.50	110.	3	0.0711	0.00167	0.30532	0.30429	0.3044	0.0702	0.0505	0.0754	0.0505	0.0754	0.0721	0.0721
API-13R	0.42	0.50	111.	12	0.0689	0.00157	0.3114	0.0008	0.3575	0.0702	0.0505	0.0754	0.0505	0.0754	0.079	0.079
API-14R	0.46	3.50	110.	9	0.254	0.0263	0.113	0.3168	0.145	0.371	0.181	0.334	0.181	0.334	0.21	0.3
API-14R	0.46	3.50	110.	12	0.211	0.0499	0.159	0.117	0.3525	0.37	0.3529	0.329	0.3529	0.329	0.3724	0.3
API-16	5.13	5.00	45.9	9	0.04	0.0093	0.34	0.3271	0.34	0.12	0.0529	0.107	0.0529	0.107	0.325	0.0941
API-17	4.75	5.00	45.7	9	0.12	0.00309	0.3133	0.30904	0.137	0.134	0.111	0.116	0.111	0.116	0.126	0.126
API-19	4.90	5.00	45.9	9	0.143	0.0055	0.2336	0.316	0.12	0.167	0.127	0.159	0.127	0.159	0.153	0.153
API-19A	4.92	5.00	45.9	9	0.188	0.0266	0.114	0.3775	0.302	0.302	0.11	0.266	0.11	0.266	0.149	0.239
API-21A	2.98	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21B	2.72	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21C	2.67	5.00	47.5	--	--	--	--	--	--	--	--	--	--	--	--	--
API-21AR	2.64	5.00	47.5	5	0.171	0.03	0.391	0.199	0.21	0.552	0.0181	0.361	0.0181	0.361	0.141	0.201
API-21AAR	2.64	5.00	47.5	5	0.171	0.03	0.391	0.189	0.21	0.552	0.0181	0.361	0.0181	0.361	0.141	0.201
API-21BR	2.60	5.00	47.5	3	0.14	0.00333	0.3143	0.30972	0.126	0.154	0.13	0.15	0.13	0.15	0.136	0.142
API-21BR	2.69	5.00	47.5	3	0.14	0.00333	0.3143	0.30972	0.126	0.154	0.13	0.15	0.13	0.15	0.136	0.142
API-21CR	2.61	5.00	47.5	5	0.133	0.0219	0.275	0.137	0.144	0.409	0.03491	0.27	0.03491	0.27	0.111	0.154
API-21CR	2.65	5.00	47.5	6	0.133	0.0214	0.275	0.137	0.144	0.409	0.03491	0.27	0.03491	0.27	0.111	0.154
API-22A	4.21	5.00	45.4	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22B	4.25	5.00	45.4	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22B	3.80	5.00	45.4	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22B	3.78	5.00	45.4	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22B	3.90	5.00	45.4	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22C	3.77	5.00	45.4	--	--	--	--	--	--	--	--	--	--	--	--	--
API-22C	3.61	5.00	45.4	5	0.181	0.0303	0.333	0.196	0.212	0.574	0.0142	0.375	0.0142	0.375	0.212	0.212
API-23	7.05	5.00	46.4	12	0.0715	0.00207	0.3015	0.30676	0.324	0.0907	0.0348	0.0783	0.0348	0.0783	0.0769	0.0769
API-24	6.14	5.00	46.4	5	0.134	0.00693	0.313	0.3040	0.343	0.272	0.0906	0.174	0.0906	0.174	0.177	0.141
API-24	6.14	5.00	46.4	5	0.140	0.00934	0.313	0.30778	0.343	0.254	0.0912	0.235	0.0912	0.235	0.159	0.159
API-25A	5.77	5.00	46.4	5	0.116	0.0174	0.251	0.31	0.156	0.346	0.00446	0.275	0.00446	0.275	0.133	0.133
API-25B	5.80	5.00	46.4	5	0.120	0.00999	0.251	0.3041	0.3041	0.272	0.00446	0.272	0.00446	0.272	0.119	0.119
API-27A	5.73	5.00	46.4	5	0.0317	0.00104	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.034	0.034
API-27B	5.73	5.00	46.4	5	0.0317	0.00104	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.034	0.034
API-27C	5.73	5.00	46.4	5	0.0317	0.00104	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.034	0.034
API-28	0.12	0.50	67.9	5	0.0197	0.0110	0.173	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.3041	0.0963	0.0963

TABLE 4 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE C31 DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

3. USING DATA FOR SPEEDS 220-420																				
CBI TEST	AVE TVP	NORM TVP	MM PSIA	N	AVE EMIS PSI/DAY	STD. DEV. PSI/DAY	RANGE OF EMISSIONS BASED ON 95% CI				RANGE OF EMISSIONS BASED ON 90% CI				RANGE OF EMISSIONS BASED ON MIN. MAX.				RANGE OF EMISSIONS BASED ON DATA	
							95% CI MIN.	95% CI MAX.	90% CI MIN.	90% CI MAX.	95% CI MIN.	95% CI MAX.	90% CI MIN.	90% CI MAX.	MIN.	MAX.	MIN.	MAX.		
API-29R	0.29	0.50	105.	9	0.0319	0.0316	0.03595	0.03471	0.0325	0.0349	0.0325	0.0356	0.03287	0.0336	0.03287	0.0336	0.03287	0.0336		
API-31	0.28	0.50	108.	12	0.0344	0.0329	0.0354	0.03125	0.03175	0.0312	0.03175	0.0312	0.03175	0.0293	0.0324	0.0293	0.0324	0.0293		
API-31A	0.27	0.50	106.	6	0.0321	0.03279	0.0334	0.03176	0.03176	0.03279	0.03176	0.03279	0.0293	0.0324	0.0293	0.0324	0.0293	0.0324		
API-32	1.92	2.50	86.2	9	0.0230	0.0314	0.03604	0.03041	0.03178	0.03295	0.03178	0.03295	0.0197	0.03145	0.0197	0.03145	0.0197	0.03145		
API-33	2.12	2.50	86.2	3	0.0306	0.03105	0.03455	0.03039	0.03251	0.03352	0.03039	0.03352	0.0275	0.03275	0.0275	0.03275	0.0275	0.03275		
API-33A	2.28	2.50	86.2	12	0.0269	0.03245	0.0311	0.03011	0.0315	0.03379	0.03011	0.03379	0.0188	0.0335	0.0188	0.0335	0.0188	0.0335		
API-34	2.35	2.50	86.2	9	0.0335	1.02E-4	4.39E-4	2.95E-4	0.03346	0.03355	2.95E-4	0.03355	0.0347	0.0353	0.0347	0.0353	0.0347	0.0353		
API-34A	2.34	2.50	86.2	6	0.0338	0.00135	0.03171	0.03051	0.03165	0.03059	0.03165	0.03059	0.0253	0.0324	0.0253	0.0324	0.0253	0.0324		
API-35	4.07	5.00	47.5	6	0.0399	1.54E-4	0.00195	9.7E-4	0.03379	0.0419	0.03379	0.0419	0.0389	0.0409	0.0389	0.0409	0.0389	0.0409		
API-36	4.01	5.00	47.5	6	0.0458	0.005	0.0355	0.0316	0.03177	0.03139	0.03177	0.03139	0.0142	0.0348	0.0142	0.0348	0.0142	0.0348		
API-37	4.02	5.00	47.5	6	0.0324	0.00423	0.0337	0.0267	0.03213	0.03861	0.03213	0.03861	0.00567	0.0359	0.00567	0.0359	0.00567	0.0359		
API-38	3.97	5.00	47.6	6	0.0339	0.00591	0.0375	0.0373	0.03412	0.04109	0.03412	0.04109	0.00348	0.0379	0.00348	0.0379	0.00348	0.0379		
API-39	3.91	5.00	47.2	6	0.0335	0.00254	0.0335	0.0316	0.032	0.047	0.032	0.047	0.0369	0.03702	0.0369	0.03702	0.0369	0.03702		
API-39R	5.61	5.00	46.8	3	0.0429	1.00E-4	7.93E-4	5.42E-4	0.03421	0.0437	0.03421	0.0437	0.03423	0.0434	0.03423	0.0434	0.03423	0.0434		
API-40	5.27	5.00	46.8	3	0.0407	0.00550	0.0324	0.03163	0.03167	0.03647	0.03167	0.03647	0.0244	0.0351	0.0244	0.0351	0.0244	0.0351		
API-41	5.25	5.00	46.9	6	0.0151	5.51E-4	0.037	0.03348	0.03309	0.04221	0.03309	0.04221	0.0116	0.0363	0.0116	0.0363	0.0116	0.0363		
API-42	5.21	5.00	46.9	6	0.0411	0.00151	0.0391	0.034951	0.034951	0.04373	0.034951	0.04373	0.00863	0.0366	0.00863	0.0366	0.00863	0.0366		
API-43	5.02	5.00	46.5	6	0.0294	0.00202	0.0266	0.0217	0.030377	0.035	0.0217	0.030377	0.0123	0.0314	0.0123	0.0314	0.0123	0.0314		
API-44	5.30	5.00	46.4	6	0.0144	3.29E-4	0.00419	0.00209	0.03122	0.0486	0.03122	0.0486	0.0123	0.0314	0.0123	0.0314	0.0123	0.0314		
API-45	5.24	5.00	46.4	6	0.00638	5E-4	0.00515	0.00316	0.03025	0.0477	0.03025	0.0477	0.00322	0.03089	0.00322	0.03089	0.00322	0.03089		
API-46	5.13	5.00	46.5	6	0.0104	9.91E-4	0.0126	0.00625	0.03025	0.0477	0.03025	0.0477	0.00322	0.03089	0.00322	0.03089	0.00322	0.03089		
API-47	4.87	5.00	46.5	9	0.0171	0.00172	0.0074	0.00502	0.03067	0.04245	0.03067	0.04245	0.012	0.0316	0.012	0.0316	0.012	0.0316		
API-48	4.64	5.00	46.5	4	0.0294	0.0045	0.0371	0.0204	0.03277	0.04866	0.03277	0.04866	0.00107	0.0339	0.00107	0.0339	0.00107	0.0339		
API-49	4.40	5.00	46.6	6	0.0187	0.00149	0.0149	0.0094	0.03094	0.04376	0.03094	0.04376	0.00927	0.0342	0.00927	0.0342	0.00927	0.0342		
API-50	0.60	0.50	87.0	9	0.00795	5.05E-4	0.00252	0.00171	0.00344	0.0047	0.00344	0.0047	0.00425	0.00766	0.00425	0.00766	0.00425	0.00766		
API-51	0.60	0.50	87.5	9	0.00795	5.05E-4	0.00252	0.00171	0.00344	0.0047	0.00344	0.0047	0.00425	0.00766	0.00425	0.00766	0.00425	0.00766		
API-52	5.51	5.00	40.0	5	0.0416	0.00053	0.039	0.0339	0.0357	0.15	0.0357	0.15	0.0122	0.0555	0.0122	0.0555	0.0122	0.0555		
API-53P	5.52	5.00	40.0	9	0.0478	0.00107	0.045	0.03312	0.03432	0.0524	0.03432	0.0524	0.0447	0.0509	0.0447	0.0509	0.0447	0.0509		
API-54	5.45	5.00	40.0	6	0.0401	0.00031	0.0392	0.03399	0.03401	0.17	0.03401	0.17	0.0447	0.0509	0.0447	0.0509	0.0447	0.0509		
API-55	5.31	5.00	40.0	3	0.0376	9.41E-5	4.22E-4	2.85E-4	0.03372	0.048	0.03372	0.048	0.0373	0.0379	0.0373	0.0379	0.0373	0.0379		
API-53P-53	5.37	5.00	40.0	12	0.0453	0.00265	0.00347	0.00327	0.0358	0.0439	0.00327	0.0358	0.039	0.039	0.039	0.039	0.039	0.039		
API-55	5.40	5.00	40.1	9	0.016	0.00279	0.012	0.00613	0.03462	0.0485	0.00613	0.03462	0.00447	0.0471	0.00447	0.0471	0.00447	0.0471		
API-56	5.47	5.00	40.2	5	0.016	0.00176	0.0223	0.0111	0.03137	0.0483	0.0111	0.03137	0.0249	0.0444	0.0249	0.0444	0.0249	0.0444		
API-57	5.50	5.00	40.2	6	0.0345	0.00159	0.02	0.00995	0.03145	0.045	0.00995	0.03145	0.0246	0.0444	0.0246	0.0444	0.0246	0.0444		
API-58	5.49	5.00	40.2	6	0.0277	0.00209	0.0225	0.0132	0.03212	0.0472	0.0132	0.03212	0.0246	0.0444	0.0246	0.0444	0.0246	0.0444		
API-52R	5.51	5.00	40.0	5	0.0455	0.0046	0.0346	0.029	0.0313	0.048	0.029	0.0313	0.0144	0.0439	0.0144	0.0439	0.0144	0.0439		
API-52-52R	5.52	5.00	40.0	12	0.0435	0.00411	0.0311	0.00966	0.03105	0.0485	0.00966	0.03105	0.0139	0.0439	0.0139	0.0439	0.0139	0.0439		
API-60	4.41	5.00	40.6	9	0.0399	0.00411	0.03177	0.029	0.03132	0.0477	0.029	0.03132	0.0144	0.0439	0.0144	0.0439	0.0144	0.0439		
API-61	4.34	5.00	40.0	6	0.0617	0.00355	0.0399	0.03477	0.03462	0.048	0.03477	0.048	0.0141	0.0439	0.0141	0.0439	0.0141	0.0439		
API-61	4.46	5.00	40.0	9	0.0754	0.00355	0.0399	0.03477	0.03462	0.048	0.03477	0.048	0.0141	0.0439	0.0141	0.0439	0.0141	0.0439		
API-62	2.96	5.00	52.0	5	0.064	1.44E-4	0.00113	6.5E-4	0.0327	0.0653	0.0327	0.0653	0.0633	0.0667	0.0633	0.0667	0.0633	0.0667		



TABLE 4 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

CBI TEST	AVE TVP	VORH TVP	HW PSIA	MW PSIA	AVE EMIS PSY/DAY	STD. DEV. PSY/DAY	95% CI PSY/DAY	90% CI PSY/DAY	RANGE OF EMISSIONS BASED ON 33% CI		RANGE OF EMISSIONS BASED ON 90% CI		RANGE OF EMISSIONS BASED ON EMIS. MAX.	
									MIN. PSY/DAY	MAX. PSY/DAY	MIN. PSY/DAY	MAX. PSY/DAY	MIN. PSY/DAY	MAX. PSY/DAY
API-63R	0.09	2.50	75.5	3.38E-4	0.0104	3.38E-4	0.00165	0.00112	0.00093	0.0118	0.0094	0.0114	0.01	0.0107
API-64	0.15	2.50	105.	3.52E-4	0.0302	3.52E-4	0.00112	0.00112	0.00098	0.0103	0.00837	0.01	0.00868	0.0102
API-65	3.30	2.50	86.2	5.31E-4	0.0329	5.31E-4	0.00225	0.00155	0.00226	0.0271	0.0233	0.0264	0.029	0.0259
API-66	3.21	2.50	86.2	5.31E-4	0.0329	5.31E-4	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-66R	3.30	2.50	86.2	5.31E-4	0.0329	5.31E-4	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-65R	3.34	2.50	86.2	5.31E-4	0.0329	5.31E-4	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-65A	3.31	2.50	86.2	5.31E-4	0.0329	5.31E-4	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-67A	0.43	0.50	97.5	0.0315	0.0092	0.0315	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-67	0.36	0.50	117.	4.74E-4	0.00511	4.74E-4	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-68	2.96	2.50	86.2	5.31E-4	0.0107	5.31E-4	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-69	2.95	2.50	86.2	5.31E-4	0.00745	5.31E-4	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-70	6.22	5.00	46.3	0.0319	0.0206	0.0319	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-71	6.19	5.00	46.3	0.0319	0.0206	0.0319	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-72	2.36	5.00	51.2	0.03246	0.04	0.03246	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-73	5.97	5.00	46.5	0.03246	0.04	0.03246	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-73A	5.83	5.00	46.5	0.03246	0.04	0.03246	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-74	5.58	5.00	46.5	0.03246	0.04	0.03246	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-75	5.55	5.00	46.5	0.03246	0.04	0.03246	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-76	5.14	5.00	46.5	0.03246	0.04	0.03246	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-76R	5.25	5.00	46.5	0.03246	0.04	0.03246	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-76.76R	5.31	5.00	46.5	0.03246	0.04	0.03246	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377
API-77	5.08	5.00	47.1	0.03246	0.04	0.03246	0.00112	0.00112	0.00122	0.031	0.0282	0.0306	0.029	0.0377

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

100
90
80
70
60
50
40
30
20
10
0

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE C91 DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

AVA Documents
Document Sharing Hub

TABLE 4 (CONTINUED)

FINAL INTERNAL FLOATING ROOF TANK EMISSION RESULTS BASED ON THE CBI DATA SELECTED AS REPRESENTING EQUILIBRIUM CONDITIONS

CBI TEST	AVE TVP	VORM TVP	MW	Y	AVE EMIS	STD. DEV.	95% CI PM2.5 PM10 PM2.5 PM10	90% CI PM2.5 PM10 PM2.5 PM10	RANGE OF EMISSIONS BASED ON CBI DATA				RANGE OF EMIS. BASED ON DATA			
									MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
API-63R	0.48	0.50	75.5	9	0.0093	5.19E-4	0.00223	0.00152	0.0017	0.0112	0.00742	0.0104	0.00913	0.0097	0.00975	0.00975
API-64	0.55	0.50	105.	15	0.00825	4.1E-4	0.00114	0.00121	0.0011	0.00939	0.00739	0.00725	0.00731	0.00731	0.00731	0.00731
API-65	3.20	2.50	86.2	12	0.0237	5.15E-4	0.00164	0.00175	0.0017	0.022	0.0418	0.0376	0.0376	0.0376	0.0376	0.0376
API-66	3.21	2.50	86.2	6	0.0453	0.0139	0.0175	0.00308	0.00306	0.0384	0.0314	0.0314	0.0314	0.0314	0.0314	0.0314
API-66R	3.30	2.50	86.2	18	0.0345	0.00153	0.00392	0.00392	0.00392	0.0384	0.0314	0.0314	0.0314	0.0314	0.0314	0.0314
API-65R	3.34	2.50	86.2	9	0.04	0.00191	0.00421	0.00421	0.00421	0.0421	0.0314	0.0314	0.0314	0.0314	0.0314	0.0314
API-65A	3.31	2.50	86.2	6	0.0433	0.00195	0.00421	0.00421	0.00421	0.0421	0.0314	0.0314	0.0314	0.0314	0.0314	0.0314
API-67A	0.43	0.50	97.5	15	0.00665	0.00122	0.0034	0.0034	0.0034	0.0314	0.0314	0.0314	0.0314	0.0314	0.0314	0.0314
API-67	0.36	0.50	112.	9	0.00492	1.25E-4	0.00115	0.00115	0.00115	0.0055	0.00453	0.00453	0.00453	0.00453	0.00453	0.00453
API-68	2.96	2.50	86.2	12	0.0104	3.55E-4	0.00115	0.00115	0.00115	0.0055	0.00453	0.00453	0.00453	0.00453	0.00453	0.00453
API-69	2.95	2.50	86.2	18	0.00696	6.9E-4	0.00163	0.00163	0.00163	0.0055	0.00453	0.00453	0.00453	0.00453	0.00453	0.00453
API-70	6.22	5.00	46.3	9	0.0194	0.03191	0.03423	0.03423	0.03423	0.0276	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138
API-71	6.19	5.00	46.3	6	0.0228	0.03316	0.03423	0.03423	0.03423	0.0276	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138
API-72	2.28	5.00	51.2	--	--	--	--	--	--	--	--	--	--	--	--	--
API-73	5.97	5.00	46.5	9	0.0382	0.03254	0.0339	0.0339	0.0339	0.0491	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307
API-73A	5.83	5.00	46.5	6	0.0597	0.00197	0.025	0.025	0.025	0.0491	0.0307	0.0307	0.0307	0.0307	0.0307	0.0307
API-74	5.58	5.00	46.6	12	0.0542	0.00444	0.0141	0.0141	0.0141	0.0693	0.0473	0.0473	0.0473	0.0473	0.0473	0.0473
API-75	5.55	5.00	46.7	6	0.0609	3.17E-4	0.00402	0.00402	0.00402	0.0693	0.0473	0.0473	0.0473	0.0473	0.0473	0.0473
API-76	5.34	5.00	46.9	19	0.0537	0.00391	0.0039	0.0039	0.0039	0.0693	0.0473	0.0473	0.0473	0.0473	0.0473	0.0473
API-76R	5.25	5.00	46.8	9	0.0445	0.00786	0.0173	0.0173	0.0173	0.0693	0.0473	0.0473	0.0473	0.0473	0.0473	0.0473
API-76R76R	5.31	5.00	46.3	27	0.0506	0.03302	0.03595	0.03595	0.03595	0.0693	0.0473	0.0473	0.0473	0.0473	0.0473	0.0473
API-77	5.08	5.00	47.1	3	0.0359	4.06E-5	2E-4	2E-4	2E-4	0.0361	0.0357	0.0357	0.0357	0.0357	0.0357	0.0357

TABLE 5

COMPARISON OF VAPOR PRESSURES AND EMISSIONS (NORMALIZED TO A NOMINAL TVP) AS DETERMINED BY API AND CBI

CBI TEST	API DATA, ALL WIND SPEEDS										API AND CBI DATA, WIND SPEEDS 5-23--22-MPH									
	API AVE TVP	API AVE ES1A	API AVE ES1B	API AVE ES1C	API AVE ES1D	API AVE ES1E	API AVE ES1F	API AVE ES1G	API AVE ES1H	API AVE ES1I	CBI AVE TVP	CBI AVE ES1A	CBI AVE ES1B	CBI AVE ES1C	CBI AVE ES1D	CBI AVE ES1E	CBI AVE ES1F	CBI AVE ES1G	CBI AVE ES1H	CBI AVE ES1I
API-1	4.50	4.75	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.50	4.75	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-2	3.00	2.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.00	2.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-3	5.00	4.30	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.30	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-4	4.75	4.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.75	4.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-5	5.14	4.75	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.14	4.75	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-6	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-12	3.40	3.40	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.40	3.40	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-13	0.38	0.38	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	0.38	0.38	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-14	0.45	0.45	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	0.45	0.45	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-13R	0.48	0.48	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	0.48	0.48	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-13R	0.42	0.42	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	0.42	0.42	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-14R	0.46	0.46	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	0.46	0.46	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-14R	0.42	0.42	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	0.42	0.42	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-16	3.70	3.70	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.70	3.70	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-17	5.13	5.15	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.13	5.15	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-16	4.95	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.95	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-19	4.90	4.95	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.90	4.95	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-19A	4.92	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.92	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-21A	2.95	2.75	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.95	2.75	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-21B	2.92	2.70	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.92	2.70	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-21C	2.67	2.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.67	2.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-21AR	2.54	2.54	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.54	2.54	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-21AAR	2.84	2.84	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.84	2.84	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-21ER	2.60	2.60	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.60	2.60	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-21ER	2.69	2.69	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.69	2.69	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-21CR	2.61	2.61	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.61	2.61	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-21CR	2.65	2.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.65	2.65	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-22A	4.21	3.95	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.21	3.95	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-22A	4.25	4.25	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.25	4.25	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-22B	3.78	3.78	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.78	3.78	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-22B	3.90	3.90	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.90	3.90	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-22C	3.77	3.77	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.77	3.77	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-22C	3.91	3.91	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.91	3.91	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-23	7.01	5.95	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	7.01	5.95	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-24	6.94	7.05	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.94	7.05	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-24	6.94	7.05	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.94	7.05	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-25	6.94	7.05	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.94	7.05	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-26A	3.72	3.72	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.72	3.72	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-26B	2.40	2.40	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	2.40	2.40	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-27A	3.71	3.71	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.71	3.71	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-27B	3.71	3.71	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.71	3.71	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-27C	3.71	3.71	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.71	3.71	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
API-28	3.72	3.72	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	3.72	3.72	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00

* NOTE: *

BLANKS IN A COLUMN UNDER THE CBI
HEADING INDICATES THAT NO INFORMATION
IS RECORDED FOR THAT SAMPLE NUMBER IN
THE CBI FINAL REPORT. NUMBERS IN
PARENTHESES UNDER THE CBI HEADINGS
INDICATE THAT CBI QUESTIONED THESE
RESULTS AND FOOTNOTED THEIR REASONS.



COMPARISON OF VAPOR PRESSURES AND EMISSIONS (NORMALIZED TO A NOMINAL 100) AS DETERMINED BY API AND CBI

[illegible]

TABLE 5 (CONTINUED)

COMPARISON OF VAPOR PRESSURES AND EMISSIONS (NORMALIZED TO A NOMINAL TYP) AS DETERMINED BY API AND CBI

[illegible]

TABLE 5

DETAILS OF CALCULATION PROCEDURES USING TEST API-26A AS AN EXAMPLE

A. USING DATA FOR ALL PING SPEEDS

---EMISSIONS-E03-IESI-API-26A-AI-IND-SPEED-19241-1---

15.23 2.28 4.2 7.0 15.6 23.0 21.2
 4.931 5.45 5.311 5.45 6.138 4.471 6.06
 4.837 5.535 5.285 5.475 6.348 4.527 6.301
 -4.203 -5.224 -5.214 -5.462 -6.138 -4.614 -6.043
 TOTAL E = 14.475 16.565 15.41 16.307 18.624 13.512 16.444

AGE = 4.825 5.522 5.270 5.462 5.203 4.537 6.149 = AVERAGE GROUP EMISSIONS = (TOTAL E)/3

EMISSIONS-SQUARED-E03-IESI-API-26A-AI-IND-SPEED-1---

15.23 2.28 4.2 7.0 15.6 23.0 21.2
 24.315 29.702 28.207 29.702 37.075 19.99 36.482
 23.397 30.636 27.931 29.976 40.297 23.494 40.462
 22.165 31.136 27.196 29.633 37.075 21.269 36.518

TOTAL ESC = 69.977 91.475 83.334 89.512 115.65 61.773 113.45

NG = NUMBER OF EMISSION VALUES IN EACH GROUP = 3

NT = TOTAL NUMBER OF EMISSION VALUES = 21 (= TOTAL NUMBER OF POINTS IN TABLES 1 AND 2)

SE = SUM OF EMISSIONS = (14.475 + 16.565 + 15.41 + 16.307 + 18.624 + 13.512 + 16.444) = 113.92

SESC = SE SQUARED = (113.92 X 113.92) = (113.92 * 2) = 12977.

SS06 = SUM OF SQUARES BETWEEN GROUPS = ((SUM((TOTAL E)^2))/NG) - (SESC/NT)
 ((14.475^2) + 16.565^2 + 15.41^2 + 16.307^2 + 18.624^2 + 13.512^2 + 16.444^2)/3 - (12977/21) = 6.9544

DF = DEGREES OF FREEDOM = NG - 1 = 7 - 1 = 6 MS66 = MEAN SQUARE BETWEEN GROUPS = SS06/DF = 1.1591

AE = AVERAGE EMISSIONS = SE/NT = 113.92/21 = 5.4247

SDAE = STANDARD DEVIATION OF THE AVERAGE EMISSIONS = SQUARE ROOT((MS66/NT)) = SQUARE ROOT((1.1591/21)) = 0.23493

195 = STUDENT'S T FOR THE GIVEN OF FOR 95% CONFIDENCE = 2.447 190 = STUDENT'S T FOR THE GIVEN OF FOR 90% CONFIDENCE = 1.943

95% CI = 95% CONFIDENCE INTERVAL OF THE AVERAGE EMISSIONS = (195)(SDAE) = (2.447)(0.23493) = 0.57448

90% CI = 90% CONFIDENCE INTERVAL OF THE AVERAGE EMISSIONS = (190)(SDAE) = (1.943)(0.23493) = 0.45647

RANGE OF EMISSIONS BASED ON 95% CI AE = 95% CI (MIN) = 4.8497 = 16.565 - 0.57448 = 15.9905
 AE = 95% CI (MAX) = 6.0002 = 4.8497 + 0.57448 = 5.4242

RANGE OF EMISSIONS BASED ON 90% CI AE = 90% CI (MIN) = 4.9647 = 16.444 - 0.45647 = 15.9875
 AE = 90% CI (MAX) = 6.0002 = 4.9647 + 0.45647 = 5.4212

RANGE OF EMISSIONS BASED ON DATA = MINIMUM(AE) = 4.8497 TO MAXIMUM(AE) = 6.0002

TABLE 6 (CONTINUED)

B. USING DATA FOR WIND SPEEDS > 20 MPH

NT = 6
 SE = 32.055
 SEEC = 1027.6
 SEEC = 3.9914
 DF = 1
 MSE = 3.9914
 AE = 5.3427
 SDAE = 0.50533

195 = 12.705 190 = 6.3118
 95% CI = 10.2325 90% CI = 5.0947

RANGE OF EMISSIONS BASED ON 95% CI = -4.0699 TO 15.575
 RANGE OF EMISSIONS BASED ON 90% CI = 0.2580 TO 10.427

RANGE OF EMISSIONS BASED ON DATA = 4.5373 TO 6.148

C. USING DATA FOR WIND SPEEDS < OR = 20 MPH

NT = 15

SE = 91.862

SEEC = 6791.4

SEEC = 3.0065

DF = 4

MSE = 0.75164

AE = 5.4575

SDAE = 0.22385

195 = 2.775 190 = 2.132

95% CI = 0.52161 90% CI = 0.47725

RANGE OF EMISSIONS BASED ON 95% CI = 4.9361 TO 5.0759

RANGE OF EMISSIONS BASED ON 90% CI = 4.9803 TO 5.9349

RANGE OF EMISSIONS BASED ON DATA = 4.9253 TO 6.239

IN THOSE CASES WHERE THERE IS ONLY ONE GROUP OF THREE POINTS THE ABOVE METHOD OF CALCULATING THE STANDARD DEVIATION AND THE CONFIDENCE INTERVALS DOES NOT WORK BECAUSE THE DEGREES OF FREEDOM (DF) EQUALS ZERO (0). IN THOSE CASES THE STANDARD DEVIATION OF THE AVERAGE OF THE THREE POINTS AND THE CONFIDENCE INTERVALS WERE CALCULATED ASSUMING THAT THERE WERE THREE POINTS AND THEREFORE THAT DF = 2. THESE STANDARD DEVIATIONS AND CONFIDENCE INTERVALS WILL THEREFORE GENERALLY BE CONSIDERABLY SMALLER THAN THOSE DETERMINED BY THE ABOVE METHOD.

THE CALCULATIONS ABOVE ARE FOR EMISSIONS IN POUNDS PER DAY. THE EMISSIONS IN POUNDS-WEIGHT/DAY WERE DETERMINED BY DIVIDING THE EMISSIONS IN POUNDS PER DAY BY THE MOLECULAR WEIGHT OF THE VAPORS PASSING THROUGH THE BURNER ANALYZER. THE STATISTICAL ANALYSIS OF THE EMISSIONS IN POUNDS-WEIGHT PER DAY WERE THEN HANDLED EXACTLY THE SAME WAY AS DESCRIBED ABOVE FOR THE EMISSIONS IN POUNDS PER DAY.

B.1 Evaluation of Vapor Pressure Functions

October 11, 1982

R.J. Laverman
Plainfield Research

RE: Vapor Pressure Functions for Scaling
Internal Floating Roof Emissions

In accordance with your request, I have reviewed the problem of evaluating appropriate vapor pressure functions for scaling IFR emission data.

The following functions were analyzed and compared:

- (1). $E = b \left\{ \frac{\left(\frac{P_v}{14.7} \right)}{\left[1 + \left(1 - \frac{P_v}{14.7} \right)^{0.5} \right]^2} \right\}$ - (Used in Bulletin 2517 and Draft Bulletin 2519)
- (2). $E = b \left[\frac{\frac{P_v}{14.7}}{1 - \frac{P_v}{14.7}} \right]^{0.7}$ - (Former API vapor pressure function)
- (3). $E = b \left(\frac{P_v}{14.7} \right)^N$ - (Function proposed by TRW Engineering)

where: E = Emissions, (lbmoles/day)

P_v = Product True Vapor Pressure, (psia)

b = A scaling constant dependent upon roof and seal type, (lbmoles/day)

N = A scaling exponent (the optimum value of N was to be selected)

INTEROFFICE CORRESPONDENCE

CHICAGO BRIDGE & IRON COMPANY

Licensee=American Petroleum Inst/9968792101, User=Dennis, Collin
Not for Resale, 07/05/2012 12:29:14 MDT



Documents

Document Sharing Hub

October 11, 1982

Attached to this letter is a copy of Table 1 and Figures 1 through 4, which were prepared by R.L. Russell of Union Oil Co. and are dated 6-11-82. The emission and vapor pressure values listed in Table 1 pertaining only to the tests on mixtures of propane and normal octane were used to evaluate the above vapor pressure functions. These values are also listed in Table 2, which summarizes the evaluation described below.

Table 2 summarizes the resulting b values for Phases 1 through 3. For each test listed, the average vapor pressure was used to calculate a value of X_i for each of the scaling functions. The X_i values were then paired with the average emissions, Y_i , for each test. For each vapor pressure function the data pairs (X_i, Y_i) were used to find the straight line which passed through $(0,0)$ and which gave the best fit using the least squares method. The slope of the straight line determined why this method was the scaling constant, b.

For each vapor pressure function, the correlation coefficient was also calculated as an indicator of how well the function fit the data. Note that the correlation coefficient is close to 1.00 (1.00 corresponds to a perfect fit) in all cases. This indicates that the vapor pressure data fit is good regardless of the vapor pressure function used.

Figure 5 shows a graphical method of determining the best scaling exponent N for use in Equation (3) on page 1. It is evident that the best fit is obtained when $N \approx 0.7$.

A more accurate way to determine the optimum value of N is to apply a least square analysis directly to the (E, P_v) data. This method leads to the following result.

Phase Number	b	N	Number of Tests Included
1	0.1549	0.6156	4
2	0.0581	0.7457	5
3	0.1062	0.6622	3

$$\begin{aligned}\bar{N} &\equiv \text{Weighted Average} \\ &= \frac{4(0.6156) + 5(0.7457) + 3(0.6622)}{4 + 5 + 3}\end{aligned}$$

$$\bar{N} = 0.6815$$

Carrying the exponent N beyond one significant figure is probably not justifiable on the basis of the data scatter. Therefore, the suggested value of N to be used is 0.7.

A comparison of the three vapor pressure functions is shown in Figure 6 for the Phase 1 data with 1 in² seal gaps/ft dia. Note that each of the functions fits the data fairly well. At any given vapor pressure, the difference between the scaling functions is small relative to the data scatter at the same point.

Figure 7 shows the data from Phase 1 for 0 in² seal gaps/ft dia. It would be difficult to determine the best function on the basis of this data since three of the four points occur at a single vapor pressure. Note that all of the functions fall below the data at the low end of the vapor pressure scale. This is due to the fact that the functions were defined such that they must pass through the point (0,0).

Figure 8 shows the data of Phases 2 and 3, each with 1 in² of seal gaps/ft dia. Note that the TRW function, Equation (3) with N = 0.7, gives the best fit for both phases. This is reflected by the correlation coefficients which are 0.9964 and 0.9996 for

October 11, 1982

Phases 2 and 3, respectively.

Examination of Figure 8 reveals once again that any one of the scaling functions is capable of adequately scaling the emission data when applied within the vapor pressure range in which data was actually taken. However, gross differences become apparent if an attempt is made to estimate emissions above the range of test data. The data from Phase 2 can be used to illustrate this point. At 14.0 psia, the emission functions for the Phase 2 roof predict the following:

Function		P_v	E
Number	Description	(psia)	(lbmoles/day)
1	P^* function from Bulletin 2517	14.0	0.154
2	Former API function	14.0	8.14
3	Proposed by TRW	14.0	0.0531

The lack of emission data from relatively high vapor pressure stocks precludes the possibility of accurately determining the best function to use for extrapolation beyond the range of vapor pressure test data.

Conclusions:

The overall conclusions that may be derived from this evaluation are summarized below:

- (1). Based on the correlation coefficient, the function proposed by TRW with $N = 0.7$ provides a better fit to the data than either of the other two functions evaluated

R.J. Laverman
Plainfeild Research

Page Five

October 11, 1982

- (2). The improvement in data fit provided by the TRW function is small and may not merit revising the proposed Bulletin 2519.
- (3). Gross differences between scaling functions may occur if an attempt is made to scale emission data to vapor pressures above 9 psia. The accuracy of the proposed Bulletin 2519 is dubious beyond this point.

If you should have any questions regarding the attached information, please feel free to contact me.

Sincerely,

Timothy J. Haynie
Timothy J. Haynie
Research Engineer

TJH:sib

NOTE: TSTU = POUNDS PER SQUARE INCH ABSOLUTE; P/DAV = POUND-HOLE PER DAY; C3 = PROPANE; CB = NORMAL BUTANE; C6 = NORMAL
HEXANE; TVP = TRUE VAPOR PRESSURE; ME = MEASURED EMISSIONS AT TVP FOR THE INDICATED TEST;
CE = CALCULATED EMISSIONS;
 $P = \frac{ME}{TVPP}$, WHERE B AND M = THE INTERCEPT AND THE SLOPE OF THE LINES IN FIGURES 1 THROUGH 4 AS DETERMINED BY A LINEAR
LEAST SQUARES REGRESSION PROGRAM. THE VALUES FOR G, H, AND THE MULTIPLE CORRELATION COEFFICIENT SQUARED, R-SQ2, ARE GIVEN
BELOW EACH SET OF DATA IN THIS TABLE. THE LINES ARE DETERMINED USING THE C3/C4 DATA ONLY; THEREFORE, THE APPARENT PRODUCT
FACTOR FOR THE C6 AND CH TESTS CAN BE DETERMINED BY THE RATIO ME/CE WHERE CE IS CALCULATED USING THE VALUES OF G, H, AND
THE TVP FOR THE PRODUCT BEING CONSIDERED. THIS RATIO IS ALSO SHOWN FOR THE C3/CN TESTS AS IT PROVIDES AN INDICATION OF
WHETHER THE VALUES CALCULATED FOR THE C6 AND C4 DATA ARE SIGNIFICANTLY DIFFERENT FROM 1.

FIGURE 1: PHASE 1, EMISSIONS VERSUS VAPOR PRESSURE (USING 1 INCH SQUARE (CAPS) PER FOOT OF DIAMETER PRIMARY SEAL DATA ONLY).

FIGURE 2: PHASE 1, EMISSIONS VERSUS VAPOR PRESSURE (USING 1 INCH SQUARE (CAPS) PER FOOT OF DIAMETER PRIMARY SEAL DATA ONLY).

TEST-NO.	PROQUOI	TVP	HE	CE	PLOT- TIME	RECE	TEST-NO.	PROQUOI	TVP	HE	CE	PLOT- TIME	RECE
API-22A	C3/CA	4.22	0.116	0.172	1	0.95	API-21A	C3/CA	2.72	0.0433	0.0533	1	1.10
API-22B	C3/CA	3.91	0.129	0.115	2	1.11	API-21B	C3/CA	2.54	0.0493	0.0547	2	0.90
API-22C	C3/CA	3.76	0.150	0.112	3	1.34	API-21C	C3/CA	2.64	0.0514	0.0541	3	0.95
API-22D	C3/CA	3.69	0.0814	0.111	4	0.73	API-21D	C3/CA	2.64	0.0514	0.0541	4	1.01
API-22E	C3/CA	2.40	0.0550	0.1029	5	0.65	API-21E	C3/CA	2.95	0.0105	0.0174	5	1.07
API-22F	C3/CA	0.127	0.0240	0.0440	6	0.94	API-21F	C6	1.92	0.0173	0.0427	6	0.41
API-22G	C3/CA	0.730	0.0208	0.0440	7	0.61							
API-22H	C3/CA	0.726	0.0809	0.0469	8	1.72							

B = 0.0128 M = 0.0156 R002 = 0.876

FIGURE 11 PHASE 3, EMISSIONS VERSUS VAPOR PRESSURE (USING 1 INCH SQUARE (GAPS) PER FOOT OF DIAMETER PRIMARY SEAL DATA ONLY.

TEST NO. - PRODUCT	TVP	ME (HR/DAY)	CE (HR/DAY)	PLOT- TING SYSTEM	ME/CE
API-00	C3/C8	4.40	0.0490	1	1.00
API-62	C3/C8	7.97	0.0355	2	0.99
API-63R	C3/C8	0.54	0.0146	3	1.01
API-64	C4	0.55	0.00953	"	0.71
API-55	C6	3.24	0.0335	"	0.97
API-65R	C6	3.33	0.0340	"	1.03

FIGURE 3: PHASE 2, EMISSIONS VERSUS VAPOR PRESSURE (USING 1 INCH SQUARE (GAPS) PER FOOT OF DIAMETER PRIMARY SEAL DATA ONLY).

TEST-NO.	PRGNO	TVR	ME	CE	SYDUL	PLOT- TING	MEZCE
API-36	C3/CA	4.01	0.0211	0.0213	1		0.99
API-40	C3/CA	5.69	0.0256	0.0205	2		0.90
API-50	C3/CA	0.60	0.00113	0.00667	3		0.77
API-67	CA	0.36	0.00360	0.00563	4		0.64
API-67A	CA	0.43	0.00466	0.00793	6		1.12
API-68	CA	2.96	0.0126	0.0160	9		0.75
API-71	C3/CO	6.71	0.0326	0.0307	4		1.06
API-72	C3/CA	7.39	0.0171	0.0143	5		1.19

CONCLUSION: CONSIDERING ALL OF THE ABOVE INFORMATION A PRODUCT FACTOR OF 1 FOR PURE COMPONENTS VERSUS A MIXTURE APPEARS TO BE A