

**APPENDIX B**

**SOURCE TEST RESULTS FROM PETROLEUM REFINERY FLUIDIZED CATALYTIC  
CRACKING UNITS THROUGHOUT THE UNITED STATES**

Air District staff reviewed available data on total particulate matter emissions from fluidized catalytic cracking units at refineries throughout the United States. A summary of the relevant data and results and is shown below in Table B.1.

**Table B.1 – Source Test Results from Petroleum Refinery Fluidized Catalytic Cracking Units Throughout the United States**

Refinery/Unit	Agency	Test Methods	Test Date(s)	Total PM <sub>10</sub> (gr/dscf)	Total PM <sub>10</sub> @ 5% O <sub>2</sub> (gr/dscf)	Primary PM Control Technology
BP Whiting, IN - FCU 500	US EPA	EPA 5 and 201A/202	6/9/11 & 8/2/11	0.020	0.016	ESP
BP Whiting, IN - FCU 500	Indiana DEM	EPA 201A/202	4/14/16 - 4/15/16	0.026	0.021	ESP
BP Whiting, IN - FCU 500	Indiana DEM	EPA 201A/202	8/16/16 - 8/18/16	0.020	0.016	ESP
BP Whiting, IN - FCU 500	Indiana DEM	EPA 201A/202	4/20/18 & 4/23/18	0.026	0.022	ESP
BP Whiting, IN - FCU 500	Indiana DEM	EPA 201A/202	6/5/19 - 6/6/19	0.016	0.014	ESP
BP Whiting, IN - FCU 600	Indiana DEM	EPA 201A/202	4/19/16 - 4/20/16	0.024	0.020	ESP
BP Whiting, IN - FCU 600	Indiana DEM	EPA 201A/202	8/22/16 - 8/23/16	0.019	0.016	ESP
BP Whiting, IN - FCU 600	Indiana DEM	EPA 201A/202	5/17/17 - 5/18/17	0.018	0.015	ESP
BP Whiting, IN - FCU 600	Indiana DEM	EPA 201A/202	4/25/18 - 4/26/18	0.009	0.007	ESP
BP Whiting, IN - FCU 600	Indiana DEM	EPA 201A/202	6/12/19 - 6/13/19	0.006	0.005	ESP
Chevron Kapolei, HI	US EPA, Hawaii DOH	EPA 5 and 201A/202	6/24/11 - 6/26/11	0.014	0.014	ESP
Chevron Salt Lake Refinery, UT	Utah DEQ	EPA 201A/202	12/10/14	0.009	0.007	ESP
Chevron Salt Lake Refinery, UT	Utah DEQ	EPA 201A/202	8/3/17	0.026	0.022	ESP
CITGO Corpus Christi East Refinery, TX	Texas CEQ	EPA 5/202	8/21/18	0.031	0.024	ESP
CITGO - Lake Charles, LA	USEPA	EPA 5B/202	5/26/11 - 5/27/11	0.010	N/A <sup>a</sup>	WGS
ExxonMobil Baton Rouge Refinery, LA	Louisiana DEQ	EPA 5/202	5/23/12	0.040	0.032	WGS
ExxonMobil Baton Rouge Refinery, LA	Louisiana DEQ	EPA 5/202	11/21/13 - 11/22/13	0.032	0.026	WGS
ExxonMobil Baton Rouge Refinery, LA	Louisiana DEQ	EPA 5/202	6/16/15 - 6/17/15	0.036	0.030	WGS
ExxonMobil Baton Rouge Refinery, LA	Louisiana DEQ	EPA 5/202	11/18/15	0.027	0.023	WGS
ExxonMobil Baton Rouge Refinery, LA	Louisiana DEQ	EPA 5/202	4/20/17	0.020	0.016	WGS
ExxonMobil Baton Rouge Refinery, LA	Louisiana DEQ	EPA 5/202	11/15/17	0.032	0.026	WGS
ExxonMobil Baton Rouge Refinery, LA	Louisiana DEQ	EPA 5/202	1/28/20 - 1/29/20	0.078	0.065	WGS
ExxonMobil Torrance, CA	US EPA	EPA 201A/202	6/30/11	0.010	0.010	ESP
Flint Hills Resources, LP - Pine Bend, MI	Minnesota Pollution Control Agency	EPA 201A/202	11/2/11 - 11/3/11	0.019	0.018	ESP

Refinery/Unit	Agency	Test Methods	Test Date(s)	Total PM <sub>10</sub> (gr/dscf)	Total PM <sub>10</sub> @ 5% O <sub>2</sub> (gr/dscf)	Primary PM Control Technology
Flint Hills Resources, LP - Pine Bend, MI	Minnesota Pollution Control Agency	EPA 201A/202	8/20/14 - 8/22/14	0.016	N/A <sup>a</sup>	ESP
Flint Hills Resources, LP - Pine Bend, MI	Minnesota Pollution Control Agency	EPA 201A/202	6/27/17 - 6/29/17	0.019	0.018	ESP
HollyFrontier Woods Cross, UT - Unit 4 FCC #1	Utah DEQ	EPA 5B/202	12/20/12	0.004	0.004	WGS
HollyFrontier Woods Cross, UT - Unit 4 FCC #1	Utah DEQ	EPA 5/202	10/22/15	0.003	0.002	WGS
HollyFrontier Woods Cross, UT - Unit 4 FCC #1	Utah DEQ	EPA 5/202	10/2/14 - 10/3/14	0.005	0.004	WGS
HollyFrontier Woods Cross, UT - Unit 25 FCC #2	Utah DEQ	EPA 5/202	9/14/16 - 9/15/16	0.008	0.006	WGS
HollyFrontier Woods Cross, UT - Unit 25 FCC #2	Utah DEQ	EPA 5/202	10/31/17	0.010	0.009	WGS
HollyFrontier Cheyenne Refining, WY	Wyoming DEQ	EPA 5/202	3/3/17	0.002	0.002	WGS
HollyFrontier Cheyenne Refining, WY	Wyoming DEQ	EPA 5/202	11/8/17	0.007	0.006	WGS
HollyFrontier Cheyenne Refining, WY	Wyoming DEQ	EPA 5/202	8/22/18	0.006	0.004	WGS
HollyFrontier Cheyenne Refining, WY	Wyoming DEQ	EPA 5/202	7/24/19	0.008	0.007	WGS
Hovensa - US Virgin Islands	US EPA	EPA 5/202	6/18/11 - 6/19/11	0.017	0.014	WGS
Marathon - Robinson, IL	US EPA	EPA 5/202	7/19/11	0.028	0.026	WGS
Marathon - Detroit, MI	US EPA	EPA 5F/202	4/24/12	0.033	0.028	ESP
Marathon - Detroit, MI	US EPA	EPA 5F/202	4/25/12	0.025	0.021	ESP
Marathon - Detroit, MI	US EPA	EPA 5F/202	4/26/12	0.026	0.022	ESP
Marathon - Detroit, MI	Michigan DEQ	EPA 5F/202	11/18/14	0.019	0.017	ESP
Marathon - Detroit, MI	Michigan DEQ	EPA 5F/202	11/19/14 - 11/20/14	0.022	0.019	ESP
Marathon - Detroit, MI	Michigan DEQ	EPA 5F/202	9/1/15	0.027	0.022	ESP
Marathon - Detroit, MI	Michigan DEQ	EPA 5F/202	8/30/16 - 8/31/16	0.043	0.035	ESP
Marathon - Detroit, MI	Michigan DEQ	EPA 5F/202	8/31/16 - 9/1/16	0.042	0.035	ESP
Marathon - Detroit, MI	Michigan DEQ	EPA 5F/202	2/28/17	0.030	0.025	ESP
Marathon - Detroit, MI	Michigan DEQ	EPA 5F/202	2/13/18 - 2/14/18	0.035	0.033	ESP
Marathon - Detroit, MI	Michigan DEQ	EPA 5F/202	3/13/19	0.012	0.010	ESP
Marathon Refining - Galveston Bay, TX	Texas CEQ	EPA 5/202	6/30/16	0.020	0.018	WGS
Marathon Refining - Garyville, LA	US EPA	EPA 5/202	3/18/14 - 3/19/14	0.010	0.008	WGS
Marathon Refining - Garyville, LA	Louisiana DEQ	EPA 5/202	10/25/17	0.004	0.003	WGS
Marathon Refining - Garyville, LA	Louisiana DEQ	EPA 5/202	11/6/18	0.004	0.004	WGS

<b>Refinery/Unit</b>	<b>Agency</b>	<b>Test Methods</b>	<b>Test Date(s)</b>	<b>Total PM<sub>10</sub> (gr/dscf)</b>	<b>Total PM<sub>10</sub> @ 5% O<sub>2</sub> (gr/dscf)</b>	<b>Primary PM Control Technology</b>
Marathon Refining - Garyville, LA	Louisiana DEQ	EPA 5/202	10/12/19	0.005	0.004	WGS
Sunoco - Girard Point Philadelphia, PA	US EPA	EPA 5/202	6/24/11	0.034	N/A <sup>a</sup>	WGS
Tesoro Salt Lake City Refinery, UT	Utah DEQ	EPA 5/202	11/8/19 - 11/9/19	0.016	0.014	WGS <sup>b</sup>
Tesoro Salt Lake City Refinery, UT	Utah DEQ	EPA 5/202	2/19/19 - 2/20/19	0.025	0.024	WGS <sup>b</sup>
Tesoro Salt Lake City Refinery, UT	Utah DEQ	EPA 5/202	9/20/18	0.005	0.004	WGS <sup>b</sup>
Tesoro Salt Lake City Refinery, UT	Utah DEQ	EPA 5/202	8/24/18	0.013	0.012	WGS <sup>b</sup>
Tesoro Salt Lake City Refinery, UT	Utah DEQ	EPA 201A/202	8/8/17	0.041	0.037	ESP
Tesoro Salt Lake City Refinery, UT	Utah DEQ	EPA 201A/202	8/18/16	0.022	0.020	ESP
Tesoro Salt Lake City Refinery, UT	Utah DEQ	EPA 201A/202	7/7/15	0.019	0.017	ESP
Tesoro Salt Lake City Refinery, UT	Utah DEQ	EPA 201A/202	7/11/12	0.030	0.034	ESP
Valero - Port Arthur, TX	US EPA	EPA 5/202	6/13/11 - 6/14/11	0.008	0.007	WGS

<sup>a</sup> No oxygen information available in source test report.

<sup>b</sup> Tesoro Salt Lake City Refinery began operation of a WGS system to abate FCCU emissions in 2018.