

**TABLE C-1
POINT SOURCE EXHAUST PARAMETERS - SULFUR RECOVERY UNIT THERMAL OXIDIZERS
MICHIGAN REFINING DIVISION**

Point Source Description	Emission Unit ID	Aermod Input ID	Stack Orientation	Stack Coordinate (UTM)		Stack Height		Exit Temperature		Volumetric Flow Rate (acfm)	Exit Velocity		Inside Diameter	
				Easting	Northing	(feet)	(meters)	(F)	(K)		(f/s)	(m/s)	(inches)	(meters)
PROCESS STACKS/VENTS														
SRU Thermal Oxidizer	EU42-43SULRECOV-S1	SRUTO42	Vertical	322123.9	4683147.3	199.5	60.81	1,296	975.4	45,100	76.37	23.28	42.5	1.079
SRU/TGU Thermal Oxidizer	EU72-SULRBLOCK2-S1	SRUTO72	Vertical	322086.0	4683770.4	195.0	59.44	621	600.4	38,500	12.77	3.89	96	2.438
					ROP Limit	150.0	45.72							

Source	AERMOD Source ID	Contents	Emissions (g/s)	Hatch Height (ft)	Hatch Height (m)	Hatch Diameter (ft)	Hatch Diameter (m)	Hatch Area (m2)	Side Length (m)	Emissions (g/s/m2)	Southwest Corner (m)	
											Easting	Northing
72 Railcar Loading	RAILLD72	H2S	1.00000	12	3.66	3	0.91	0.7	0.8104	1.52E+00	322126.0	4683660.2

**TABLE C-2
MODELED EMISSION RATES - SULFUR CAP OPTIMIZATION PROJECT
MICHIGAN REFINING DIVISION**

Point Source Description	Emission Unit ID	Aermod Input ID	SO2 Emission Rate						
			ROP Limits		Emission	Short-term		Annual	
			Monthly	Annual	Factor	PTE		PTE	
			(LT/day)	(LT/day)	(lbs/LT)	(lb/hr)	(g/s)	(lb/hr)	(g/s)
EMISSIONS BASED ON CURRENT ROP LIMITS									
SRU Thermal Oxidizer	EU42-43SULRECOV-S1	SRUTO42	145	130	1.981	12.0	1.5080	10.7	1.3520
SRU/TGU Thermal Oxidizer	EU72-SULRBLOCK2-S1	SRUTO72	-	260	0.409	4.4	0.5583	4.4	0.5583
EMISSIONS BASED ON PROPOSED ROP LIMITS									
SRU Thermal Oxidizer	EU42-43SULRECOV-S1	SRUTO42	-	-	-	-	-	-	-
SRU/TGU Thermal Oxidizer	EU72-SULRBLOCK2-S1	SRUTO72	-	390	0.459	7.5	0.9392	7.5	0.9392

Notes:

1. Emission factors based on actual 2018 - 2020 production and SO2 emissions.

**TABLE C-3
SUMMARY OF MODELED IMPACTS ASSOCIATED WITH THE SULFUR CAP OPTIMIZATION PROJECT
MICHIGAN REFINING DIVISION**

Regulated Pollutant	Modeling Scenario	Averaging Period	Modeled Concentration (ug/m ³)	Significant Impact Level (ug/m ³)	PSD Increment (ug/m ³)	NAAQS (ug/m ³)	
SO ₂	Combined impact of SRU 42 and SRU 72 based on current permit-allowable ROP elemental sulfur production limits	1-Hour	4.3	7.9	-	196	
		3-Hour	4.0	25	512	1,300	
		24-Hour	1.5	5	91.0	-	
		Annual	0.2	1	20	-	
	Combined impact of SRU 42 and SRU 72 based on proposed elemental sulfur production limits	1-Hour	3.4	7.9	-	196	
		3-Hour	3.1	25	512	1,300	
		24-Hour	1.1	5	91.0	-	
		Annual	0.1	1	20	-	
	Reduction in modeled impact due to the project	1-Hour	-0.9				
		3-Hour	-0.9				
		24-Hour	-0.4				
		Annual	-0.1				

Notes

1. Model runs conducted using AERMOD (Version 21112) over a five year meteorological database (Detroit City Airport, 2016 - 2020).

**TABLE C-5
PAH EQUIVALENT EVALUATION
MICHIGAN REFINING DIVISION**

Potency Factors for TACs with AQD Footnote 5.

[Procedure for the Carcinogenic PAHs of Footnote No. 5](#)

Table 1. PAH Potency Equivalency Factors (PEFs)

CHEMICAL NAME	CAS NO.	PEF	Emission Rate (lb/hr)
Dibenz(a,h)anthracene	53-70-3	1.1	6.00E-08
3-Methylcholanthrene	56-49-5	5.7	9.00E-08
7,12-Dimethylbenz(a)anthracene	57-97-6	65	8.00E-07
Chrysene	218-01-9	0.01	9.00E-08
Indeno(1,2,3-cd)pyrene	193-39-5	0.1	9.00E-08
Benzo(a)anthracene	56-55-3	0.1	9.00E-08
Benzo(b)fluoranthene	205-99-2	0.1	9.00E-08
Benzo(k)fluoranthene	207-08-9	0.1	
Benzo(j)fluoranthene	205-82-3	0.1	9.00E-08
5-Methylchrysene	3697-24-3	1	
Benzo(a)pyrene	50-32-8	1	6.00E-08
Dibenzo(a,e)pyrene	192-65-4	1	
Dibenzo(a,h)pyrene	189-64-0	10	
Dibenzo(a,i)pyrene	189-55-9	10	
Dibenzo(a,l)pyrene	191-30-0	10	

Equivalent Emission Rate of benzo(a)pyrene (lb/hr) 5.27E-05

yellow columns = must enter information

Instructions: In the table for Rule 227(1)(a) enter in CAS Numbers and emission rates for each PAH that is emitted. The table above will calculate the "equivalent emission rate of benzo(a)pyrene." Next, you need to compare this to the IRSL (or SRSL) for benzo(a)pyrene.

In the table for Rule 227(1)(a), (b), or (c), enter the CAS No. for benzo(a)pyrene (50-32-8) into Column B, **and change the Chemical Name in Column A from "benzo(a)pyrene" to "PAHs as benzo(a)pyrene."** Changing the name will prevent the table above from double-counting the benzo(a)pyrene emissions. Then enter the equivalent emission rate of benzo(a)pyrene into the appropriate column.

TABLE 6
RULE 227(1)(C) ANALYSIS FOR AIR TOXICS ASSOCIATED WITH THE SULFUR CAP OPTIMIZATION PROJECT
MICHIGAN REFINING DIVISION

		Thermal Oxidizer		
		Emission Rate (lb/hr)	Modeled Impact $\mu\text{g}/\text{m}^3$	Avg Time
Cadmium	7440439	5.5E-05	8.0E-07	Annual
Sulfuric Acid	7664939	1.4E+00	2.0E-02	Annual
Sulfuric Acid	7664939	1.4E+00	6.2E-01	1-Hour

Thermal Oxidizer at 1 g/s Unit Emission rate Impact $\mu\text{g}/\text{m}^3$	
1 hr	3.55
8 hr	2.32
24 hr	1.08
Annual	0.12

Chemical Name	CAS No.	Combined TAC Impacts Facility		Screening Level				Is PAI less than the ITSL?	Is PAI less than IRSL or SRSL?
		Modeled Impact $\mu\text{g}/\text{m}^3$	Avg Time	ITSL $\mu\text{g}/\text{m}^3$	ITSL Avg Time	IRSL $\mu\text{g}/\text{m}^3$	SRSL $\mu\text{g}/\text{m}^3$		
Cadmium	7440439	8.0E-07	Annual	-	-	0.0006	0.006	-	YES
Sulfuric Acid	7664939	2.0E-02	Annual	1	Annual	-	-	YES	-
Sulfuric Acid	7664940	6.2E-01	1-Hour	120	1-Hour	-	-	YES	-

Notes

1. Model runs conducted using AERMOD (Version 21112) over a one year meteorological database (Detroit City Airport, 2020).