



Appendix B Health Risk Assessment



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Stockton Construction Health Risk Assessment

Unmitigated Emissions

Alternative	PM2.5 Emissions (tons)	g/s	Annual Concentration at 100 m	Cancer Risk per Million
Soil Embankment	1.5412	0.014779	0.16	50.06
Precast Panel Walls	1.0785	0.010342	0.11	35.03
Viaduct Bridge	1.0729	0.010288	0.11	34.85

Mitigated Emissions

Alternative	PM2.5 Emissions (tons)	g/s	Annual Concentration at 100 m	Cancer Risk per Million
Soil Embankment	0.1976	0.001895	0.021	6.42
Precast Panel Walls	0.1473	0.001412	0.016	4.78
Viaduct Bridge	0.1299	0.001246	0.014	4.22



AERSCREEN
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AERMOD

19191 2/2/2021

TITLE: STOCKTON CONSTRUCTION

***** STACK PARAMETERS *****

SOURCE	EMISSION	RATE:	1 g/s	7.937 lb/hr
STACK	HEIGHT:		3 meters	9.84 feet
STACK	INNER	DIAMETER:	0.127 meters	5 inches
PLUME	EXIT	TEMPERATURE:	673 K	751.7 Deg F
PLUME	EXIT	VELOCITY:	51.8 m/s	169.95 ft/s
STACK	AIR	FLOW	RATE:	1390 ACFM
RURAL	OR	URBAN:	URBAN	
POPULATION:	150000			
INITIAL	PROBE	DISTANCE	=	5000 meters 16404 feet

***** BUILDING DOWNWASH PARAMETERS *****

NO BUILDING DOWNWASH HAS BEEN REQUESTED FOR THIS ANALYSIS

***** PROBE ANALYSIS *****
25 meter receptor spacing: 1 meters - 5000 meters

Zo	ROUGHNESS	1-HR	CONC	DIST	TEMPORAL
SECTOR	LENGTH	(ug/m3)	(m)	PERIOD	
1*		1	318.6	25 WIN	
*	=	worst	case	flow	sector



*****MAKEMET METEOROLOGY PARAMETERS *****

MIN/MAX TEMPERATURE: 250 / 310 (K)

MINIMUM WIND SPEED: 0.5 m/s

ANEMOMETER HEIGHT: 10 meters

SURFACE CHARACTERISTICS INPUT: AERMET SEASONAL TABLES

DOMINANT SURFACE PROFILE: Urban
 DOMINANT CLIMATE TYPE: Dry Conditions
 DOMINANT SEASON: Winter

ALBEDO: 0.35
 BOWEN RATIO: 2
 ROUGHNESS LENGTH: 1 (meters)

SURFACE FRICTION VELOCITY (U*) NOT ADJUSTED

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR	MO	DY	JDY	HR								
--	--	--	---	--								
	10	4	25	25	1							
HO	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O	LEN	Z0	BOWEN	ALBEDO	REF	WS
-	-	-	-	-	-	-	-	-	-	-	-	-
	-64	1.206	-9	0.02	-999	3046	2609.5	1	2	0.35	7	
HT	REF	TA	HT									
-	-	-	-									
	10	310	2									
WIND	SPEED	AT	STACK	HEIGHT	(non-down 2.5 m/s)							
STACK-TIP	DOWNWASH	ADJUSTED	STACK	HEIGHT:	3 meters							
ESTIMATED	FINAL	PLUME	RISE	(non-downwash):	0.9 meters							
ESTIMATED	FINAL	PLUME	HEIGHT	(non-downwash):	3.9 meters							



METEOROLOGY	CONDITIONS	USED	TO	PREDICT	AMBIENT	BOUNDARY	IMPACT						
YR	MO	DY	JDY	HR									
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	10	2	14	25	12								
HO	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O	LEN	ZO	BOWEN	ALBEDO	REF	WS	
-	-	-	-	-	-	-	-	-	-	-	-	-	
	316.49	0.195	1.8	0.02	634	198	-2	1	2	0.14	0.5		
HT	REF	TA	HT										
-	-	-	-										
	10	280	2										
WIND	SPEED	AT	STACK	HEIGHT	(non-down	0.2 m/s							
STACK-TIP	DOWNWASH	ADJUSTED	STACK	HEIGHT:	3 meters								
ESTIMATED	FINAL	PLUME	RISE	(non-downwash):	130.1 meters								
ESTIMATED	FINAL	PLUME	HEIGHT	(non-downwash):	133.1 meters								

***** AERSCREEN AUTOMATED DISTANCES *****
 OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

MAXIMUM DIST (m)	MAXIMUM 1-HR (ug/m3)	CONC (m)	DIST (ug/m3)	1-HR	CONC
1	4.254	2525	9.137		
25	318.6	2550	9.027		
50	184.9	2575	8.92		
75	147.6	2600	8.814		
100	110.5	2625	8.711		
125	92.61	2650	8.61		
150	77.49	2675	8.511		
175	65.34	2700	8.413		
200	57.11	2725	8.318		
225	53.58	2750	8.224		



STOCKTON DIAMOND

250	49.94	2775	8.132
275	46.43	2800	8.042
300	47.85	2825	7.954
325	48.48	2850	7.867
350	47.99	2875	7.781
375	47.23	2900	7.698
400	46.29	2925	7.616
425	45.23	2950	7.535
450	44.09	2975	7.456
475	42.91	3000	7.378
500	41.71	3025	7.301
525	40.51	3050	7.226
550	39.53	3075	7.152
575	38.61	3100	7.08
600	37.69	3125	7.008
625	36.77	3150	6.938
650	35.87	3175	6.869
675	34.97	3200	6.801
700	34.1	3225	6.735
725	33.24	3250	6.669
750	32.41	3275	6.605
775	31.6	3300	6.541
800	30.81	3325	6.479
825	30.05	3350	6.418
850	29.32	3375	6.357
875	28.6	3400	6.298
900	27.91	3425	6.239
925	27.25	3450	6.181
950	26.6	3475	6.125
975	25.98	3500	6.069
1000	25.38	3525	6.014
1025	24.8	3550	5.96
1050	24.23	3575	5.907
1075	23.69	3600	5.854
1100	23.17	3625	5.802
1125	22.66	3650	5.751
1150	22.17	3675	5.701
1175	21.7	3700	5.652
1200	21.24	3725	5.603
1225	20.8	3750	5.555
1250	20.37	3775	5.508
1275	19.96	3800	5.461
1300	19.56	3825	5.415



STOCKTON DIAMOND

1325	19.17	3850	5.37
1350	18.8	3875	5.325
1375	18.43	3900	5.281
1400	18.08	3925	5.237
1425	17.74	3950	5.195
1450	17.41	3975	5.152
1475	17.09	4000	5.111
1500	16.78	4025	5.07
1525	16.48	4050	5.029
1550	16.18	4075	4.989
1575	15.9	4100	4.95
1600	15.62	4125	4.911
1625	15.35	4150	4.872
1650	15.09	4175	4.834
1675	14.84	4200	4.797
1700	14.59	4225	4.76
1725	14.35	4250	4.724
1750	14.12	4275	4.688
1775	13.89	4300	4.652
1800	13.67	4325	4.617
1825	13.45	4350	4.583
1850	13.24	4375	4.548
1875	13.04	4400	4.515
1900	12.84	4425	4.481
1925	12.65	4450	4.448
1950	12.46	4475	4.416
1975	12.27	4500	4.384
2000	12.09	4525	4.352
2025	11.92	4550	4.321
2050	11.74	4575	4.29
2075	11.58	4600	4.26
2100	11.41	4625	4.229
2125	11.25	4650	4.2
2150	11.1	4675	4.17
2175	10.95	4700	4.141
2200	10.8	4725	4.112
2225	10.65	4750	4.084
2250	10.51	4775	4.056
2275	10.37	4800	4.028
2300	10.24	4825	4.001
2325	10.1	4850	3.974
2350	9.973	4875	3.947
2375	9.846	4900	3.92



2400	9.721	4925	3.894
2425	9.599	4950	3.868
2450	9.48	4975	3.843
2475	9.363	5000	3.817
2500	9.249		

*****AERSCREEN		MAXIMUM	IMPACT	SUMMARY	*****		
MAXIMUM 1-HOUR CALCULATION PROCEDURE	SCALED 3-HOUR CONC (ug/m3)	SCALED 8-HOUR CONC (ug/m3)	SCALED 24-HOUR CONC (ug/m3)	SCALED ANNUAL CONC (ug/m3)	CONC (ug/m3)		
FLAT	TERRAIN		1101	1101	990.8	660.6	110.1
DISTANCE	FROM	SOURCE		7 meters			
IMPACT AMBIENT	AT BOUNDARY	THE	4.254	4.254	3.828	2.552	0.4254
DISTANCE	FROM	SOURCE		1 meters			



Construction Health Risk

Cair= 1.00000 ($\mu\text{g}/\text{m}^3$)

Cancer Risk_{inh} = Doseair * CPF * ASF * ED/AT * FAH

Doseair = Cair * {BR/BW} * A * EF * 10⁻⁶

Age Group	Age Sensitivity Factor (ASF)	Fraction of Time (FAH)	BR/BW	A	EF	ED	AT	CPF	Doseair	Risk
3rd	10	0.85	361	1	0.96	0.25	70	1.1	0.00034656	1.15726E-05
0-2	10	0.85	1090	1	0.96	2	70	1.1	0.0010464	0.000279538
2-9	3	0.72	631	1	0.96	7	70	1.1	0.00060576	0.000143929
2-16	3	0.72	572	1	0.96	14	70	1.1	0.00054912	0.000260942
16-30	1	0.73	261	1	0.96	14	70	1.1	0.00025056	4.02399E-05
16-70	1	0.73	233	1	0.96	54	70	1.1	0.00022368	0.00013856

3 yr Construction = 3.07E-04
 70 yr lifetime = 0.000690613
 30 yr lifetime = 0.000592293
 6.8348