APPENDIX B

Revised Air Quality Calculations

Table D-10: Estimated VOC, CO, NOx, SOx, and PM_{10} Emission Asphalt Oil Tank, Batch Mixer, and Batch Dryer - Revised 16 June 2008
Proposed Asphalt & Recycling Plant
Dutra Haystack Landing Asphalt & Recycling Facility
Draft Environmental Impact Report

Asphalt Tank	Emission Rate [1] (pounds per year)	Maximum Daily VOC Emissions (pounds)	Total Annual VOC Emissions (tons)	Maximum Daily CO Emissions (pounds)	Total Annual CO Emissions (tons)
30,000 Asphalt Tank	9.18	0.025	0.009	0.0024	0.0009
30,000 Asphalt Tank	9.18	0.025	0.014	0.0024	0.0013
Total	18	0.050	0.023	0.0049	0.0022

Batch Mixer	Hot Mix Heat Requirement (mmBTU/ton)	Natural Gas Heating Value [2] (mmBTU/mmcf)	Emission Rate [2] (pounds/mmcf)	Emission Rate (pounds/ton)	Maximum Daily Asphalt Production (tons)	Maximum Daily Emissions (pounds)	Annual Emissions (tons)
VOCs	0.26	1,020	5.5	0.0014	4,000	5.6	0.16
SOx	0.26	1,020	0.60	0.00015	4,000	0.61	0.017
NOx	0.26	1,020	140	0.036	4,000	143	4.0
CO	0.26	1,020	84	0.021	4,000	86	2.4

Batch Dryer	Natural Gas Emission Factor [2] (pounds per ton)	Maximum Daily Asphalt Production (ton)	Maximum Daily Emissions (pounds)	Annual Emissions (ton)
PM_{10}	0.027	4,000	108	3.0
VOCs [3]	0.0082	4,000	27	0.76

Notes:

Based on an annual production capacity of 225,000 tons

CO = carbon monoxide

NOx = nitrogen oxides

VOCs = volatile organic compounds

PM_{10} = particulate matter less than one micron in size

SOx = sulfide oxides

mmBTU = million British thermal units

mmcf = million cubic feet

VOCs are synonymous with reactive organic gases (ROG)

[1] Tank emissions estimated using EPA software Tank 4.0.9d

[2] BAAQMD Hot Asphalt Mixing Facilities Engineering Evaluation Template

[3] VOC emission = VOC dryer - VOC mixer

Table D-13: Total Estimated Batch Asphalt Plant Emissions - Revised 16 June 2008
Proposed Asphalt & Recycling Plant
Dutra Haystack Landing Asphalt & Recycling Facility
Draft Environmental Impact Report

Pounds per Day Based on Maximum Production of		**4,000**	**tons of Asphalt per Day**		
Activity	**PM_{10}**	**VOCs**	**SOx**	**NOx**	**CO**
Barge Off-Loading Emissions	1.1	NA	NA	NA	NA
Cold Feed System Emissions	3.6	NA	NA	NA	NA
Total Fugitive Dust / Yard Emissions	6.4	NA	NA	NA	NA
Asphalt Oil Storage Tank Emissions	NA	0.050	NA	NA	0.0049
Mixer Emissions	NA	5.6	0.61	143	86
Dryer Emissions	108	27	NA	NA	NA
Truck Loadout Emissions [1]	2.8	17	NA	NA	NA
Silo Filling Emissions [1]	2.3	49	NA	NA	NA
Asphalt Crusher	1.5	NA	NA	NA	NA
Maximum Daily Emissions	124	98	0.61	143	86
Tons per Year Based on Maximum Production of		**225,000**	**tons of Asphalt per Year**		
Activity	**PM_{10}**	**VOCs**	**SOx**	**NOx**	**CO**
Barge Off-Loading Emissions	0.059	NA	NA	NA	NA
Cold Feed System Emissions	0.11	NA	NA	NA	NA
Total Fugitive Dust / Yard Emissions	1.0	NA	NA	NA	NA
Asphalt Oil Storage Tank Emissions	NA	0.023	NA	NA	0.0022
Mixer Emissions	NA	0.16	0.017	4.0	2.4
Dryer Emissions	3.0	0.76	NA	NA	NA
Truck Loadout Emissions [1]	0.079	0.47	NA	NA	NA
Silo Filling Emissions [1]	0.066	1.4	NA	NA	NA
Asphalt Crusher	0.11	NA	NA	NA	NA
Total Annual Emissions	4.3	2.8	0.017	4.0	2.4

Notes:
NA = not applicable
PM10 = particulate mater less than 10 microns in size
VOCs = volatile organic compounds
SOx = sulfur oxides
NOx = nitrogen oxides
CO = carbon monoxide

[1] Conservatively assumes all particulate matter from truck loading and silo filling is PM_{10}.
VOCs are synonymous with reactive organic gases (ROG)

Table D-18: Estimated Barge Emission - Revised 16 June 2008
Dutra Haystack Landing Asphalt & Recycling Facility
Draft Environmental Impact Report

Marine Vessel Emission Factor (Rate) Calculation [1]								
				Emission Rate (g/kW-hr)				
Pollutant	Exponent (x)	Intercept (b)	Coefficient (a)	Cruise Mode	Slow Cruise Mode		Maneuvering	Auxiliary Engine
PM_{10}	1.5	0.2551	0.0059	0.00	0.28		0.32	0.26
NOx	1.5	10	0.13	0	10.95		11.85	11
SO_2	---	---	2.4	0	0.01		16.40	13
CO	1.0	---	0.84	0.0	2.09		4.19	0.84
ROG	1.5	---	0.067	0.000	0.26		0.75	0.070

Estimated Tugboat Emissions									
	Emissions Rates (lb/trip)					Existing Emissions per Trip	Proposed Emissions per Trip	Existing Plant Emissions	Proposed Plant Emissions
Pollutant	Cruise Mode	Slow Cruise Mode Existing	Slow Cruise Mode Proposed	Maneuvering	Auxiliary Engine	(lb)	(lb)	(tpy)	(tpy)
PM_{10}	0.0	1.5	1.5	0.17	0.069	1.8	1.7	0.022	0.106
NOx	0	60	58	6.2	2.8	69	67	0.87	4.16
SO_2	0	0.047	0.045	8.6	3.4	12	12	0.15	0.76
CO	0	11.6	11.0	2.2	0.22	14	13	0.17	0.84
ROG	0.0	1.5	1.4	0.4	0.019	1.9	1.8	0.023	0.112

Notes:

g = grams
kW = kilowatt
hr = hour
lb = pounds
tpy = tons per year
hp = horsepower

Equations:

For PM, NOx, CO and HC, Emission Rate (g/kW-hr) = a (Fractional Load)-x + b
For SOx, Emission Rate (g/kW-hr) = a (Fuel Sulfur Flow in g/kW-hr) + b
Fuel Consumption (g/kW-hr) = 14.12/(Fractional Load) + 205.717

Sulfur Fuel Flow (g/kW-hr) = 0.025 * Fuel Consumption (g/kW-hr)
For all pollutants,
Emissions = Emission Rate (g/kW-hr) * Mode Specific (kW) * Time (hours)]*pounds/453.5924 grams

[1] US. EPA, 2000, Analysis of Commercial Marine Vessel Emissions and Fuel Consumption.

Assumptions:

Main Engine	
DWT (hp) =	1,600
DWT (kW) =	1,193
Trip in BAAQMD (hours) =	7.05
Cruise Fractional Load =	0.8
Cruise Load (kW) =	0
Cruise (hr/trip) =	0
Slow Cruise Fractional Load =	0.4
Slow Cruise Load (kW) =	477
Slow Cruise Existing Plant (hr/trip) =	5.25
Slow Cruise Proposed Plant(hr/trip) =	5.0
Slow Cruise Sulfur Fuel Flow	0.0036
Maneuvering Fractional Load =	0.2
Maneuvering Load (kW) =	239
Maneuvering (hr/trip) =	1
Maneuvering Sulfur Fuel Flow	6.9
Baseline (trips/year) =	25
Future (trips/year) =	125
Increase (trips/year) =	100
Sulfur in Fuel (%) =	0.0015
Auxiliary Engine	
Auxiliary Engine (kW) =	60
Standby Fractional Load =	1

Table D-19: Estimate in Net Increase of Criteria Air Pollutants from On-Site and Off-Site Emissions - Revised 16 June 2008
Dutra Haystack Landing Asphalt & Recycling Facility
Draft Environmental Impact Report

Criteria Air Pollutants	Maxiumum Emissions [3]	PM_{10} [1]	ROG [2]	SOx	NOx	CO
Existing Plant Estimated Criteria Air Pollutant Emissions	(pounds per day)	70	58	13	194	84
	(tons per year)	2.5	1.7	0.25	13	3.5
Proposed Plant Estimated Annual Criteria Air Pollutant Emissions	(pounds per day)	134	112	13	391	150
	(tons per year)	5.4	4.2	0.89	35	14
Net Increase in Criteria Air Pollutant Emissions	(pounds per day)	63	55	0.37	197	66
	(tons per year)	2.9	2.6	0.64	22	10

PM_{10} = particulate matter less than 10 microns in size
VOCs = volatile organic compounds
SOx = sulfur oxides
NOx = nitrogen oxides
CO = carbon monoxide
ROG = reactive organic gases

1 Conservatively assumes all particulate matter from truck loading and silo filling is PM_{10}.

[2] Assumes volatile organic gases are synonymous with ROG

[3] Assumes one barge trip and maximum production rate for daily maximum.
Assumes maximum annual production for maximum annual emissions.