

APPENDIX A
Air Quality Factors, Assumptions, and Calculations

**Hansen Area Water Recycling Project IS/MND
Air Quality Calculations Summary (Pipeline)**

Stationary (Off-Road) Construction Equipment Emissions					Emissions (pounds per day)				
Equipment Name	Equipment Type	Rated HP ^a	% Load/100 ^b	Daily Hours of Operation ^c	ROC	CO	NO _x	SO _x	PM ₁₀
Excavator (1)	medium diesel	150	0.580	8	0.70	7.66	16.70	1.39	1.04
Water truck (2)	heavy diesel	175	0.410	2	0.86	5.74	3.44	0.29	0.22
Dump truck (2)	heavy diesel	250	0.410	6	3.69	24.60	29.52	2.46	0.92
Loader (1)	medium diesel	130	0.465	8	1.45	7.25	21.28	1.93	0.97
Backhoe (1)	medium diesel	80	0.465	8	0.89	4.46	6.55	0.60	0.60
Crane (1)	heavy diesel	120	0.430	6	0.93	2.79	7.12	0.62	0.46
Compactor (1)	medium diesel	8	0.430	2	0.01	0.05	0.14	0.01	0.01
Paver (1)	medium diesel	90	0.590	2	0.11	0.74	2.44	0.21	0.11
Subtotal Stationary Equipment					8.64	53.29	87.19	7.51	4.32

Notes:
a) Horsepower ratings were derived from typical equipment ratings from SCAQMD (Table A9-8-C in the Handbook) and from the California Air Resources Board (ARB) website (<http://www.arb.ca.gov/msprog/mailouts/msc9925/msc9925e.pdf>, Appendix E, Revised January 10, 2002)
b) Load factors are based on SCAQMD Handbook Table A9-8-D for Off-Road Construction Equipment.
c) Scheduled hours are M-F 7 a.m. to 6 p.m. and Saturday 8 a.m. to 5 p.m. (Average of 10.67 hours per day, six days a week -- used 11 hours for the daily average). Hours of operation for each piece of equipment is based on the average proportion of 11-hour day during which that piece of equipment is typically used.

Source: South Coast Air Quality Management District *CEQA Air Quality Handbook* (April 1993), Table A9-8-B. Handbook emission factors used (all diesel): Excavator, Other Construction Equipment (for Water Truck and Dump Truck), Backhoe, Loader, Crane, Roller (for Compactor), and Asphalt Paver (for Paver).

Mobile (On-Road) Construction Equipment Emissions				Emissions (pounds per day)				
Equipment Name	Equipment Type		Daily VMT ^a	ROC	CO	NO _x	SO _x	PM ₁₀
Construction worker vehicles (24)	light gasoline		480	0.673	7.103	0.689	0.004	0.013
Welder's truck (1)	medium gasoline		5	0.010	0.103	0.016	0.000	0.000
Pick-up trucks (3)	medium gasoline		30	0.057	0.621	0.097	0.000	0.002
Delivery/haul trucks (6)	heavy diesel		120	0.197	0.916	5.508	0.049	0.098
Subtotal Mobile Equipment				0.937	8.744	6.309	0.053	0.113

Notes:
a) VMT's are estimated assuming all workers arrive at staging areas then proceed to construction activity sites along the proposed alignment and would only work on one section of the pipeline at any given time. Assumed 20 miles per worker commute per day for 24 workers, six days a week, for 52 weeks. Also assumed delivery/haul trips by large diesel trucks would occur 6 times a day at a distance of 20 miles round-trip (to and from LADWP equipment/supply facility and/or fill material disposal site). The number of delivery/haul truck trips are assumed to represent a total distance per day, using one or more trucks for trips of various lengths which total 120 miles per day on average.

Source: EMFAC2002 Draft Version 2.2 (Modeled for Year 2003 for Average Urban Los Angeles County)

PM₁₀ Dust Emissions from Construction				
Conditions	Area of Ground Disturbance (acres)	Dust Generation Factor	Dust Generation (lbs/day) ^b	Project Total (tons) Over 12-months
Average Conditions	0.184 ^a	0.11 tons/acre-month	1.56	0.607
Worst-Case Conditions	0.184 ^a	0.42 tons/acre-month	5.94	2.318

Notes:
a) Estimated using LADWP's approximated 2000-foot work area, multiplied by 4-foot-wide trench (maximum area of exposed soil at any given time, i.e., 8,000 square feet), divided by 43,560.17 sq. ft. (1 acre) = 0.184 acre.
b) Pounds per day conversion assumed 30 months (130 weeks), 6 days a week = 780 days.

Source: Midwest Research Institute, *Improvement of Specific Emission Factors (BACM Project No. 1) Final Report*, for SCAQMD (for PM₁₀ dust emissions), March 29, 1996.

	Project Emissions (pounds per day)				
	ROC	CO	NO _x	SO _x	PM ₁₀
Project Totals	9.58	62.04	93.50	7.57	10.38

**Hansen Area Water Recycling Project IS/MND
Air Quality Calculations Summary (Tank/Pump Station)**

Stationary (Off-Road) Construction Equipment Emissions					Emissions (pounds per day)				
Equipment Name	Equipment Type	Rated HP^a	% Load/100^b	Daily Hours of Operation^c	ROC	CO	NO_x	SO_x	PM₁₀
Bulldozer (1)	medium diesel	103	0.590	6	0.73	3.65	7.66	0.73	0.18
Water truck (2)	heavy diesel	175	0.410	2	0.86	5.74	3.44	0.29	0.22
Dump truck (2)	heavy diesel	250	0.410	6	3.69	24.60	29.52	2.46	0.92
Loader (1)	medium diesel	130	0.465	6	1.09	5.44	7.98	0.73	0.36
Backhoe (1)	medium diesel	80	0.465	6	0.67	3.35	4.91	0.45	0.22
Crane (1)	heavy diesel	120	0.430	8	1.24	3.72	9.49	0.83	0.62
Compactor (1)	medium diesel	8	0.430	2	0.01	0.05	0.14	0.01	0.01
Grader (1)	medium diesel	157	0.580	6	1.64	4.37	11.47	1.09	0.55
Concrete Mixer (1)	light diesel	11	0.560	6	0.07	0.37	0.89	0.07	0.06
Subtotal Stationary Equipment					10.00	51.28	75.50	6.65	3.13

Notes:
a) Horsepower ratings were derived from typical equipment ratings from SCAQMD (Table A9-8-C in the Handbook) and from the California Air Resources Board (ARB) website (<http://www.arb.ca.gov/msprog/mailouts/msc9925/msc9925e.pdf>, Appendix E, Revised January 10, 2002)
b) Load factors are based on SCAQMD Handbook Table A9-8-D for Off-Road Construction Equipment.
c) Scheduled hours are M-F 7 a.m. to 6 p.m. and Saturday 8 a.m. to 5 p.m. (Average of 10.67 hours per day, six days a week -- used 11 hours for the daily average).
Hours of operation for each piece of equipment is based on proportion of 11-hour day during which that piece of equipment is typically used.

Source: South Coast Air Quality Management District *CEQA Air Quality Handbook* (April 1993), Table A9-8-B. Handbook emission factors used (all diesel): Excavator, Other Construction Equipment (for Water Truck and Dump Truck), Backhoe, Loader, Crane, Roller (for Compactor), and Asphalt Paver (for Paver).

Mobile (On-Road) Construction Equipment Emissions				Emissions (pounds per day)				
Equipment Name	Equipment Type	Daily VMT^a		ROC	CO	NO_x	SO_x	PM₁₀
Construction worker vehicles (24)	light gasoline	480		0.673	7.103	0.689	0.004	0.013
Welder's truck (1)	medium gasoline	5		0.010	0.103	0.016	0.000	0.000
Pick-up trucks (3)	medium gasoline	30		0.057	0.621	0.097	0.000	0.002
Delivery/haul trucks (6)	heavy diesel	120		0.197	0.916	5.508	0.049	0.098
Subtotal Mobile Equipment				0.937	8.744	6.309	0.053	0.113

Notes:
a) VMT's are estimated assuming all workers arrive at staging areas then proceed to construction activity sites along the proposed alignment and would only work on one section of the pipeline at any given time. Assumed 20 miles per worker commute per day for 24 workers, six days a week, for 52 weeks. Also assumed delivery/haul trips by large diesel trucks would occur 6 times a day at a distance of 20 miles round-trip (to and from LADWP equipment/supply facility and/or fill material disposal site).
The number of delivery/haul truck trips are assumed to represent a total distance per day, using one or more trucks for trips of various lengths which total 120 miles per day on average.

Source: EMFAC2002 Draft Version 2.2 (Modeled for Year 2003 for Average Urban Los Angeles County)

PM₁₀ Dust Emissions from Construction				
Conditions	Area of Ground Disturbance (acres)	Dust Generation Factor	Dust Generation (lbs/day)^b	Project Total (tons) Over 30-months
Average Conditions	1.056 ^a	0.11 tons/acre-month	8.94	3.485
Worst-Case Conditions	1.056 ^a	0.42 tons/acre-month	34.12	13.306

Notes:
a) Estimated based on LADWP's approximated 46,000-square-foot storage tank construction site (maximum area of exposed soil during construction), divided by 43,560.17 sq. ft. (1 acre) = 1.056 acre.
b) Pounds per day conversion assumed 30 months (130 weeks), 6 days a week = 780 days.

Source: Midwest Research Institute, *Improvement of Specific Emission Factors (BACM Project No. 1) Final Report*, for SCAQMD (for PM₁₀ dust emissions), March 29, 1996.

	Project Emissions (pounds per day)				
	ROC	CO	NO_x	SO_x	PM₁₀
Project Totals	10.94	60.02	81.81	6.71	37.37