Appendix E
Construction Emission Calculations

APPENDIX E

Construction Emission Summary – PMWC

EA/IS and FONSI/MND for PMWC Groundwater Production Element Project and SMWC Groundwater Monitoring Project

Emission Source	Emissions (lb/day)					
	ROG	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Well Drilling	4.0	20.0	34.0	0.0068	1.76	1.62
Well Development/ Aboveground Facilities Construction	4.9	18.8	41.8	0.0047	1.77	1.63
Maximum Emissions	4.9	20.0	41.8	0.0068	1.8	1.6
FRAQMD Thresholds	25	NE	25	NE	80	NE
Threshold Exceeded?	No	NA	Yes	NA	No	NA

The FRAQMD Construction Mitigation Measures must be implemented for any project exceeding the threshold.
NA = Not applicable
NE = Threshold has not been established

Worker Commute Trips				Emissions (lb/day)					
Construction Phase	# of Workers/day	Days of Work	Miles Traveled per Round Trip	**ROG**	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Well Drilling	7	10	50	0.040	1.51	0.140	0.0023	0.007	0.006
Well Development	4	20	50	0.023	0.86	0.080	0.0013	0.004	0.004
Aboveground Facilities	5	10	50	0.0287	1.078	0.1003	0.0017	0.0050	0.0044

Round trip mileage represents the distance from the construction site to the nearest city, in this case Yuba City, CA.
Well drilling emissions are based on the assumption that well drilling will occur 7 days per week, with two work crews operating 12 hours each day.
Well Development and Aboveground Facilities Construction emissions are based on the assumption that crews will work 7 days per week, 12 hours per day.
It is assumed that the Well Development and Aboveground Facilities Construction activities will occur simultaneously.

Offsite Vehicle Emissions			Emissions (lb/day)					
Construction Phase	# of Vehicle Trips	Miles Traveled Round Trip	**ROG**	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Cement Delivery Trucks	3	50	0.110	1.779	0.173	0.003	0.024	0.022
Fuel Delivery Trucks	1	50	0.037	0.593	0.058	0.001	0.008	0.007

It is assumed that cement truck deliveries will occur on 4 days during the aboveground construction phase of the project, with three deliveries per day.
It is assumed that fuel truck deliveries will occur weekly during all phases of construction (4 days total).

Exhaust Emission Factors

Vehicle	Vehicle Type in EMFAC2007	2011 Emission Factors (lb/mile)						
		ROG	CO	NOx	SOx	PM10	PM2.5	CO2
Work Trucks (unpaved roads)	Light-Duty Truck, Gasoline	0.0007	0.0119	0.0012	0.00002	0.0002	0.0001	1.9507
Employee Commute Paved Road	Passenger Vehicles, Gasoline	0.0001	0.0043	0.0004	0.00001	0.0000	0.00002	0.6320
Vehicle	**Vehicle Type in EMFAC2007**	**2011 Emission Factors (g/mile)**						
		ROG	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO2**
Work Trucks (unpaved roads)	Light-Duty Truck, Gasoline	0.334	5.38	0.523	0.009	0.1	0.07	884.86
Employee Commute	Passenger Vehicles, Gasoline	0.052	1.956	0.182	0.003	0.009	0.008	286.666

Emission factors from the California Air Resources Board's EMFAC 2007 model for Kern County. It was assumed that vehicles would travel at 10 mph on unpaved roads, and 45 mph on paved roads.

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\bbeattie.CH2MHILL\Desktop\PMWD\PMWD_Well_Installation.urb924

Project Name: PMWC Well Installation Sutter County

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 6/1/2011-6/10/2011 Active Days: 10	3.78	33.61	16.09	0.00	0.00	1.72	1.72	0.00	1.58	1.58	**5,955.46**
Trenching 06/01/2011-06/10/2011	3.78	33.61	16.09	0.00	0.00	1.72	1.72	0.00	1.58	1.58	5,955.46
Trenching Off Road Diesel	3.76	33.58	15.58	0.00	0.00	1.72	1.72	0.00	1.58	1.58	5,904.37
Trenching Worker Trips	0.02	0.03	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.10
Time Slice 6/11/2011-6/30/2011 Active Days: 20	**4.85**	**41.58**	**16.30**	**0.00**	**0.00**	**1.76**	**1.76**	**0.00**	**1.62**	**1.62**	5,247.40
Mass Grading 06/11/2011-06/30/2011	4.85	41.58	16.30	0.00	0.00	1.76	1.76	0.00	1.62	1.62	5,247.40
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	4.83	41.54	15.53	0.00	0.00	1.75	1.75	0.00	1.61	1.61	5,170.75
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.76	0.00	0.00	0.00	0.01	0.00	0.00	0.00	76.64

Phase Assumptions

Phase: Mass Grading 6/11/2011 - 6/30/2011 - Well Development

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

0 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 12 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 12 hours per day

Phase: Trenching 6/1/2011 - 6/10/2011 - Well Drilling

Off-Road Equipment:

1 Bore/Drill Rigs (291 hp) operating at a 0.75 load factor for 24 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 24 hours per day

APPENDIX E

Construction Emission Summary – SMWC

EA/IS and FONSI/MND for PMWC Groundwater Production Element Project and SMWC Groundwater Monitoring Project

Emission Source	Emissions (lb/day)					
	ROG	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Well Drilling	2.1	11.3	17.1	0.0055	0.90	0.82
Well Development/ Aboveground Facilities Construction	5.0	19.3	41.9	0.0057	1.79	1.65
Maximum Emissions	5.0	19.3	41.9	0.0057	1.8	1.6
FRAQMD Thresholds	25	NE	25	NE	80	NE
Threshold Exceeded?	No	NA	Yes	NA	No	NA

The FRAQMD Best Available Mitigation Measures must be implemented for any project exceeding the threshold.

NA = Not applicable

NE = Threshold has not been established

Worker Commute Trips				Emissions (lb/day)					
Construction Phase	# of Workers/day	Days of Work	Miles Traveled per Round Trip	**ROG**	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Well Construction	3	15	50	0.017	0.65	0.060	0.0010	0.003	0.003

Round trip mileage represents the distance from the construction site to the nearest city, in this case Yuba City, CA.

Well construction emissions are based on the assumption that construction activities will occur 5 days per week, 12 hours per day.

Offsite Vehicle Emissions			Emissions (lb/day)					
Construction Phase	# of Vehicle Trips	Miles Traveled Round Trip	**ROG**	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**
Cement Delivery Trucks	3	50	0.110	1.779	0.173	0.003	0.024	0.022
Fuel Delivery Trucks	1	50	0.037	0.593	0.058	0.001	0.008	0.007

It is assumed that cement truck deliveries will occur on 2 days during construction, with three deliveries per day.

It is assumed that fuel truck deliveries will occur on 2 days during construction.

Exhaust Emission Factors

Vehicle	Vehicle Type in EMFAC2007	2011 Emission Factors (lb/mile)						
		ROG	CO	NOx	SOx	PM10	PM2.5	CO2
Work Trucks (unpaved roads)	Light-Duty Truck, Gasoline	0.0007	0.0119	0.0012	0.00002	0.0002	0.0001	1.9507
Employee Commute Paved Road	Passenger Vehicles, Gasoline	0.0001	0.0043	0.0004	0.00001	0.0000	0.00002	0.6320
Vehicle	**Vehicle Type in EMFAC2007**	**2011 Emission Factors (g/mile)**						
		ROG	**CO**	**NOx**	**SOx**	**PM10**	**PM2.5**	**CO2**
Work Trucks (unpaved roads)	Light-Duty Truck, Gasoline	0.334	5.38	0.523	0.009	0.1	0.07	884.86
Employee Commute	Passenger Vehicles, Gasoline	0.052	1.956	0.182	0.003	0.009	0.008	286.666

Emission factors from the California Air Resources Board's EMFAC 2007 model for Kern County. It was assumed that vehicles would travel at 10 mph on unpaved roads, and 45 mph on paved roads.

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Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Unmitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\bbeattie.CH2MHILL\Desktop\PMWD\SMWC_Well_Installation.urb924

Project Name: SMWC Well Installation Sutter County

Project Location: California State-wide

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 7/11/2011-7/15/2011 Active Days: 5	1.90	16.82	8.30	0.00	0.00	0.86	0.86	0.00	0.79	0.79	3,003.28
Trenching 07/11/2011-07/15/2011	1.90	16.82	8.30	0.00	0.00	0.86	0.86	0.00	0.79	0.79	3,003.28
Trenching Off Road Diesel	1.88	16.79	7.79	0.00	0.00	0.86	0.86	0.00	0.79	0.79	2,952.18
Trenching Worker Trips	0.02	0.03	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.10
Time Slice 7/18/2011-7/29/2011 Active Days: 10	**4.85**	**41.58**	**16.30**	**0.00**	**0.00**	**1.76**	**1.76**	**0.00**	**1.62**	**1.62**	**5,247.40**
Mass Grading 07/18/2011-07/29/2011	4.85	41.58	16.30	0.00	0.00	1.76	1.76	0.00	1.62	1.62	5,247.40
Mass Grading Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Off Road Diesel	4.83	41.54	15.53	0.00	0.00	1.75	1.75	0.00	1.61	1.61	5,170.75
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.02	0.04	0.76	0.00	0.00	0.00	0.01	0.00	0.00	0.00	76.64

Phase Assumptions

Phase: Mass Grading 7/18/2011 - 7/29/2011 - Well Preparation

Total Acres Disturbed: 0

Maximum Daily Acreage Disturbed: 0

Fugitive Dust Level of Detail: Default

0 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

2 Off Highway Trucks (479 hp) operating at a 0.57 load factor for 12 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 12 hours per day

Phase: Trenching 7/11/2011 - 7/15/2011 - Well Drilling

Off-Road Equipment:

1 Bore/Drill Rigs (291 hp) operating at a 0.75 load factor for 12 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 12 hours per day