#1

AIR QUALITY DYNAMICS

SPECIALIZING IN AIR QUALITY ANALYSIS

November 4, 2008

Long Beach Development Services
333 West Ocean Boulevard, 5th Floor
Long Beach, California 90802
Attn: Steve Valdez

Re: Senior Community Housing at 3635 Elm Avenue: Recirculation of MND - Amended Air Quality Analysis

Mr. Valdez:

Air Quality Dynamics was retained by the project applicant to review and, where appropriate, revise the amended air quality calculations associated with initial site preparation and related earthmoving activities for the above referenced project.

A review of available documentation indicates that recirculation of the Mitigated Negative Declaration (MND) was prompted by comments on the initial MND by the South Coast Air Quality Management District (SCAQMD) in October 2008. Of relevance was SCAQMD's request to prepare a localized air quality impacts analysis to ensure that nearby sensitive receptors are not adversely affected by construction activities. SCAQMD further recommended that the revised analysis utilize either an updated version of the URBEMIS software program or follow the calculation methodologies presented in the Chapter 9 and the Appendix to Chapter 9 of the CEQA Air Quality Handbook. As such, the revised analysis utilized the latest version of URBEMIS to produce the reported construction emission estimates. Based upon a 50 meter receptor distance, emissions were predicted to be below the identified localized significance thresholds or would be reduced to insignificant levels through the implementation of mitigation measures.

Although URBEMIS was utilized to generate emission estimates, it is not well suited to predict emissions from small scale construction projects. In fact, the emission factors for estimating fugitive dust are based upon large scale projects (i.e., 14 to 300 acres) and tractor scrapers as the predominant earthmoving equipment. As such, the emission estimates associated with on-site construction activity generated by URBEMIS are excessive and do not reflect emissions for the above referenced project. To produce viable emission estimates, a refined approach is required.

A subsequent analysis was, therefore, prepared utilizing all relevant and appropriate procedures presented by the U.S. Environmental Protection Agency and SCAQMD. Construction estimating guidance was also reviewed to assign equipment and activity timelines in a manner commensurate with identified project phases and industry standards. The methodologies and assumptions offered under this guidance were used to ensure that emission estimates associated with earthmoving activities effectively quantified pollutant source strength.

Emission estimates associated with earthmoving activities were evaluated assuming three discrete phases. Phase 1 considered clearing and grubbing to remove grass, roots and trees. Phase 2 assumed mass grading would occur to level and prepare the site for Phase 3 which entails the structural excavation of approximately 13,000 cubic yards of soil to accommodate a single-level subterranean parking garage. All emission estimates were based upon equipment operating profiles to accommodate maximum daily output values.

Results of the refined analysis revealed that maximum daily emissions were predicted to be below the identified SCAQMD localized significance thresholds for all pollutants both for near-field (i.e., 25 meter) and 50 meter downwind distances.

Attachment A presents a listing of emissions for each identified construction phase and their associated equipment inventory as well as a summary table comparing on-site emissions to SCAQMD's localized significance thresholds. Attachment B includes a detailed listing of related emission calculation worksheets. I have additionally attached a copy of my biography which should serve to underscore the technical adequacy of the analysis.

I can be reached at (310) 576-5837 should you have any questions or need additional information.

Sincerely,

Bill Piazza

Attachments: as stated

Attachment A
(Emissions Summary)

Phase 1
Clearing/Grubbing Emissions
(lbs/day)

Nitrogen Oxides (NOx)	Carbon Monoxide (CO)	Particulates (PM10)	Particulates (PM2.5)
6.024	2.944	1.857	0.616

Equipment Inventory:

Wheel Loader (assume Caterpillar 950 class (170 HP) with 61.9 cubic yard output per hour during site clearing and grubbing / 125 cubic yard bucket capacity per hour during haul truck loading)

Haul Truck (assume 10 cubic yard capacity w/10 mile round trip haul route)

Water Truck (assume watering disturbed area 3 times per day)

Note: Standard watering practice conducted in a manner consistent with SCAQMD Rule 403 assumed to achieve 68 percent control efficiency for fugitive emissions.

Phase 2
Mass Grading Emissions
(lbs/day)

Nitrogen Oxides (NOx)	Carbon Monoxide (CO)	Particulates (PM10)	Particulates (PM2.5)
8.549	4.577	0.784	0.692

Equipment Inventory:

Motor Grader (assume Caterpillar 120 class (125 HP) with 12 foot blade length)

Water Truck (assume watering disturbed area 3 times per day)

Note: Standard watering practice conducted in a manner consistent with SCAQMD Rule 403 assumed to achieve 68 percent control efficiency for fugitive emissions.

Phase 3
Structural Excavation Emissions
(lbs/day)

Nitrogen Oxides (NOx)	Carbon Monoxide (CO)	Particulates (PM10)	Particulates (PM2.5)
14.755	3.944	0.574	0.451

Equipment Inventory:

Excavator (assume Caterpillar 225 class (250 HP) with 180 cubic yard bucket capacity per hour during excavation and haul truck loading)

Haul Truck (assume 10 cubic yard capacity w/10 mile round trip haul route)

Water Truck (assume watering during active soil disturbance)

Notes: Standard watering practice conducted in a manner consistent with SCAQMD Rule 403 assumed to achieve 68 percent control efficiency for fugitive emissions.

Emissions Summary
Localized Significance Thresholds
(Source Receptor Area 4)

Construction Phase	Pollutant Concentration			
	Nitrogen Oxides (NOx)	Carbon Monoxide (CO)	Particulates (PM10)	Particulates (PM2.5)
Clearing/Grubbing	6.024	2.944	1.857	0.616
Mass Grading	8.549	4.577	0.784	0.692
Structural Excavation	14.755	3.944	0.574	0.451
Significance Threshold (25 meters)	46.0	574.0	4.0	3.0
Significance Threshold (50 meters)	47.0	789.0	13.0	5.0

Attachment B
(Emission Calculation Worksheets)

EMISSION CALCULATIONS
CLEARING / GRUBBING

CONSTRUCTION RELATED ACTIVITIES

Site Clearing and Grubbing
Aggregate Loading
Aggregate Stockpiling

EQUIPMENT

Wheel Loader (assume Caterpillar 950 class loader (170 HP) with 61.9 cubic yard output per hour during site clearing and grubbing / 125 cubic yard bucket capacity per hour during haul truck loading)
Haul Truck (assume 10 cubic yard capacity with 10 mile round trip haul route)
Water Truck (assume heavy duty diesel (HHD) category)

SCOPE OF WORK

Clear-Grub surficial soils, stockpile and remove from site.

FUGITIVE EMISSION QUANTIFICATION

1. CLEARING-GRUBBING / SOIL VOLUME

Amount of soil removed (cy) = ((A x B x C) / 27)

A = Length (ft)	135.0
B = Width (ft)	115.0
C = Depth (ft)	0.33
Total	191.5

2. CLEARING-GRUBBING / SOIL DENSITY

Amount of soil removed (tons) = (A x B) / 2000

A = Amount of Soil Removed (cy)	191.5
B = Soil Density (lbs/cy)	2500.0
Total	239.3

3. CLEARING-GRUBBING / EMISSIONS

Emissions for general land clearing.

Emisson Factor (lbs/hr) = (0.75) x (1.0 x (s)$^{1.2}$ x (M)$^{-1.4}$)

s = Material Silt Content (%)	6.9
M = Material Moisture Content (%)	7.9
Total	0.752761
Operational Time (hrs)	3.1
Emission Rate / PM10 (lbs/day)	2.3285
Emission Rate / PM2.5 (lbs/day)	0.489

4. STOCKPILE LOADING / EMISSIONS

Emissions for aggregate batch drop (aggregate collected and loaded into haul truck).

Emission Factor (lbs/ton) = k(0.0032) x (U/5)$^{1.3}$ x (M/2)$^{-1.4}$

EMISSION CALCULATIONS
CLEARING / GRUBBING

k = Particle Size Multiplier	0.35
U = Mean Wind Speed (mph)	4.36
M = Material Moisture Content (%)	7.9
Total	0.000137
Tons Transferred	239.3
Emission Rate / PM10 (lbs/day)	0.0233
Emission Rate / PM2.5 (lbs/day)	0.005

5. STOCKPILE WIND EROSION / EMISSIONS

Emission Rate (lbs/day) = (1.8 x U x 0.5 x A) x 24

U = Mean Wind Speed (m/s)	1.95
A = Acres	0.057
Emission Rate / PM10 (lbs/day)	2.416
Emission Rate / PM2.5 (lbs/day)	0.507

MOBILE SOURCE EMISSION QUANTIFICATION

1. LOADER / CLEARING-GRUBBING

Emission Rate (lbs/day) = (A x B x C)

A = Equipment Used (#)	1.0
B = Operational Time (hrs)	3.1
C = Emission Factor (lbs/hr)	
CO	0.6383
ROGS	0.0000
NOX	1.3029
SOX	0.0000
PM10	0.0733
Emission Rate / CO (lbs/day)	1.974
Emission Rate / ROGS (lbs/day)	0.000
Emission Rate / NOX (lbs/day)	4.030
Emission Rate / SOX (lbs/day)	0.000
Emission Rate / PM10 (lbs/day)	0.227
Emission Rate / PM2.5 (lbs/day)	0.202

2. LOADER / STOCKPILE LOADING

Emission Rate (lbs/day) = (A x B x C)

A = Equipment Used (#)	1.0
B = Operational Time (hrs)	1.2
C = Emission Factor (lbs/hr)	
CO	0.6383
ROGS	0.0000
NOX	1.3029
SOX	0.0000
PM10	0.0733
Emission Rate / CO (lbs/day)	0.767
Emission Rate / ROGS (lbs/day)	0.000

EMISSION CALCULATIONS
CLEARING / GRUBBING

Emission Rate / NOX (lbs/day)	1.565
Emission Rate / SOX (lbs/day)	0.000
Emission Rate / PM10 (lbs/day)	0.088
Emission Rate / PM2.5 (lbs/day)	0.078

3. HAUL TRUCK / ON-SITE

Emission Rate (lbs/day) = (A xB)/(C)

A = Emission Factor (g/hr)

CO	50.066
ROGS	0.000
NOX	106.582
PM10	2.163
B = Operational Time (hrs)	1.2
C = Conversion (grams to pounds)	453.59

Emission Rate / CO (lbs/day)	0.133
Emission Rate / ROGS (lbs/day)	0.000
Emission Rate / NOX (lbs/day)	0.282
Emission Rate / PM10 (lbs/day)	0.006
Emission Rate / PM2.5 (lbs/day)	0.005

4. WATER TRUCK

Emission Rate (lbs/day) = (A x B x C)/(D)

A = Emission Factor (g/mile)

CO	21.727
ROGS	0.000
NOX	44.986
PM10	3.318
B = Travel Length (miles)	0.5
C = Number of Passes	3.0
D = Conversion (grams to pounds)	453.59

Emission Rate / CO (lbs/day)	0.070
Emission Rate / ROGS (lbs/day)	0.000
Emission Rate / NOX (lbs/day)	0.146
Emission Rate / PM10 (lbs/day)	0.011
Emission Rate / PM2.5 (lbs/day)	0.010

OPERATIONAL TOTALS

CO	lbs/day	2.944
ROGS	lbs/day	0.000
NOX	lbs/day	6.024
SOX	lbs/day	0.000
PM10	lbs/day	5.099
PM2.5	lbs/day	1.297
Control Efficiency/Fugitive		0.68
Control Efficiency/Stockpile		0.68
PM10	lbs/day	1.857
PM2.5	lbs/day	0.616

EMISSION CALCULATIONS
MASS GRADING

CONSTRUCTION RELATED ACTIVITIES

Site Grading

EQUIPMENT

Motor Grader (assume Caterpillar 120 class (125 HP) with 12 foot blade length)
Water Truck (assume heavy duty diesel (HHD) category)

SCOPE OF WORK

Rough grade surficial soils.

FUGITIVE EMISSION QUANTIFICATION

1. GRADING / SOIL DISTURBED

Amount of soil disturbed (sf) = (A x B x C)

A = Length (ft)	180.0
B = Width (ft)	133.0
C = Number of Passes	10
Total	243936.6

2. GRADING / EMISSIONS

Emissions for general site grading.

Emisson Factor (lbs/vmt) = (0.60) x (0.051(S)$^{2.0}$)

S = Mean Vehicle Speed (MPH)	0.481
Total	0.007087
Vehicle Miles Traveled	3.85
Emission Rate / PM10 (lbs/day)	0.0273
Emission Rate / PM2.5 (lbs/day)	0.0057

MOBILE SOURCE EMISSION QUANTIFICATION

1. MOTOR GRADER / GRADING

Emission Rate (lbs/day) = (A x B x C)

A = Equipment Used (#)	1.0
B = Operational Time (hrs)	8.00
C = Emission Factor (lbs/hr)	
CO	0.5585
ROGS	0.0000
NOX	1.0405
SOX	0.0000
PM10	0.0948
Emission Rate / CO (lbs/day)	4.468
Emission Rate / ROGS (lbs/day)	0.000
Emission Rate / NOX (lbs/day)	8.324
Emission Rate / SOX (lbs/day)	0.000

EMISSION CALCULATIONS
MASS GRADING

Emission Rate / PM10 (lbs/day)	0.758
Emission Rate / PM2.5 (lbs/day)	0.675

2. WATER TRUCK

Emission Rate (lbs/day) = (A x B x C)/(D)

A = Emission Factor (g/mile)

CO	21.727
ROGS	0.000
NOX	44.986
PM10	3.318

B = Travel Length (miles)	0.8
C = Number of Passes	3.0
D = Conversion (grams to pounds)	453.59

Emission Rate / CO (lbs/day)	0.109
Emission Rate / ROGS (lbs/day)	0.000
Emission Rate / NOX (lbs/day)	0.225
Emission Rate / PM10 (lbs/day)	0.017
Emission Rate / PM2.5 (lbs/day)	0.015

OPERATIONAL TOTALS

CO	lbs/day	4.577
ROGS	lbs/day	0.000
NOX	lbs/day	8.549
SOX	lbs/day	0.000
PM10	lbs/day	0.802
PM2.5	lbs/day	0.696

Control Efficiency/Fugitive	0.68

PM10	lbs/day	0.784
PM2.5	lbs/day	0.692

EMISSION CALCULATIONS
STRUCTURAL EXCAVATION

CONSTRUCTION RELATED ACTIVITIES

Structural Excavation
Aggregate Loading

EQUIPMENT

Excavator (assume Caterpiller 225 class (250 hp) with 180 cubic yard bucket capacity per hour during excavation and haul truck loading)
Haul Truck (assume 10 cubic yard capacity with 10 mile round trip haul route)
Water Truck (assume stationary / no idle)

SCOPE OF WORK

Excavate surrounding class B soils load soil into haul truck

FUGITIVE EMISSION QUANTIFICATION (PM10)

1. EXCAVATION / SOIL VOLUME

Amount of soil removed (cy) = ((A x B x C) / 27) + (A x 2 x C x D)

A = Length (ft)	34.4
B = Width (ft)	34.4
C = Depth (ft)	16.0
D = Fall-in Factor	0.011
Total	714.63

2. EXCAVATION / SOIL DENSITY

Amount of soil removed (tons) = (A x B) / 2000

A = Amount of Soil Removed (cy)	714.63
B = Soil Density (lbs/cy)	2500.0
Total	893.29

3. EXCAVATION / EMISSIONS

Emissions for aggregate batch drop (excavation).

Emisson Factor (lbs/ton) = k(0.0032) x $(U/5)^{1.3}$ x $(M/2)^{-1.4}$

k = Particle Size Multiplier	0.35
U = Mean Wind Speed (mph)	4.36
M = Material Moisture Content (%)	7.9
Total	0.000137
Tons Transferred	893.29
Emission Rate / PM10 (lbs/day)	0.122362
Emission Rate / PM2.5 (lbs/day)	0.025696

4. STOCKPILE LOADING / EMISSIONS

Emissions for aggregate batch drop (haul truck loading)

Emission Factor (lbs/ton) = k(0.0032) x $(U/5)^{1.3}$ x $(M/2)^{-1.4}$

EMISSION CALCULATIONS
STRUCTURAL EXCAVATION

k = Particle Size Multiplier	0.35
U = Mean Wind Speed (mph)	4.36
M = Material Moisture Content (%)	7.9
Total	0.000137
Tons Transferred	893.29
Emission Rate / PM10 (lbs/day)	0.122362
Emission Rate / PM2.5 (lbs/day)	0.002570

MOBILE SOURCE EMISSION QUANTIFICATION

1. EXCAVATOR / EXCAVATION

Emission Rate (lbs/day) = (A x B x C)

A = Equipment Used (#)	1.0
B = Operational Time (hrs)	3.97
C = Emission Factor (lbs/hr)	
CO	0.4374
ROGS	0
NOX	1.7260
SOX	0
PM10	0.0596
Emission Rate / CO (lbs/day)	1.737
Emission Rate / ROGS (lbs/day)	0.000
Emission Rate / NOX (lbs/day)	6.853
Emission Rate / SOX (lbs/day)	0.000
Emission Rate / PM10 (lbs/day)	0.237
Emission Rate / PM2.5 (lbs/day)	0.211

2. EXCAVATOR / LOADING

Emission Rate (lbs/day) = (A x B x C)

A = Equipment Used (#)	1.0
B = Operational Time (hrs)	4.03
C = Emission Factor (lbs/hr)	
CO	0.4374
ROGS	0
NOX	1.7260
SOX	0
PM10	0.0596
Emission Rate / CO (lbs/day)	1.763
Emission Rate / ROGS (lbs/day)	0.000
Emission Rate / NOX (lbs/day)	6.955
Emission Rate / SOX (lbs/day)	0.000
Emission Rate / PM10 (lbs/day)	0.240
Emission Rate / PM2.5 (lbs/day)	0.214

3. HAUL TRUCK / ON-SITE

Emission Rate (lbs/day) = (A xB)/(C)

A = Emission Factor (g/hr)

EMISSION CALCULATIONS
STRUCTURAL EXCAVATION

CO	50.066
ROGS	0.000
NOX	106.582
PM10	2.163
B = Operational Time (hrs)	4.03
C = Conversion (grams to pounds)	453.59

Emission Rate / CO (lbs/day)	0.445
Emission Rate / ROGS (lbs/day)	0.000
Emission Rate / NOX (lbs/day)	0.947
Emission Rate / PM10 (lbs/day)	0.019
Emission Rate / PM2.5 (lbs/day)	0.018

OPERATIONAL TOTALS

CO	lbs/day	3.944
ROGS	lbs/day	0.000
NOX	lbs/day	14.755
SOX	lbs/day	0.000
PM10	lbs/day	0.741
PM2.5	lbs/day	0.470

Control Efficiency/Fugitive 0.68

PM10	lbs/day	0.574
PM2.5	lbs/day	0.451

EMISSION CALCULATIONS
REFERENCES

California Air Resources Board, 2006. *Emfac2007 (Version 2.3) - Calculating Emission Inventories in California.*

Midwest Research Institute, 1996. *Improvement of Specific Emission Factors (BACM Project No. 1 Final Report.* MRI Project No. 3855.

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Richarson Engineering Services, Inc. 1996. *Process Plant Construction Estimating Standards* ISBN 1-881386-32-5.

South Coast Air Quality Management District, 2008. *Final Localized Significance Threshold Methodology.*

South Coast Air Quality Management District, 2006. *Final Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds.*

South Coast Air Quality Management District, 2005. *Sample Construction Scenarios for Projects Less than Five Acres in Size.*

South Coast Air Quality Management District, 1993. *CEQA Air Quality Handbook.*

South Coast Air Quality Management District, 1981. *Meteorological Data Set for Long Beach* California.

U.S. Environmental Protection Agency, 1995. *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources,* Fifth Edition. AP-42.

U.S. Environmental Protection Agency, 1992. *Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures*. EPA-450/2-92-004.

Attachment C
(Biography)

Biography

Bill Piazza

Mr. Bill Piazza has more than 20 years of experience in the field of environmental health and safety with particular expertise in both air dispersion modeling and health risk assessments. As an Environmental Assessment Coordinator with the Los Angeles Unified School District, Mr. Piazza completed more than 200 risk and hazard assessment studies. To date, he has characterized and modeled the contaminant emissions of more than 2,000 commercial and industrial operations.

Mr. Piazza has participated in the drafting of several environmental regulations including Public Resources Code Section 21151.8 and Education Code Section 17213 (e.g., SB 352) which require school districts to evaluate the impacts of siting schools within close proximity to facilities that emit toxic air contaminants.

Mr. Piazza has also performed private consultative services to clients such as MCA and Disney Development Companies, the Los Angeles City Department of Water and Power, Communities for a Better Environment, Corporation for Clean Air, Safe Action for the Environment and the Santa Clarita Organization for Planning the Environment. Mr. Piazza has provided services as a subcontractor to other consulting firms to assess the impact of both process and fugitive emissions associated with projects prepared under the auspices of the California Environmental Quality (CEQA) and National Environmental Policy Acts (NEPA).

Mr. Piazza has consulted with members of the Los Angeles, El Segundo, Huntington Park and Rolling Hills Estates city councils, as well as members of the City of Santa Monica Airport Commission, to address issues related to air toxic emissions.

Mr. Piazza has lectured for several health and hazard assessment classes conducted under the auspices of the University of California, Los Angeles and the University of Southern California and made several presentations to the American Industrial Hygiene Association, Southern California Society for Risk Analysis, California's Coalition for Adequate School Housing and Coalition for Clean Air on community-based risk and exposures to both criteria pollutants and toxic air contaminants.

Mr. Piazza participated as a member of the South Coast Air Quality Management District's (SCAQMD) Localized Significance Threshold Working Group which developed an assessment tool to assist lead agencies in the analysis of air pollution impacts at the local scale. Mr. Piazza was also a member of SCAQMD's MATES II external peer review group responsible for evaluating the agency's technical methodology and implementation plan to characterize ambient levels and "hot spot" concentrations of toxic compounds throughout the South Coast Air Basin.

Mr. Piazza additionally participated as a member of the California Air Resources Board's (ARB) Risk Management Subcommittee and Risk Characterization Technical Group responsible for developing statewide assessment methodologies to assess the generation and associated impact of diesel emissions on sensitive receptor populations. Mr. Piazza was also a member of ARB's Community Health Modeling Working Group which was responsible for developing guidelines for the assessment and mitigation of air pollution impacts at the neighborhood scale.

Mr. Piazza's assessment work has also been featured in journal articles published by Environment and Planning C: Government and Policy 2002 and the Journal of Environmental Health.