applied environmental inc.

April 2, 2013

Harold D. Bingham, Manager
3rd Street Properties, LLC
730 11th Street, NW, 4th Floor
Washington, D.C. 20001

RE: missions Analysis for Proposed Accessory Parking Structure
rd & Mass Project, 214 Massachusetts Avenue, NE, Washington, D.C. 20002

Dear Mr. Bingham:

At your request, Applied Environmental conducted a study to assess the potential air quality impacts from vehicular emissions at the proposed accessory parking structure at the 3rd & Mass Project. The project site is located at 420 – 430 3rd Street, and 208, 214 and 236 Massachusetts Avenue, NE, Washington, D.C. 20002. The proposed project will consist primarily of the construction of six new townhouses, and the addition of a three-story underground parking structure with 105 vehicle spaces. The purpose of this study was to determine the potential impact on the neighborhood of carbon monoxide (CO) and nitrogen dioxide (NO_2) in the exhaust emissions from the proposed parking structure. This analysis compares the worst-case peak hour CO and NO_2 emissions with Environmental Protection Agency (EPA) 1-Hour National Ambient Air Quality Standards (NAAQS).

Analysis of peak hour vehicle emissions of CO and NO_2 was performed using air modeling software approved by the EPA for emissions analysis. The peak hour emissions were projected to occur during the morning and afternoon rush hour period when the highest number of vehicles would be entering and exiting the parking structure. Where assumptions had to be made regarding the calculations, the assumptions were conservatively biased to produce a worst-case scenario. The results of the emissions analysis are presented in the following table.

	CO			NO2			
	ug/m3	ppm	%NAAQS	ug/m3 NOx	conversion of NOx to NO2	ppb	%NAAQS
Summer	670	**0.587**	1.7%	42.14	80%	**18**	18.0%
Winter	984	**0.861**	2.5%	44.44	50%	**12**	12.0%
EPA 1-hour NAAQS		35				100	

Notes: ug/m³ = micrograms per cubic meter of air; ppm = parts per million; ppb = parts per billion;
NOx = nitrogen oxides, which is directly modeled in emissions and includes NO_2.

The results in the above table indicate the maximum calculated concentration of modeled pollutants emitted from the parking structure at any distance. These concentrations were predicted to occur two meters (seven feet) from the exhaust shaft. The concentrations rapidly decrease from these levels as the distance from the exhaust shaft increases. The emissions at these concentrations would not affect compliance with the one-hour NAAQS in the immediate site vicinity. **In the professional opinion of Applied Environmental, based on our review of the provided data and the results of the analysis, we do not see any indication that this project will negatively affect the ambient air quality of the immediate project area.**

BOARD OF ZONING ADJUSTMENT
District of Columbia
CASE NO. 18531
EXHIBIT NO. 41

200 Fairbrook Drive, Suite 201 • Herndon, Virginia 20170 • 703-648-0822 • Fax 703-648-0575
www.appenv.com

It is understood that particulate matter (PM) is also a pollutant of concern in exhaust emissions, particularly when diesel powered vehicles are present. Particulate matter is not directly emitted by gasoline engines in significant quantities, but is formed by secondary chemical processes largely involving NO_2. According to the developer, no diesel fueled vehicles are anticipated in this parking facility. As a conservative measure, a percentage of diesel vehicles were still included in the analysis as described below.

The District of Columbia Department of the Environment (DDoE) does not request modeling for PM for project-related emissions as part of the Environmental Impact Screening Form (EISF) process, and has not provided any guidance for modeling project-related PM emissions in the D.C. area However, the short-term EPA NAAQS for PM are based on 24-hour averages There are no one-hour standards for particulate matter, so compliance with the NAAQS cannot be compared with one-hour model results According to the 2011 version of the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Handbook *HVAC Applications*, Chapter 15, when considering pollutants of concern in parking garages, the following guidance is provided. "*. .the ventilation rate required to dilute CO to acceptable levels is usually satisfactory to control the level of other contaminants as well, providing the percentage of diesel vehicles does not exceed 20%* " In light of the negligible CO concentrations predicted by the model results, the ASHRAE guidance suggests that PM emissions would likewise be negligible

Background and Model Development

In order to protect public health and the quality of the United States' air resources, the Clean Air Act requires the EPA to establish federal air pollutant limits known as the NAAQS. The EPA has established limits for six pollutants – CO, NO_2, ozone, lead, sulfur dioxide, and PM. The PM NAAQS are further divided into coarse (PM10) and fine (PM2 5) standards Generally, when an area does not meet the NAAQS, it goes through a formal rule making process that designates it as a nonattainment area. The Washington DC-MD-VA region, which includes the District of Columbia and several surrounding counties in Maryland and Virginia, has been classified as a moderate nonattainment area for eight-hour ground level ozone since April of 2004. The Washington DC-MD-VA region is designated as a maintenance area for CO, after meeting the NAAQS for CO in the 1990s. The Washington DC-MD-VA region was listed in nonattainment for PM2 5 in January of 2005, but has since met the attainment goal and has petitioned the EPA for redesignation as an attainment area. No area of the country is currently listed in non-attainment of the NAAQS for NO_2.

Analysis of garage emissions for CO and NO_2 was performed using air modeling software approved by the EPA for emissions analysis Inputs to the models were based on the current mechanical design specifications for the project as provided to us by 3rd Street Properties; the site-specific Transportation Impact Study and Technical Appendix dated February 28, 2013 by Gorove/Slade, and data obtained from the Metropolitan Washington Council of Governments (MWCOG), a formal organization of the state and local governments for the region. Where assumptions had to be made regarding the calculations, the assumptions were conservatively biased to produce a worst-case scenario. This analysis was performed utilizing the EPA-developed computer model MOBILE 6.2 for emissions factor calculations of vehicles, and the SCREEN3 model for point source pollution dispersion modeling, in accordance with guidance developed by DDoE.

Inputs to the MOBILE 6.2 model were obtained from the MWCOG document, *"Air Quality Conformity Determination of the 2009 Constrained Long Range Plan and the FY2010-2015 Transportation Improvement Program for the Washington Metropolitan Region,"* dated July 15, 2009. A project-specific vehicle fleet was developed for the MOBILE 6.2 model in accordance with the EPA document, *User's Guide to MOBILE 6 (Mobile Source Emission Factor Model)*, Office of Transportation and Air Quality, August 2003

The MOBILE 6 2 model provides emissions factors for CO and Nitrogen Oxides (NOx) based on specific inputs including vehicle types, vehicle age, inspection and maintenance programs, fuel characteristics, weather, and seasonal variation The MWCOG inputs were utilized in this model for all factors with the exception of the vehicle type (fleet) characteristics For this project, the regional fleet data was utilized for only six of the 16 classes of vehicles Because the scope of the project was limited to the parking structure, heavy duty trucks, buses, and motorcycles were excluded from the analysis It would be impossible for any large trucks, buses, or delivery vehicles to enter the garage due to height restrictions Based on regional vehicle registration data provided by MWCOG, the following classes of vehicles were applied to the vehicle fleet for emissions analysis:

- 37.5% Light duty vehicles (cars)
- 44 5% Light duty trucks class 1-2 (small to mid-size SUVs and vans)
- 17.4% Light duty trucks class 3-4 (large SUVs, vans, and pickups)
- 0.6% Small heavy duty trucks (Commercial vans and pickups up to 10,000 lb).

No compensation for alternative fuel vehicles (natural gas, ethanol, electric, or hybrid) was applied to the analysis. Default fractions of diesel vehicles were applied, which typically range from 1-3% in these vehicle classes

Data on the garage usage was obtained from the Gorove/Slade *Transportation Impact Study* and *Technical Appendix* dated February 28, 2013. Based on the data from Gorove/Slade, the peak hour traffic volume for the garage was conservatively estimated at 68 vehicles. This estimate is significantly higher than the peak hour traffic volumes produced by Gorove/Slade based on standard trip generation rates for the development, and is considered a worst-case scenario. The estimate was based on the site traffic mode split data provided by Gorove/Slade in the TIS, and the survey data reported by Gorove/Slade in the *Technical Appendix*. The modeled estimate applies the mode split data from Gorove/Slade which indicates that 40.9% of the proposed workforce will drive. The estimate further assumes that all drivers will drive alone, that 60% of the drivers will arrive in the same peak hour, and that 70% of the drivers will park in the garage instead of the annex lot These factors are conservatively biased from the reported data that 17% of drivers carpool, that 52% of drivers arrive during the peak hour, and that 34% of the parking area is provided in the annex lot.

The CO and NOx modeling scenarios were each performed twice, with inputs modified for seasonal summer and winter variations. The MOBILE 6.2 output for NOx was converted to NO_2 in accordance with guidance in the EPA document, *Additional Clarification Regarding Applicability of Appendix W Modeling Guidance for the 1-hour NO2 NAAQS*, March 1, 2011 The conversion was completed applying Tier 2 methodology with very conservative factors based on direct modeling results published by the EPA and others.

The MOBILE 6 2 input and output is presented as Appendix 1. The SCREEN3 model results are presented as Appendix 2. If you have any questions, or if we can be of further assistance, please do not hesitate to contact me.

Sincerely,

Timothy J Baker, P G
Division Manager
Environmental Services

Ref.. 2228-13-0057

Appendix 1

Mobile 6.2 Input and Output

```
MOBILE6 INPUT FILE :
> Header· 3rd & Massachusetts Ave NE, Washington, D.C.

REPORT FILE           3Mass TXT
DATABASE OUTPUT     .
WITH FIELDNAMES
DAILY OUTPUT        :
AGGREGATED OUTPUT   .
EMISSIONS TABLE     · 3Mass TB1  REPLACE
SPREADSHEET         . 3Mass TAB  REPLACE

RUN DATA
>COMMENTS
>3rd & Massachusetts Ave, NE, Washington, D C

EXPRESS HC AS VOC   :
EXPAND EXHAUST      :

NO REFUELING        :
WE DA TRI LEN DI      WeekTLD2 WDT
FUEL PROGRAM        . 2 S
94+ LDG IMP           NLEVNE D

* Registration Distribution
REG DIST              R02_DC RDT

* Anti-Tampering Program
ANTI-TAMP PROG      :
83 68 50 22222 22222111 1 12 096. 12211112

* MWCOG D.C  Inspection and Maintenance (I/M) Programs post 2004
> Exhaust I/M - LDV pre-83 MY IDLE test program #1

I/M PROGRAM           1 1983 2050 2 T/O IDLE

I/M MODEL YEARS     · 1 1972 1983

I/M VEHICLES          1 22222 11111111 1

I/M STRINGENCY      . 1 20 0

I/M COMPLIANCE        1 96.0

I/M WAIVER RATES      1 3 0 3.0

I/M EXEMPTION AGE     1 25 0


> Exhaust I/M - LDV MY 84-95 IM240 test program #2      (DC IM240 Start:1999)

I/M PROGRAM         · 2 1983 2050 2 T/O IM240

I/M MODEL YEARS     . 2 1984 1995

I/M VEHICLES          2 22222 11111111 1

I/M STRINGENCY      . 2 20.0

I/M COMPLIANCE      · 2 96.0

I/M WAIVER RATES    : 2 3 0 3 0

I/M CUTPOINTS       : 2 DC.C02
I/M EXEMPTION AGE   · 2 25.0
```

```
> Evap I/M - LDV pre-95 MY Gas Cap pressure test program #3
I/M PROGRAM          3 1999 2050 2 T/O GC
I/M MODEL YEARS      3 1972 1995
I/M VEHICLES         3 22222 11111111 1
I/M COMPLIANCE     . 3 96.0
I/M WAIVER RATES     3 3 0 3 0
I/M EXEMPTION AGE  · 3 25.0

> Exhaust I/M - LDV post-96 MY OBD test program #4      (DC OBD Start.Jan 2004)
I/M PROGRAM          4 1983 2050 2 T/O OBD I/M
I/M MODEL YEARS      4 1996 2050
I/M VEHICLES       : 4 22222 11111111 1
I/M STRINGENCY       4 20 0
I/M COMPLIANCE     · 4 96 0
I/M WAIVER RATES     4 3.0 3 0
I/M EXEMPTION AGE    4 25 0

> Evap I/M - LDV post-96 OBD Evap test program #5       (DC OBD Start Jan 2004)
I/M PROGRAM          5 1999 2050 2 T/O EVAP OBD & GC
I/M MODEL YEARS      5 1996 2050
I/M VEHICLES         5 22222 11111111 1
I/M STRINGENCY     · 5 20 0
I/M COMPLIANCE       5 96.0
I/M WAIVER RATES   · 5 3.0 3.0
I/M EXEMPTION AGE    5 25 0

* Default Diesel Sales Fractions used

SCENARIO RECORD       Washington, D C.   Speed  2.5                    Month· 01
>FV FILE      FV      OPMODE: Stable      FACILITY· Arterial     SCENARIO  1
CALENDAR YEAR         2013
EVALUATION MONTH    . 1
MIN/MAX TEMPERATURE· 20 0 43.0
ALTITUDE            · 1
AVERAGE SPEED       . 2 5 Arterial
SOAK DISTRIBUTION     SOAKZERO SK
FUEL RVP              12 9
```

```
VMT FRACTIONS       :
0 3749  0 0989  0.3457  0 1169  0.0572  0.0064  0.0000  0.0000
0 0000  0.0000  0.0000  0 0000  0 0000  0 0000  0 0000  0 0000

SCENARIO RECORD     · Washington, D.C    Speed. 2.5                    Month  07
>FV FILE·     .FV     OPMODE  Stable      FACILITY. Arterial     SCENARIO: 2
CALENDAR YEAR         2013
EVALUATION MONTH      7
MIN/MAX TEMPERATURE   68 5 95.0
ALTITUDE            · 1
AVERAGE SPEED       . 2 5 Arterial
SOAK DISTRIBUTION   . SOAKZERO SK
FUEL RVP              12.9

VMT FRACTIONS
0 3749  0.0989  0 3457  0.1169  0 0572  0.0064  0.0000  0 0000
0 0000  0.0000  0.0000  0.0000  0.0000  0.0000  0 0000  0 0000


END OF RUN          :
```

```
*******************************************************************************
* MOBILE6.2 03 (24-Sep-2003)                                                  *
* Input file. 3MASS IN (file 1, run 1)                                        *
*******************************************************************************
*COMMENTS
*3rd & Massachusetts Ave, NE, Washington, D C.
  M603 Comment
               User has disabled the calculation of REFUELING emissions


* Reading non-default WEEKDAY RUNNING LOSS HOURLY TRIP LENGTH FRACTIONS
* from the following external data file: WEEKTLD2 WDT

  M616 Comment:
               User has supplied post-1999 sulfur levels

* Reading 94+ LEV IMPLEMENTATION SCHEDULE from the following external
* data file  NLEVNE D

* Reading Registration Distributions from the following external
* data file· R02_DC RDT
  M 49 Warning
                 1 00     MYR sum not = 1  (will normalize)
  M 49 Warning
                 1 00     MYR sum not = 1  (will normalize)
  M 49 Warning
                 1 00     MYR sum not = 1  (will normalize)
  M 49 Warning
                 1.00     MYR sum not = 1  (will normalize)
  M 49 Warning:
                 1 00     MYR sum not = 1  (will normalize)
  M 49 Warning:
                 1.00     MYR sum not = 1. (will normalize)
* Exhaust I/M - LDV pre-83 MY IDLE test program #1
* Exhaust I/M - LDV MY 84-95 IM240 test program #2   (DC IM240 Start 1999)

* Reading non-default I/M CUTPOINTS from the following external
* data file: DC C02
*
* Evap I/M - LDV pre-95 MY Gas Cap pressure test program #3
* Exhaust I/M - LDV post-96 MY OBD test program #4   (DC OBD Start Jan 2004)
* Evap I/M - LDV post-96 OBD Evap test program #5    (DC OBD Start Jan 2004)

* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
*  Washington, D C.   Speed· 2 5                      Month  01
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
*FV FILE      FV     OPMODE· Stable       FACILITY· Arterial     SCENARIO. 1
  M583 Warning
            The user supplied arterial average speed of  2.5
            will be used for all hours of the day   100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types
* Reading start SOAK distribution from the following external
* data file  SOAKZERO SK
```

```
 M615 Comment
             User supplied VMT mix
 M112 Warning.
             Wintertime Reformulated Gasoline Rules Apply
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file  TECH12 D
 M 48 Warning.
            there are no sales for vehicle class HDGV8b
 M 48 Warning
            there are no sales for vehicle class LDDT12

 LEV phase-in data read from file NLEVNE D
                  Calendar Year   2013
                         Month   Jan.
                      Altitude   Low
            Minimum Temperature   20 0 (F)
            Maximum Temperature.  43 0 (F)
              Absolute Humidity:   75  grains/lb
            Fuel Sulfur Content:   30  ppm

            Exhaust I/M Program   Yes
               Evap I/M Program   Yes
                    ATP Program   Yes
              Reformulated Gas    Yes
```

Vehicle Type GVWR	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution.	0 3746	0 4446	0 1716		0 0049	0 0003	0 0025	0.0015	0 0000	1.0000
Composite Emission Factors (g/mi)										
Composite VOC .	2 596	1.931	3.535	2 377	3 116	0 235	0 673	0 412	0 00	2 455
Composite CO	17 36	16.05	24 85	18 50	38 65	2 163	1 597	1 824	0 00	18 099
Composite NOX	0 623	0.710	1 493	0.928	1.060	0 330	0 815	2 428	0 00	0 816
Exhaust emissions (g/mi)										
VOC Start.	0 000	0 000	0.000	0 000		0 000	0 000		0 000	
VOC Running.	0 490	0 542	1.225	0 732		0.235	0 673		0 000	
VOC Total Exhaust.	0 490	0 542	1.225	0 732	1 451	0 235	0 673	0 412	0 00	0.644
CO Start	0 00	0.00	0 00	0.00		0 000	0 000		0 000	
CO Running.	17 36	16.05	24 85	18 50		2 163	1.597		0 000	
CO Total Exhaust:	17 36	16.05	24 85	18 50	38 65	2 163	1.597	1 824	0 00	18.099
NOx Start	0 000	0.000	0.000	0 000		0 000	0 000		0.000	
NOx Running:	0 623	0 710	1 493	0 928		0 330	0.815		0 000	
NOx Total Exhaust.	0 623	0 710	1.493	0 928	1 060	0.330	0.815	2 428	0 00	0.816

```
* # # # # # # # # # # # # # # # # # # # # # # # # #
*  Washington, D C    Speed  2 5                    Month  07
* File 1, Run 1, Scenario 2
* # # # # # # # # # # # # # # # # # # # # # # # # #
*FV FILE     .FV     OPMODE  Stable       FACILITY  Arterial     SCENARIO  2
  M583 Warning
            The user supplied arterial average speed of  2 5
            will be used for all hours of the day.  100% of VMT
            has been assigned to the arterial/collector roadway
            type for all hours of the day and all vehicle types
* Reading start SOAK distribution from the following external
* data file  SOAKZERO SK
  M615 Comment
              User supplied VMT mix
  M 48 Warning·
            there are no sales for vehicle class HDGV8b
  M 48 Warning·
            there are no sales for vehicle class LDDT12
 LEV phase-in data read from file NLEVNE D
                  Calendar Year·  2013
                         Month   July
                      Altitude   Low
              Minimum Temperature   68 5 (F)
              Maximum Temperature   95 0 (F)
                Absolute Humidity    75  grains/lb
              Fuel Sulfur Content·   30  ppm

              Exhaust I/M Program.  Yes
                 Evap I/M Program·  Yes
                      ATP Program:  Yes
                Reformulated Gas:   Yes
```

Vehicle Type· GVWR	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution	0 3746	0 4446	0 1716		0 0049	0 0003	0 0025	0 0015	0 0000	1 0000
Composite Emission Factors (g/mi)										
Composite VOC	2.910	2 121	3 639	2 543	3 033	0 233	0 645	0 403	0.00	2 675
Composite CO	13.10	10 51	15 14	11 80	30 16	2 155	1 555	1 689	0 00	12 331
Composite NOX ·	0 724	0.629	1.261	0.805	0 920	0.321	0.771	2 224	0 00	0 777
Exhaust emissions (g/mi)										
VOC Start:	0 000	0 000	0 000	0 000		0 000	0 000		0.000	
VOC Running·	0 375	0 412	0 877	0 541		0.233	0 645		0.000	
VOC Total Exhaust	0 375	0.412	0 877	0 541	0.960	0.233	0 645	0 403	0.00	0 481
CO Start:	0 00	0 00	0 00	0.00		0.000	0 000		0.000	
CO Running	13.10	10 51	15 14	11 80		2 155	1 555		0.000	
CO Total Exhaust	13.10	10 51	15.14	11 80	30 16	2.155	1 555	1 689	0.00	12.331
NOx Start	0.000	0.000	0 000	0 000		0 000	0 000		0 000	
NOx Running.	0 724	0.629	1 261	0 805		0 321	0.771		0.000	
NOx Total Exhaust·	0 724	0 629	1 261	0 805	0.920	0 321	0 771	2 224	0.00	0 777

Appendix 2

Screen3 Model Results

03/29/13
18 15 44

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

3rd & Mass, winter CO

SIMPLE TERRAIN INPUTS

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	427300E-01
STACK HEIGHT (M)	=	7 0000
STK INSIDE DIAM (M)	=	2 5500
STK EXIT VELOCITY (M/S)	=	4 5743
STK GAS EXIT TEMP (K)	=	268 0000
AMBIENT AIR TEMP (K)	=	268 0000
RECEPTOR HEIGHT (M)	=	1 8000
URBAN/RURAL OPTION	=	URBAN
BUILDING HEIGHT (M)	=	0000
MIN HORIZ BLDG DIM (M)	=	0000
MAX HORIZ BLDG DIM (M)	=	0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10 0 METERS WAS ENTERED

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 49500 000 (ACFM)

BUOY FLUX = 000 M**4/S**3, MOM FLUX = 34 016 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
2	984 0	4	20 0	20 0	6400 0	2.27	.33	29	NO
100	11.88	5	5 0	5 0	10000 0	11 01	10 91	7 64	NO
200	14 42	6	1.0	1 0	10000 0	21 75	21 58	14 65	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 2 M.

2	984 0	4	20 0	20 0	6400 0	2 27	.33	29	NO

DWASH= MEANS NO CALC MADE (CONC = 0 0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	984 0	2	0

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 96043 ***

3rd & Mass, winter NOx

SIMPLE TERRAIN INPUTS
   SOURCE TYPE              =         POINT
   EMISSION RATE (G/S)      =      193000E-02
   STACK HEIGHT (M)         =        7 0000
   STK INSIDE DIAM (M)      =        2 5500
   STK EXIT VELOCITY (M/S)=          4 5743
   STK GAS EXIT TEMP (K)    =      268 0000
   AMBIENT AIR TEMP (K)     =      268 0000
   RECEPTOR HEIGHT (M)      =        1.8000
   URBAN/RURAL OPTION       =         URBAN
   BUILDING HEIGHT (M)      =          0000
   MIN HORIZ BLDG DIM (M) =           0000
   MAX HORIZ BLDG DIM (M) =           0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED

   STACK EXIT VELOCITY WAS CALCULATED FROM
   VOLUME FLOW RATE =   49500.000     (ACFM)

BUOY  FLUX =      000 M**4/S**3;  MOM  FLUX =   34 016 M**4/S**2

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF    0  M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST      CONC              U10M    USTK   MIX HT    PLUME    SIGMA    SIGMA
   (M)   (UG/M**3)   STAB   (M/S)   (M/S)     (M)    HT (M)   Y (M)    Z (M)  DWASH
-------  ----------  ----  -------  -------  -------  -------  -------  -------  -----
     2    44.44        4    20 0     20 0   6400.0     2 27       33       29    NO
   100.    5366        5     5 0      5 0  10000 0    11 01    10.91     7 64    NO
   200     6514        6     1 0      1 0  10000 0    21 75    21 58    14 65    NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     2  M
     2    44 44        4    20 0     20 0   6400.0     2 27       33       29    NO

 DWASH=   MEANS NO CALC MADE (CONC = 0 0)
 DWASH=NO MEANS NO BUILDING DOWNWASH USED
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

     ****************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ****************************************

 CALCULATION        MAX CONC     DIST TO    TERRAIN
  PROCEDURE        (UG/M**3)     MAX (M)     HT (M)
--------------    -----------    -------    -------
SIMPLE TERRAIN      44 44             2          0


**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```

03/29/13
18 08 15

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

3rd & Mass, Summer CO

SIMPLE TERRAIN INPUTS

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	291100E-01
STACK HEIGHT (M)	=	7 0000
STK INSIDE DIAM (M)	=	2 5500
STK EXIT VELOCITY (M/S)	=	4 5743
STK GAS EXIT TEMP (K)	=	300 0000
AMBIENT AIR TEMP (K)	=	300 0000
RECEPTOR HEIGHT (M)	=	1.8000
URBAN/RURAL OPTION	=	URBAN
BUILDING HEIGHT (M)	=	0000
MIN HORIZ BLDG DIM (M)	=	.0000
MAX HORIZ BLDG DIM (M)	=	.0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10 0 METERS WAS ENTERED.

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 49500 000 (ACFM)

BUOY FLUX = 000 M**4/S**3; MOM FLUX = 34 016 M**4/S**2

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
2	670 4	4	20 0	20 0	6400 0	2.27	.33	.29	NO
100	8.093	5	5 0	5 0	10000 0	11 01	10 91	7 64	NO
200	9 564	6	1.0	1 0	10000.0	22.03	21.60	14.68	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 2. M

2	670 4	4	20 0	20 0	6400 0	2 27	.33	29	NO

DWASH= MEANS NO CALC MADE (CONC = 0 0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	670 4	2	0

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

03/29/13
18 11 18

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

3rd & Mass, Summer NOx

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	183000E-02
STACK HEIGHT (M)	=	7 0000
STK INSIDE DIAM (M)	=	2.5500
STK EXIT VELOCITY (M/S)	=	4 5743
STK GAS EXIT TEMP (K)	=	300.0000
AMBIENT AIR TEMP (K)	=	300 0000
RECEPTOR HEIGHT (M)	=	1.8000
URBAN/RURAL OPTION	=	URBAN
BUILDING HEIGHT (M)	=	0000
MIN HORIZ BLDG DIM (M)	=	0000
MAX HORIZ BLDG DIM (M)	=	0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10 0 METERS WAS ENTERED.

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 49500 000 (ACFM)

BUOY FLUX = 000 M**4/S**3; MOM FLUX = 34 016 M**4/S**2

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0 M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
2	42 14	4	20 0	20 0	6400.0	2 27	33	29	NO
100.	.5088	5	5 0	5 0	10000 0	11 01	10 91	7 64	NO
200	6012	6	1.0	1 0	10000 0	22 03	21 60	14 68	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 2 M

2	42 14	4	20 0	20 0	6400 0	2.27	33	29	NO

DWASH= MEANS NO CALC MADE (CONC = 0 0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	42 14	2	0

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****