DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY CONTROL

GUIDELINES FOR PERFORMING MESOSCALE ANALYSIS OF INDIRECT SOURCES

DEP

MAY 1991

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I. PURPOSE

"Guidelines for Performing Mesoscale Analysis of Indirect Sources", hereafter referred to as "Guidelines" has been prepared by the Massachusetts Department of Environmental Protection (DEP) in consultation with Massachusetts Environmental Policy Act (MEPA) staff to provide guidance on the preparation of analyses of certain indirect source projects in relation to their potential impacts on regional hydrocarbon emissions. Such analysis is herein known as "mesoscale analysis".

The Guidelines are designed for use by those parties responsible for preparation of mesoscale air quality analyses required pursuant to the MEPA process. However, they are not meant to be a substitute for on-going MEPA consultation process.

II. BACKGROUND

An indirect source is a facility, building(s), structure(s), or project that attracts or may attract mobile sources of air pollution.

A mesoscale analysis of an indirect source, for the purpose of these Guidelines, is an estimate of the mobile source emissions generated by the project as compared to the areawide (regional) emissions from the existing road network. The analysis area may include an area anywhere from approximately 0.3 km to 16 km around and including the indirect source project; the exact geographical area depends on local conditions and the extent of a project's impact on the travel patterns in the area. In all cases, the areas should be large enough to include all roadway links that are potentially directly and indirectly impacted by the project. A mesoscale analysis should be performed for hydrocarbons to establish the total amount of emissions expected from each of the project alternatives, including the "Build" and "No Build," in the base and future years.

Hydrocarbons, in the presence of sunlight, undergo complex chemical reactions and form the pollutant ozone. Given the regional nature of ozone and the complexity of its formation process, it is not feasible to estimate the impact of an individual indirect source project on ambient concentrations of ozone. Instead, total hydrocarbons, the major precursor element to ozone, serve as a reliable indicator of regional degradation or improvement in ozone concentrations. To be consistent with the emissions inventory contained in the Massachusetts SIP for Ozone and Carbon Monoxide, and the chemical reactive properties of ozone's component elements, projects should be analyzed in terms of non-methane hydrocarbons (NMHC). Non-methane hydrocarbons emissions represent that portion of total hydrocarbons that are volatile or highly reactive and as such, represent the primary precursor to ozone formation.

III. INDIRECT SOURCE PROJECTS REQUIRING MESOSCALE ANALYSIS

1. Mesoscale analysis will be required for the following projects for which an Environmental Notification Form (ENF) is filed under the Massachusetts Environmental Policy Act (MEPA) after May 1, 1991:

ENF

   o any office project generating 3,000 or more average daily traffic (ADT); and

   o any other non-residential project generating 6,000 or more ADT.

2. Mesoscale analysis will be required for the following projects for which a decision on the adequacy of a Draft Environmental Impact Report (DEIR) is issued under the Massachusetts Environmental Policy Act (MEPA) after May 1, 1991:

EIR

   o any non-residential project generating 10,000 or more ADT.

IV. MESOSCALE ANALYSIS REQUIREMENTS

A proposed indirect source project may have impacts on the traffic characteristics, such as volume and speed, of roadway segments. An area which includes all the impacted roadway segments is defined as the mesoscale area.

Based on the roadway segments and their existing traffic characteristics, hydrocarbon emissions for the base case can be calculated. By changing the traffic characteristics on the roadway segments to those which are expected to occur when the indirect source project is completed, hydrocarbon emissions for the estimated time of completion can then be calculated. Similarly, hydrocarbon emissions for the build and no-build cases for future years are calculated.

Once the analysis has been completed, it can be determined if the project will result in an increase or decrease in hydrocarbon emissions. Emissions will increase or decrease based upon the effects of traffic volumes and speeds on the roadway segments in the project, as a result of the indirect source project.

a. Defining the Study Area

The analysis area should include an area anywhere from approximately 0.3 km to 16 km around and including the indirect source project; the exact geographical area depends on local conditions and the extent of a project's impact on the travel patterns in the area. In all cases, the areas should be large enough to include all roadway links that will potentially experience an increase of 10% in traffic due to the project and currently operate at Level-of-Service (LOS) D or lower or will be degraded to LOS D or lower. Before proceeding with the mesoscale analysis, the study area should be selected in consultation with MEPA staff and the DEP/DAQC staff.

b. Years of Analysis

The mesoscale analysis of the indirect source project and its alternatives, including "No Build" should be performed for each of the following years: base year, project completion year and project design year.

c. Data Requirements and Analysis

Mesoscale analysis requires data on both traffic and emissions by roadway link for each project alternative and analysis year. Once emissions are calculated for each roadway link, total emissions can be calculated by adding all emissions for each roadway link.

Data required:

- o identification of roadway links and length of links
- o average daily traffic (ADT) and average daily speeds for base, completion, and design year by roadway link
- o emission factors generated from the Mobile 4 emissions factor model (inputs to the model should be verified with MEPA prior to performing mesoscale analysis)

For Calculating Emissions by Roadway Link Use the Following Formulas:

Total NMHC Emissions of Roadway Link	=	Emission Factor	x	Vehicle Miles Traveled
Vehicle Miles Traveled (VMT)	=	ADT	x	Roadway Link Length

d. Presentation of Data and Results

In presenting the mesoscale analysis data, suggested figures and tables to be included are: a map showing the mesoscale area, a list of all roadway links, data tables for ADT, VMT, speeds, emission factors and total emissions associated with each roadway link.

In presenting the mesoscale analysis results, total emissions for each project alternative and analysis year should be compared. The suggested method of comparison is in a summary table (see example below.

SUMMARY OF MESOSCALE ANALYSIS

Total NMHC Emissions Burden (tons/day)						
Existing Case	Base Year		Completion Year		Design Year	
	Build	No Build	Build	No Build	Build	No Build

e. Mitigation Measures

If the mesoscale analysis demonstrates that non methane hydrocarbon emissions from the preferred alternative are greater than those from the no-build case in both the short and long term, then all reasonable and feasible hydrocarbon reduction/ mitigation measures should be presented.

V. GLOSSARY

The following is a list of terms found throughout the Guidelines.

Average Daily Traffic	the average traffic volume which occurs over 365 days a year
emission factors	a number which describes the average emissions of a pollutant from a set of vehicles in various mixes
hydrocarbon emissions	primarily gaseous vapors formed by the burning of fossil fuels or the evaporation of volatile liquids. The main source of hydrocarbon emissions is transportation vehicles, refineries, petroleum storage and processing plants and users of organic solvents
MOBILE 4	MOBILE 4 is an EPA computer model that calculates emission factors for hydrocarbons, carbon monoxide and oxides of nitrogen from gasoline-fueled and diesel highway motor vehicles.
non-methane hydrocarbons	that portion of total hydrocarbons that is volatile or highly reactive and as such, represent the precursor to ozone formation
ozone	a complex variety of secondary pollutants or "smog" formed when nitrogen oxides combine with hydrocarbons in sunlight
roadway link	a section of roadway which is subject to travel by a constant volume of vehicles

AIR QUALITY ANALYSIS OF INDIRECT SOURCES

Microscale Analysis:

Applicability: applies to projects generating 3,000 or more trips per day in CO non-attainment communities only.*

Scoping language: Air quality microscale modeling for carbon monoxide will be needed for intersections deteriorating to level of service D or worse where the project contributes 10% or more to the existing traffic volumes. DEP/AQC must be consulted as to intersections, sensitive receptors and model input parameters.

Mesoscale Analysis:

Applicability: applies to office parks generating 3,000 or more trips per day and non-residential projects generating 6,000 or more trips per day.

Scoping Language: Air Quality mesoscale analysis for ozone will be needed for this project to assess the total hydrocarbon emissions associated with all project-related vehicle trips and to demonstrate that the hydrocarbon emissions associated with the preferred alternative are less than those from the build case in both the short and long term. If hydrocarbon emissions from the preferred alternative are greater than the no-build case, reasonable and feasible hydrocarbon reduction/mitigation measures must be included. Consult the "Guidelines for Performing Mesoscale Analysis of Indirect Sources" (available at the MEPA office) and DEP/DAQC to determine the appropriate study area.

* - Proposed CO Non-attainment Communities

Boston	Everett	Lowell
Cambridge	Malden	Worcester
Somerville	Medford	Springfield
Revere	Quincy	
Chelsea	Waltham	

VHB

MOBILE SOURCE

AIR QUALITY MODELING

Vanasse Hangen Brustlin, Inc.

November 12, 1992

Watertown, MA
Bedford, NH
Providence, RI
Hartford, CT
Hayes, VA
Orlando, FL

Thomas Wholley
Vanasse Hangen Brustlin, Inc
P.O. Box 9151
Watertown, MA 02272
(617) 924-1770

Outline

I. POLLUTANTS

A. Ozone:

B. Carbon Monoxide:

II. REGULATORY PROCESS

A. CAAA-NEPA:

B. MEPA:

III. TRAFFIC DATA

A. Mesoscale Analysis:

1) Network
2) Corridor
3) Site Specific

B. Microscale Analysis:

1) Peak Hour
2) Eight Hour

IV. EMISSIONS DATA

A. Mesoscale Analysis:

1) MOBILE4.1 - MOBILE5

B. Microscale Analysis:

1) MOBILE4.1 - MOBILE5

V. MODELING

A. Mesoscale Analysis:

1) Gross Burden

B. Microscale Analysis:

1) CAL3QHC

FOUR-STEP TRAVEL DEMAND FORECAST TECHNIQUES

- TRIP GENERATION (Who?)
- TRIP DISTRIBUTION (Where?)
- MODAL SPLIT (How?)
- TRIP ASSIGNMENT (Route?)

VHB

MOBILE4.1 FLAGS AND INPUTS

Mesoscale Modeling Analysis
(Carbon Monoxide, Hydrocarbons and Oxides of Nitrogen)

MOBILE4.1 FLAGS

Tampering Rates	use MOBILE4.1 defaults
Speed Flag	use one speed for all vehicles
VMT Mix	use MOBILE4.1 defaults
Annual Mileage Accumulation and/or Registration Distribution by Age	use MOBILE4.1 defaults
Modified Basic Exhaust Emission Rates	use MOBILE4.1 defaults
Inspection and Maintenance	Model I/M Program, Flag set to "2"
Program Inputs	
Star Year:	1983
Stringency Level:	12%
1st Model Year:	analysis year minus 14
Last Model Year:	2020
Waiver Rate Pre-1981:	1%
Waiver Rate 1981 & Post:	1%
Compliance Rate:	85%
Program Type:	decentralized/computerized
Inspection Frequency:	annual
Vehicle Types Subject to Inspection	LDGV, LDGT1, LDGT2
Test Type:	idle
Alternative Credits:	none
Transient Test:	not modelled
Purge System Check:	not modelled
Pressure Check:	not modelled
Exhaust Emission Correction Factors:	no corrections modeled
Anti-Tampering Program	no ATP modeled
Refueling Emission Factors	Stage II Vapor Recovery System modeled, Flag set to "2"
Inputs	
Stage II Start Year:	1991
Phase In Period:	3 years
System Efficiency:	95% for all vehicle types

Local Area Parameter (LAP) Record — One record for all scenarios, Flag set to "2"

<u>LAP Inputs</u>

Minimum Temperature (°F):	67.5°
Maximum Temperature (°F):	94.4°
"Period 1" Reid Vapor Pressure (RVP):	11.5 psi
"Period 2" RVP:	9.0 psi
"Period 2" Start Year:	1989
Oxygenated Fuel Flag:	No oxygenated fuel program modeled, set Flag to "1"
Diesel Sales Fraction:	No alternative diesel sales fraction, set Flag to "1"
Temperature Flag	use scenario temperature, Flag set to "1"

```
              PROMPT - vertical flag input, no prompting                 0000000
MOBILE4.1                                                                0000000
1             TAMFLG - default tampering rates                           0000000
1             SPDFLG - one speed per scenario for all IV                 0000000
1             VMFLAG - default vmt mix                                   0000000
1             MYMRFG - default registration and mileage accrual rates    0000000
1             NEWFLG - default exhaust emission rates                    0000000
2             IMFLAG - Yes I/M program                                   0000000
1             ALHFLG - no additional correction factor inputs            0000000
1             ATPFLG - no anti-tampering program                         0000000
2             RLFLAG - yes calculate refueling losses                              0
2             LOCFLG - read in local area parameters one time            0000000
1             TEMFLG - calculate exhaust temperatures                    0000000
4             OUTFMT - 80 column descriptive format                      0000000
4             PRTFLG - print exhaust HC, CO and NOx emission factor results0000000
2             IDLFLG - do not print idle emissions results               0000000
3             NMHFLG - print NMHC                                        0000000
1             HCFLAG - print HC components                               0000000
83 12 78 20  1  1 085 2 1 2221 1 11
91 3 095
TEST HC          C 67.5 94.4 11.5  9.0 89      LAP rec                   0000000
1 92  5.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 10.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 15.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 20.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 25.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 30.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 35.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 40.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 45.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 50.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 55.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 60.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
1 92 65.0 85.4 20.6 27.3 20.6                     1st req sc rec         0000000
```

1MOBILE4.1 0000000

MOBILE4.1(4Nov91)

0I/M program selected:

0 Start year (January 1):	1983
Pre-1981 MYR stringency rate:	12%
First model year covered:	1978
Last model year covered:	2020
Waiver rate (pre-1981):	1.%
Waiver rate (1981 and newer):	1.%
Compliance Rate:	85.%
Inspection type:	Computerized decentralized
Inspection frequency	Annual
Vehicle types covered:	LDGV - Yes
	LDGT1 - Yes
	LDGT2 - Yes
	HDGV - No
1981 & later MYR test type:	Idle

0TEST HC

Minimum Temp: 68. (F) Maximum Temp: 94. (F)

Period 1 RVP: 11.5 Period 2 RVP: 9.0 Period 2 Yr: 1989

0VOC HC emission factors include evaporative HC emission factors.

0

0Cal. Year: 1992 Region: Low Altitude: 500. Ft.
I/M Program: Yes Ambient Temp: 88.0 / 88.0 / 88.0 F
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
+										
Veh. Spd.:	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
VMT Mix:	0.615	0.179	0.077		0.035	0.007	0.002	0.078	0.008	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	7.51	9.61	12.70	10.54	21.29	1.43	2.00	4.84	10.30	8.53
Exhst CO:	59.72	81.43	112.95	90.92	265.98	4.47	5.20	32.28	104.55	72.63
Exhst NOX:	1.31	1.65	1.95	1.74	4.61	2.62	2.98	24.73	0.77	3.36

0Cal. Year: 1992 Region: Low Altitude: 500. Ft.
I/M Program: Yes Ambient Temp: 88.0 / 88.0 / 88.0 F
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
+										
Veh. Spd.:	10.0	10.0	10.0		10.0	10.0	10.0	10.0	10.0	
VMT Mix:	0.615	0.179	0.077		0.035	0.007	0.002	0.078	0.008	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	4.07	5.24	6.83	5.72	13.67	1.12	1.57	3.80	7.21	4.80
Exhst CO:	30.80	41.43	55.47	45.65	176.96	3.08	3.59	22.26	50.23	38.93
Exhst NOX:	1.17	1.49	1.78	1.57	4.84	2.18	2.47	20.52	0.70	2.91

0Cal. Year: 1992 Region: Low Altitude: 500. Ft.
I/M Program: Yes Ambient Temp: 88.0 / 88.0 / 88.0 F
Anti-tam. Program: No Operating Mode: 20.6 / 27.3 / 20.6

0Veh. Type:	LDGV	LDGT1	LDGT2	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
+										
Veh. Spd.:	15.0	15.0	15.0		15.0	15.0	15.0	15.0	15.0	
VMT Mix:	0.615	0.179	0.077		0.035	0.007	0.002	0.078	0.008	
0Composite Emission Factors (Gm/Mile)										
VOC HC:	3.08	3.93	5.10	4.28	10.29	0.90	1.26	3.05	6.15	3.65
Exhst CO:	21.37	28.67	36.87	31.14	124.39	2.22	2.59	16.06	32.62	26.97
Exhst NOX:	1.13	1.45	1.73	1.53	5.07	1.87	2.12	17.64	0.71	2.66

CAL3QHC 3 INPUTS

Carbon Monoxide (CO) Microscale Modeling

Average Time	60 Minutes
Surface Roughness	370 cm
Settling and Deposition velocity	0 cm/second
Windspeed	1 meter/second
Range of Wind Directions	10° increments from 0° to 360°
Stability Class	use Class"D"
Mixing Height	1000 meters

```
EXAMPLE - TWO WAY INTERSECTION          60.175.   0. 0.   8    0.3048
REC 1                      45.      -35.      6.0
REC 2                     -45.      -35.      6.0
REC 3                     -45.       35.      6.0
REC 4                      45.       35.      6.0
REC 5                      45.     -150.      6.0
REC 6                     -45.     -150.      6.0
REC 7                    -150.       35.      6.0
REC 8                    -150.      -35.      6.0
MAIN ST. AND LOCAL ST. INTERSECTION       9  1  0
  1
Link 1              AG    10. -1000.    10.      0. 1500.  20.9  0. 40.
  1
Link 2              AG    10.     0.    10.   1000. 1500.  20.9  0. 40.
  1
Link 3              AG   -10.  1000.   -10.      0. 1200.  20.9  0. 40.
  1
Link 4              AG     0.     0.  1000.      0. 1000.  20.9  0. 40.
  1
Link 5              AG   -10.     0.   -10.  -1000. 1200.  20.9  0. 40.
  1
Link 6              AG -1000.     0.     0.      0. 1000.  20.9  0. 40.
  2
Link 7              AG   -10.    10.   -10.   1000.    0.  20.0   2
        90        40        3.0 1200  6.25  1600 1 3
  2
Link 8              AG   -20.     0. -1000.      0.    0.  20.0   2
        90        50        3.0 1000  6.25  1800 1 3
  2
Link 9              AG    10.   -10.    10.  -1000.    0.  20.0   2
        90        40        3.0 1500  6.25  1800 1 3
 1.000.41000. 0.  Y 10  0 36
```

JOB: EXAMPLE - TWO WAY INTERSECTION RUN: MAIN ST. AND LOCAL ST. INTERSECTION
DATE: 11/05/1992 TIME: 15:41:35.86

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 175. CM
U = 1.0 M/S CLAS = 4 (D) ATIM = 60. MINUTES MIXH = 1000. M AMB = .0 PPM

LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. Link 1	3.0	-304.8	3.0	.0	305.	360.	AG	1500.	20.9	.0	12.2		
2. Link 2	3.0	.0	3.0	304.8	305.	360.	AG	1500.	20.9	.0	12.2		
3. Link 3	-3.0	304.8	-3.0	.0	305.	180.	AG	1200.	20.9	.0	12.2		
4. Link 4	.0	.0	304.8	.0	305.	90.	AG	1000.	20.9	.0	12.2		
5. Link 5	-3.0	.0	-3.0	-304.8	305.	180.	AG	1200.	20.9	.0	12.2		
6. Link 6	-304.8	.0	.0	.0	305.	90.	AG	1000.	20.9	.0	12.2		
7. Link 7	-3.0	3.0	-3.0	43.5	40.	360.	AG	894.	100.0	.0	6.1	.78	6.7
8. Link 8	-6.1	.0	-47.8	.0	42.	270.	AG	1118.	100.0	.0	6.1	.71	6.9
9. Link 9	3.0	-3.0	3.0	-56.2	53.	180.	AG	894.	100.0	.0	6.1	.83	8.9

RECEPTOR LOCATIONS

RECEPTOR	X	Y	Z
1. REC 1	13.7	-10.7	1.8
2. REC 2	-13.7	-10.7	1.8
3. REC 3	-13.7	10.7	1.8
4. REC 4	13.7	10.7	1.8
5. REC 5	13.7	-45.7	1.8
6. REC 6	-13.7	-45.7	1.8
7. REC 7	-45.7	10.7	1.8
8. REC 8	-45.7	-10.7	1.8

JOB: EXAMPLE - TWO WAY INTERSECTION RUN: MAIN ST. AND LOCAL ST. INTERSECTION

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4	REC5	REC6	REC7	REC8
0.	1.9	4.7	1.6	1.3	2.4	2.8	.2	2.4
10.	1.1	5.8	2.6	.6	1.1	3.4	.5	3.2
20.	.6	5.7	3.3	.1	.3	3.5	.7	3.5
30.	.6	5.1	3.6	.0	.2	3.5	.7	4.0
40.	.6	4.1	3.5	.0	.2	3.3	.9	4.3
50.	.7	3.5	3.3	.0	.2	3.0	1.0	4.5
60.	.7	2.9	3.2	.0	.3	3.0	1.2	4.4
70.	.8	3.2	3.2	.1	.3	2.9	1.3	4.0
80.	.8	3.2	3.4	.2	.2	2.8	1.8	3.2
90.	.6	3.1	3.6	.6	.1	2.8	2.5	2.4
100.	.2	2.9	3.8	.8	.0	2.5	3.3	1.7
110.	.1	2.7	3.9	.8	.0	2.4	4.1	1.3
120.	.0	2.7	3.8	.7	.0	2.1	4.5	1.2
130.	.0	2.9	4.3	.7	.0	1.9	4.4	1.1
140.	.0	3.0	4.8	.6	.0	1.7	4.3	.9
150.	.0	3.0	5.3	.6	.0	1.8	4.0	.8
160.	.1	2.8	5.4	.7	.1	1.8	3.5	.7
170.	.8	2.2	5.3	1.4	.5	1.7	3.2	.5
180.	1.8	1.4	4.3	2.6	1.2	1.1	2.4	.2
190.	3.0	.5	3.4	3.8	1.8	.5	1.7	.0
200.	3.7	.1	2.9	4.1	2.1	.1	1.2	.0
210.	3.8	.0	2.9	3.9	2.1	.0	.9	.0
220.	3.7	.0	3.0	3.5	2.4	.0	.7	.0
230.	3.4	.0	3.2	3.5	2.6	.0	.7	.0
240.	3.3	.0	3.1	4.0	3.0	.0	.7	.0
250.	3.3	.1	2.7	4.7	3.1	.0	.8	.1
260.	3.8	.3	1.9	4.7	3.1	.0	.8	.2
270.	4.5	1.1	1.1	4.0	3.2	.1	.5	.5
280.	5.3	1.9	.3	3.3	3.4	.2	.2	.8
290.	5.4	2.7	.1	2.8	3.5	.3	.1	.8
300.	4.9	3.1	.0	2.8	3.9	.3	.0	.7
310.	4.2	3.2	.0	2.8	4.2	.4	.0	.7
320.	4.0	3.0	.0	2.9	4.8	.6	.0	.7
330.	3.9	2.9	.0	2.7	5.0	.9	.0	.9
340.	3.5	2.9	.1	2.5	4.8	1.2	.0	1.2
350.	2.9	3.5	.6	2.0	4.0	1.7	.0	1.7
360.	1.9	4.7	1.6	1.3	2.4	2.8	.2	2.4
MAX	5.4	5.8	5.4	4.7	5.0	3.5	4.5	4.5
DEGR.	290	10	160	250	330	20	120	50

		MESOSCALE ANALYSIS					
	HYDROCARBONS		1992 - EXISTING				
							SUB
	ROADWAY SEGMENT	LENGTH	LENGTH	ADT	SPEED	EF	TOTAL
		(FEET)	(MILES)	(VEH/DAY)	(MPH)	(GM per)	(GM/DAY)
						(VEH-MILE)	
1	LINK 1	26,786	5.07	53,000	55	1.77	475,908
2	LINK 2	27,253	5.16	8,700	20	2.99	134,267
3	LINK 3	7,100	1.34	33,000	15	3.65	161,969
4	LINK 4	2,675	0.51	33,000	20	2.99	49,989
				TOTAL (GM/ DAY)			822,133
			1997 - NO BUILD				
							SUB
	ROADWAY SEGMENT	LENGTH	LENGTH	ADT	SPEED	EF	TOTAL
		(FEET)	(MILES)	(VEH/DAY)	(MPH)	(GM per)	(GM/DAY)
						(VEH-MILE)	
1	LINK 1	26,786	5.07	58,000	55.0	1.23	361,915
2	LINK 2	27,253	5.16	9,600	20.0	2.23	110,499
3	LINK 3	7,100	1.34	36,000	17.5	2.45	118,602
4	LINK 4	2,675	0.51	36,000	17.5	2.45	44,685
				TOTAL (GM/ DAY)			635,701
			1997 - BUILD				
							SUB
	ROADWAY SEGMENT	LENGTH	LENGTH	ADT	SPEED	EF	TOTAL
		(FEET)	(MILES)	(VEH/DAY)	(MPH)	(GM per)	(GM/DAY)
						(VEH-MILE)	
1	LINK 1	26,786	5.07	59,160	55.0	1.23	369,154
2	LINK 2	27,253	5.16	10,320	20.0	2.23	118,786
3	LINK 3	7,100	1.34	36,870	15.0	2.71	134,359
4	LINK 4	2,675	0.51	37,170	15.0	2.71	51,033
				TOTAL (GM/ DAY)			673,332