Special Study Report

AIR QUALITY MODELING ANALYSIS OF CARBON MONOXIDE CONCENTRATIONS FOR THE PROPOSED SOUTH RESOURCE RECOVERY FACILITY IN BROWARD COUNTY

PREPARED BY:

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IN ASSOCIATION WITH

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GAINESVILLE, FLORIDA

FOR:

BROWARD COUNTY ENVIRONMENTAL QUALITY CONTROL BOARD

May 11, 1984

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Wheelabrator South

MALCOLM PIRNIE

MALCOLM PIRNIE, INC.
ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

June 4, 1984

Broward County Environmental
Quality Control Board
500 S.W. 14th Ct.
Ft. Lauderdale, Florida 33315

Attention: Mr. Gary D. Carlson
Chief, Air Pollution Section

Re: Carbon Monoxide Concentration Analysis for the Broward County South Resource Recovery Facility

Gentlemen:

On behalf of the Broward County Board of County Commissioners, please find enclosed a report entitled, Air Quality Modeling Analysis of Carbon Monoxide Concentrations for the Proposed South Resource Recovery Facility in Broward County, for your review.

Because existing ambient CO concentrations near the proposed facility approach the 8-hour national and Florida ambient air quality standards, the Broward County Environmental Quality Control Board had requested that an air quality impact analysis be conducted to determine projected CO concentrations at the intersection of Routes 7 and 84 (the location of the monitoring station) when the facility is operational. Modeling results presented in the report show that the air quality impact due to the proposed facility (vehicular traffic contributions) will be insignificant in terms of maximum CO concentrations predicted in the vicinity of the intersection of Routes 7 and 84.

This analysis is conservative since the construction of I-595 is assumed to be located south of the Turnpike extension. Subsequent to the modeling effort, it was determined that I-595 may be constructed through the intersection of Routes 7 and 84 and include flyover ramps up to 4 tiers in height. Therefore, the modeling results are conservative since most of the roadways were considered at grade level and traffic volumes remain constant even though 10 to 15 percent of the traffic volume would be removed from the intersection if I-595 is constructed through the intersection.

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Should questions arise regarding this report, please do not hesitate to contact us.

Very truly yours,

MALCOLM PIRNIE, INC.

Ronald J. Mills

Ronald J. Mills
Enclosures

cc: P. Korab/Broward County
R. McCann/ESE,Inc.

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AIR QUALITY MODELING ANALYSIS OF CARBON MONOXIDE CONCENTRATIONS FOR THE PROPOSED SOUTH RESOURCE RECOVERY FACILITY IN BROWARD COUNTY

1.0 INTRODUCTION

This report presents the results of an air quality dispersion modeling analysis and study performed by Environmental Science and Engineering, Inc. (ESE) to determine projected carbon monoxide (CO) concentrations due to traffic associated with the Broward County Resource Recovery (BCRR) facility in the south portion of Broward County. The facility, referred to as the south BCRR facility, is assumed to be capable of charging 1,500 tons per day (TPD) of municipal solid waste (MSW) at a 100-percent annual availability factor. The facility will be owned by Broward County and operated by a vendor selected by Broward County. Because a vendor will not be selected until late /1984, a conceptual design has been specified by Malcolm Pirnie, Inc., based on conservative, or worst-case, assumptions from a potential air quality impact viewpoint.

Because existing ambient CO concentrations near the proposed project approach the 8-hour national and Florida Ambient Air Quality Standard (AAQS), an air quality impact analysis was conducted to determine projected CO concentrations at the intersection of Routes 7 and 84 (the location of the monitoring station) when the facility is operational.

Therefore, the principal objectives of this study were:

1. To determine, through air quality dispersion modeling, worst-case, 1- and 8-hour CO concentrations due to traffic at the intersection of Routes 7 and 84;
2. To determine representative background concentrations (i.e., concentrations from sources not considered in the modeling); and

3. To compare the total concentration (i.e., concentrations due to modeled traffic emissions and background concentration) with the 1- and 8-hour national and Florida AAQS of 35 and 9 parts per million (ppm), respectively which are not to be exceeded more than once per year.

For this analysis, the procedures stipulated in the Broward County Environmental Quality Control Board (EQCB) complex source regulation (Broward County EQCB, 1983) were followed in addressing air quality impacts.

2.0 PROJECT TRAFFIC DESCRIPTION

The general location of the proposed south BCRR facility is shown in Figures 2-1 and 2-2. As shown in Figure 2-2, the proposed plant will be located approximately 1.8 kilometers (km) south of the intersection of Routes 7 and 84. To establish the traffic impact near the project site, Malcolm Pirnie, Inc. (1983) estimated the number of vehicles associated with the project. The number of vehicles included:

1. Trucks associated with transporting MSW to the project site and accompanying residue/unprocessible waste to the landfill site, and
2. Vehicles used by employees traveling to and from work at the facility.

The following assumptions were made to estimate the total number of vehicles associated with the project:

1. As a conservative estimate, approximately 1,600 TPD or 11,200 tons per week (TPW) of processible waste will be delivered by packer trucks. This amount of MSW is 7 percent higher than the 1,500 TPD of MSW that will be burned on a daily basis at the facility.
2. The average packer truck payload is estimated at 8 tons per truck.

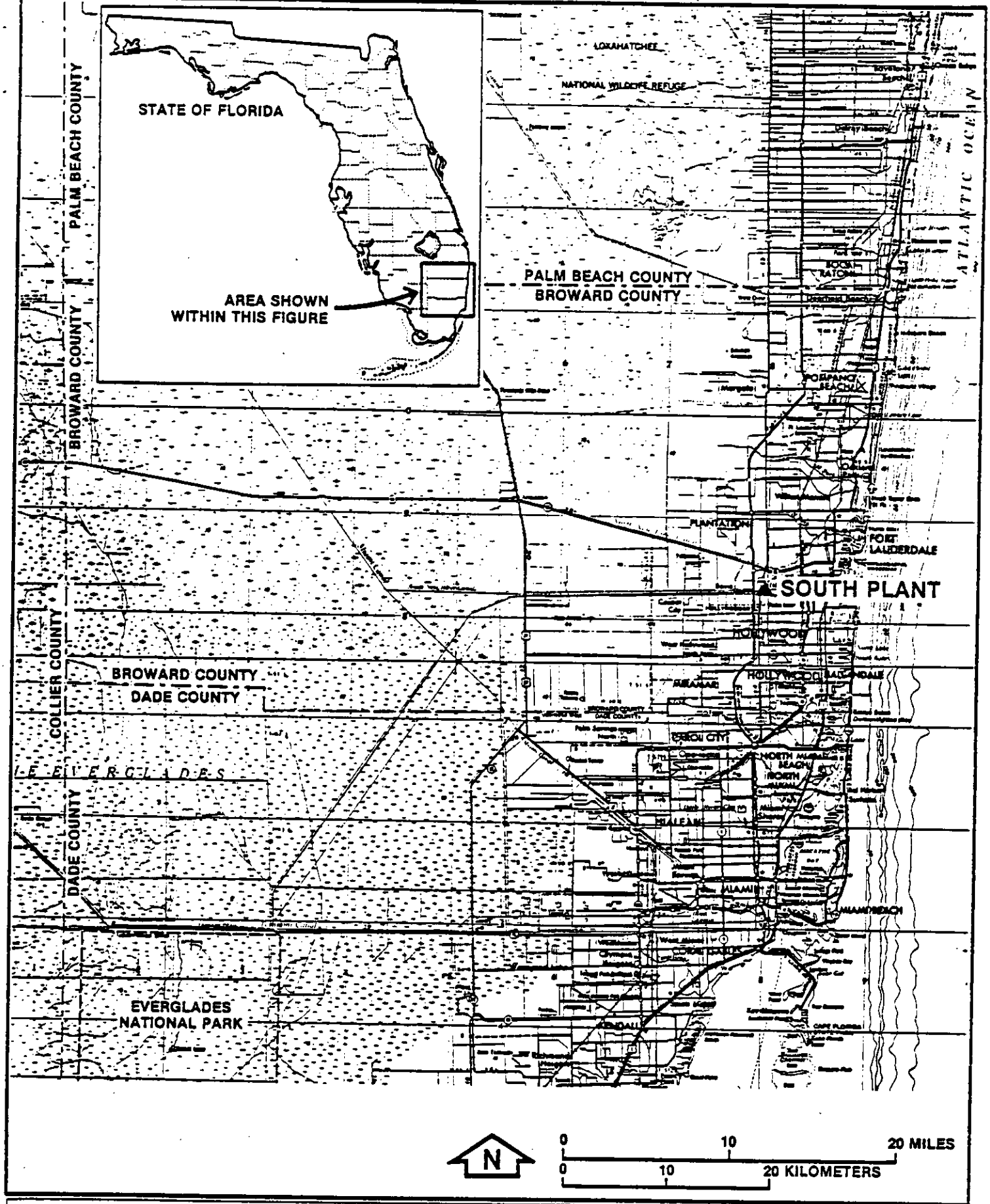

Figure 2-1
LOCATION OF PROPOSED SOUTH RESOURCE RECOVERY FACILITY IN FLORIDA

SOURCE: ESE, 1983.

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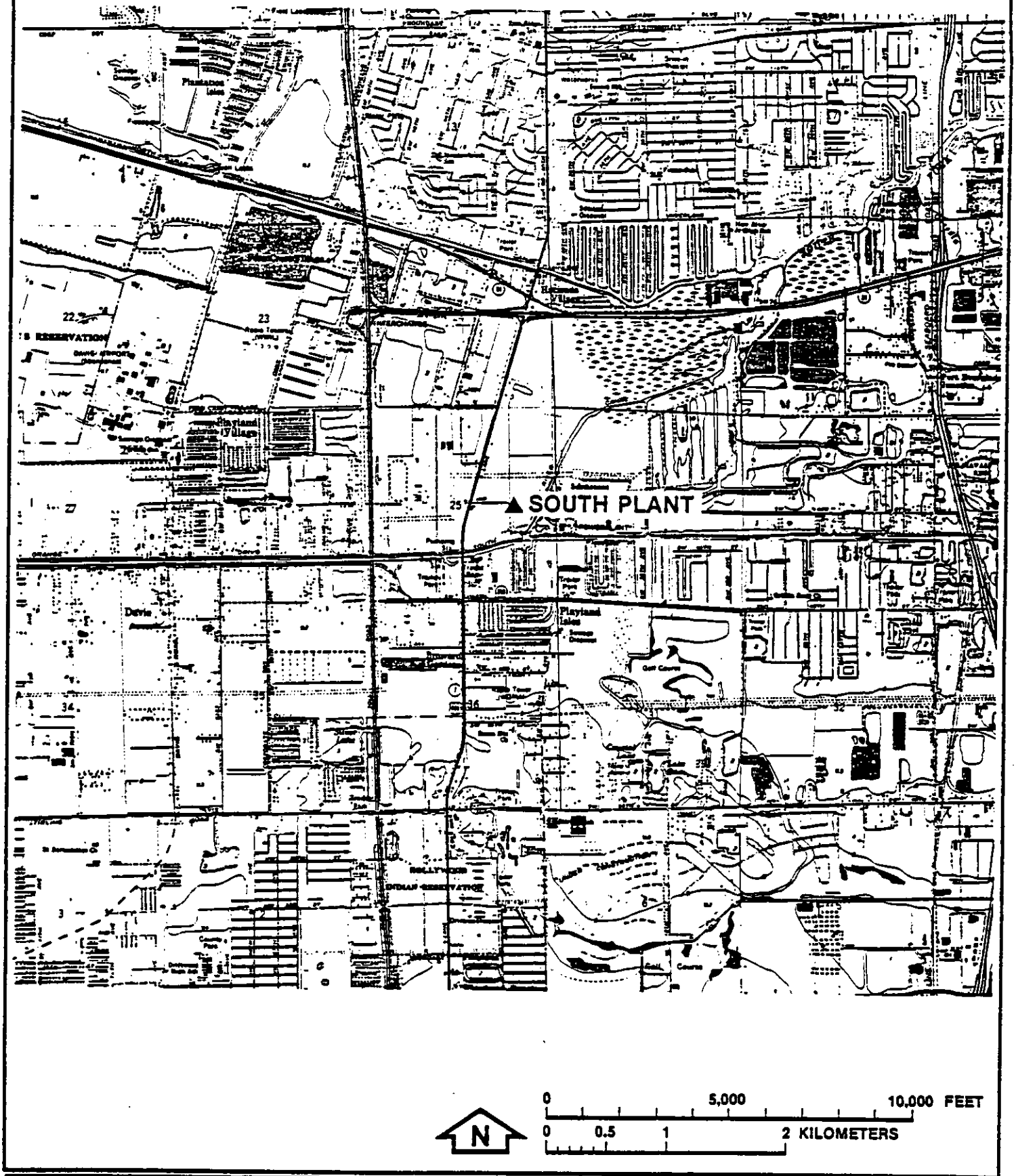

Figure 2-2
LOCATION OF PROPOSED SOUTH RESOURCE RECOVERY FACILITY IN BROWARD COUNTY

SOURCE: ESE, 1983.

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3. Processible waste will be delivered 5.5 days per week. Saturday deliveries are estimated to be 50 percent of the deliveries associated with an average weekday.
4. A projected total of 320 TPD or 2,240 TPW, of unprocessible waste will be delivered to the residue/unprocessible waste landfill.
5. The average payload for vehicles delivering unprocessible waste to the landfill is assumed to be 4 tons per vehicle.
6. Unprocessible waste will be delivered to the residue/unprocessible landfill 7 days per week. This assumption is based on current operating practices at the Broward County Sanitary Landfill.
7. The proposed facility will be operational 7 days per week.
8. Approximately 40 employees will be required on a daily basis.

Based upon these assumptions, the following average weekday vehicle trips were estimated:

Vehicle Description	Number of Trips
Processible Waste Trucks	500
Unprocessible Waste Trucks	160
Employee Vehicles	80
TOTAL	740

These traffic projections were analyzed with current and projected traffic figures and roadway capacities for the access roadways to the project site to determine the traffic impacts that would be associated with the proposed facility.

3.0 MODELING ASSUMPTIONS AND PROCEDURES

3.1 TRAFFIC DATA

Based on the Broward County EQCB complex source regulations, 3 years of analysis were considered:

1. 1987--The first year that the facility will be operational;
2. 1989--The year that a major highway (i.e., I-595) will be completed near the project site and, therefore, a critical year in terms of alleviating traffic congestion at the intersection of Routes 7 and 84; and
3. 1997--The tenth year after the date the proposed project will be operational.

In order to develop projected traffic volumes for adjacent roadway systems for these years, demand traffic volumes for the year 2000 were obtained from the Broward Area Transportation Study (Beiswenger, Hoch, and Associates, Inc./Hensley-Schmidt, Inc., 1981). In many cases, the projected traffic demands exceeded the roadway capacities. In these instances, the traffic volumes were restrained to the proposed capacity of the roadway section. Once the projected volumes (year 2000) were established, interim traffic projections for 1987, 1989, and 1997 were developed on a peak hourly basis. These volumes are consistent with the Broward Area Transportation Study and reflect the construction of I-595 as a parallel roadway to Route 84, impacts of the Fort Lauderdale/ Hollywood Airport expansion, and growth within the urban area.

Peak-hour volumes for this system were developed using a peak-hour factor of 8.6 percent of the average daily traffic (ADT) volume. These volumes represent worst-case (i.e., 4 to 6 p.m.) traffic. Design hourly capacities of each roadway were based on information provided in the Highway Capacity Manual (National Academy of Science, 1965).

Based on the roadway capacities and the projected volumes, volume-to-capacity (V/C) ratios were determined for each roadway segment. These V/C ratios were then correlated to the speed/flow chart for uninterrupted flow as shown in the Highway Capacity Manual. When traffic demand exceeded the roadway capacity, a limiting value of 5 miles per hour (mph) was used for the peak hour.

At the intersection of Routes 7 and 84, the existing Routes 7 and 84 and the Florida Turnpike extension were schematically reduced to a roadway link model. The proposed I-595 link was also incorporated into the model and assumed to be just south of the Turnpike extension. Subsequent to this modeling effort, it was determined that the I-595 connection to the Turnpike and Routes 7 and 84 would be accommodated via grade-separated flyover ramps directly through the intersection. Therefore, all modeling efforts and analyses are conservative because:

1. Traffic volumes in the current analysis are assumed to remain constant, even though a portion of these volumes (about 10 to 15 percent) will be removed from the intersection by I-595, if it were constructed directly through the intersection, thereby reducing traffic loading.
2. Most of the roadways were considered at grade level, even though I-595 will be elevated with four tiers and, therefore, result in better dispersion of traffic emissions.

3.2 EMISSION FACTORS AND ROADWAY EMISSIONS

Emission factors for vehicles on the roadways were determined by the U.S. Environmental Protection Agency's (EPA's) MOBILE2 computer program (EPA, 1981a), which is accepted by the Broward County EQCB to determine traffic emissions. This program provides emission factors, in grams per vehicle-mile (g/mile), for motor vehicles using the most recent emission factors and methodologies developed by EPA (1981b). Emission factors are developed from the following information:

1. Models and vehicle types, which are:
   - o Light-duty gasoline vehicles (LDGV),
   - o Light-duty gasoline trucks with gross weight less than 6,001 pounds (lb) (LDGT1),
   - o Light-duty gasoline trucks with gross weight between 6,001 and 8,500 lb (LDGT2),
   - o Heavy-duty gasoline vehicles (HDGV),

- o Light-duty diesel vehicles (LDDV),
- o Light-duty diesel trucks (LDDT),
- o Heavy-duty diesel vehicles (HDDV), and
- o Motorcycles (MC);

2. Vehicle mix, which is the percentage breakdown of the total vehicle population by model year and vehicle type that is characteristic of the region under study;
3. Speed correction factors;
4. Temperature correction factors; and
5. Vehicle operating mode correction factors (e.g., hot start, cold start, hot stabilized).

For this project, a representative distribution of vehicle types was assumed to be 94, 4, and 2 percent as LDGV, LDGT2, and HDDV, respectively. This distribution will provide high emissions that will produce worst-case estimates of air quality impacts. In addition, the age distribution for vehicles was assumed to be the same as the national average as presented in MOBILE2. Vehicular speeds for each roadway were derived as previously discussed and used in estimating emission factors. Because CO emission factors are inversely related to temperature, the average monthly minimum temperature of 59°F, measured at the Fort Lauderdale Airport, was used to adjust emissions for temperature.

The basic exhaust emission rates in MOBILE2 are generated from tests conducted on vehicles or engines under standardized test conditions using Federal Test Procedures (FTP). Because specific vehicular emission data are not available for the project, most of the FTP assumptions were also assumed in estimating daily vehicular emissions for this project. The FTP assumptions considered in this analysis were:

1. Absolute humidity is 75 grains of water per pound of dry air;
2. Average cold start, hot start, and stabilized operation are 21, 27, and 52 percent, respectively;

3. Vehicles are not pulling trailers;
4. Vehicles are not in an inspection maintenance program;
5. Vehicles receive typical in-use maintenance;
6. Air conditioning is not in use; and
7. Average load is 200 lb per vehicle.

The locations of the roadway segments considered in the analysis are shown in Figure 3-1. The physical dimensions of each roadway link (see Table 3-1) were determined from aerial photography and data supplied by Broward County. The total number of vehicles per hour, average speed, and composite emission factors estimated for each roadway segment are presented in Table 3-2.

To estimate the air quality impact of project-related vehicles only, emission factors for project-related vehicles were estimated for each roadway link and are presented in Table 3-3. The emission factors for the project-related vehicles are based on emission factors determined for heavy-duty diesel vehicles.

3.3 AIR QUALITY DISPERSION MODEL AND MODELING ASSUMPTIONS

Concentrations resulting from the roadway emissions determined from MOBILE2 were calculated using the CALINE3 model, which uses the crosswind finite line source Gaussian formulation (California Department of Transportation, 1979). The CALINE3 model is accepted by Broward County EQCB to address air quality impacts due to traffic emissions. Concentrations were calculated at 10-degree intervals for 360 degrees to determine the worst-case wind angle from roadway emissions at three receptors considered in the analysis. The three receptors, shown in Figure 3-1, were located:

1. At the monitor site northwest of the intersection of Routes 7 and 84 (Receptor 1),

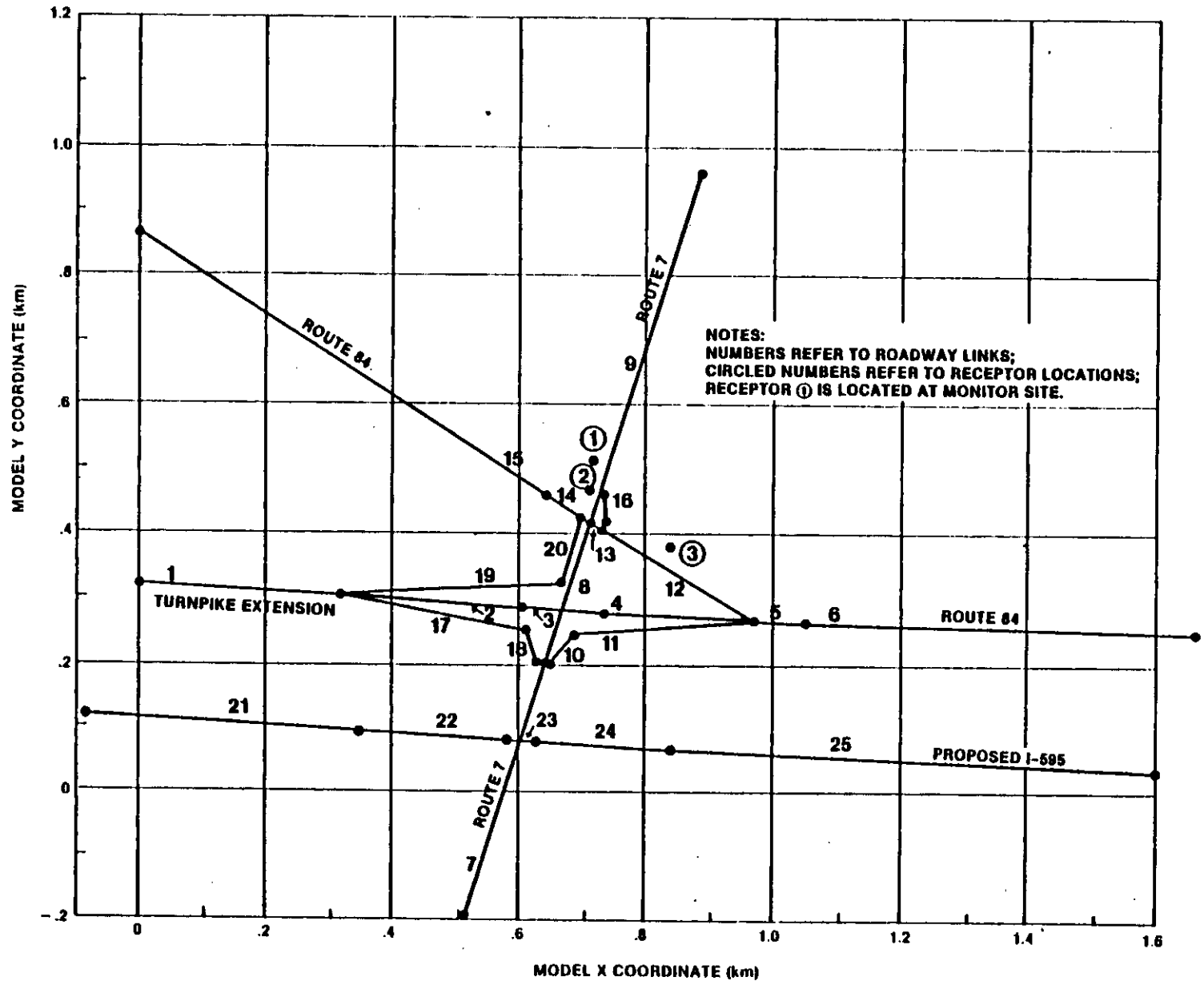

Figure 3-1
LOCATIONS OF ROADWAY LINKS AND RECEPTORS USED IN MODELING ANALYSIS

SOURCE: ESE, 1984.

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Table 3-1. Description of Roadway Links Considered in Modeling

Link Number*	Link Description	Link Type	Link Dimensions (m)			Modeled Link Coordinates (m)			
			Length	Height	Width	X_1	Y_1	X_2	Y_2
1	Turnpike Extension	At-grade	320	0.0	13.4	0	326	320	309
2	Turnpike Extension	Fill	282	3.0	13.4	320	309	602	293
3	Turnpike Extension	Bridge	137	6.1	13.4	602	293	739	283
4	Turnpike Extension	Fill	229	3.0	13.4	739	283	968	271
5	Turnpike Extension	At-grade	81	0.0	17.1	968	271	1,049	267
6	Route 84	At-grade	610	0.0	40.5	1,049	267	1,658	250
7	Route 7	At-grade	416	0.0	28.3	509	-197	636	200
8	Route 7	At-grade	233	0.0	32.0	636	200	706	422
9	Route 7	At-grade	568	0.0	32.0	706	422	884	962
10	Ramp	At-grade	67	0.0	9.8	646	200	690	250
11	Ramp	At-grade	278	0.0	9.8	690	250	968	271
12	Route 84	At-grade	344	0.0	28.3	1,049	267	735	408
13	Route 84	At-grade	32	0.0	28.3	735	408	706	422
14	Route 84	At-grade	77	0.0	32.0	706	422	642	465
15	Route 84	At-grade	758	0.0	28.3	642	465	0	869
16	Ramp	At-grade	48	0.0	9.8	738	422	732	469
17	Ramp	At-grade	289	0.0	9.8	320	309	604	253
18	Ramp	At-grade	51	0.0	9.8	604	253	626	207
19	Ramp	At-grade	352	0.0	9.8	320	309	671	337
20	Ramp	At-grade	92	0.0	9.8	671	337	690	427
21	I-595	At-grade	339	0.0	40.2	0	114	338	96
22	I-595	Fill	237	3.0	40.2	338	96	575	84
23	I-595	Bridge	48	6.1	40.2	575	84	622	78
24	I-595	Fill	236	3.0	40.2	622	78	858	67
25	I-595	At-grade	759	0.0	40.2	858	67	1,615	24

*Refer to Figure 3-1.

Source: ESE, 1984.

Table 3-2. Number of Vehicles, Average Speed, and Emission Factors for 1987, 1989, and 1997 for Each Roadway Link

Link Number*	Vehicles Per Hour			Average Speed (mph)			Composite Emission Factor† (g/mile)		
	1987	1989	1997	1987	1989	1997	1987	1989	1997
1	1,022	875	1,211	39	39	38	15.5	14.2	12.8
2	707	605	838	39	40	39	15.5	14.0	12.5
3	707	605	838	39	40	39	15.5	14.0	12.5
4	707	605	838	38	39	38	15.8	14.2	12.8
5	840	718	995	38	39	38	15.8	14.2	12.8
6	2,800	2,800	2,800	6	9	5	81.5	50.3	74.4
7	2,722	2,796	2,800	18	12	8	32.8	39.7	47.9
8	2,589	2,656	2,800	21	18	10	29.4	30.2	39.5
9	2,800	2,800	2,800	10	9	5	50.5	50.3	74.4
10	133	113	157	41	41	41	15.0	13.8	12.1
11	133	113	157	41	41	41	15.0	13.8	12.1
12	2,800	2,800	2,800	9	13	5	55.4	37.4	74.4
13	2,800	2,791	3,329	11	14	6	46.6	35.5	62.7
14	2,800	2,800	2,800	6	10	5	81.5	45.9	74.4
15	2,800	2,800	2,800	6	9	5	81.5	50.3	74.4
16	181	155	215	40	40	40	15.2	14.0	12.3
17	56	48	66	42	42	42	14.8	13.6	12.0
18	56	48	66	42	42	42	14.8	13.6	12.0
19	259	222	666	40	40	40	15.2	14.0	12.3
20	259	222	666	40	40	40	15.2	14.0	12.3
21	—	3,871	3,871	—	47	44	—	13.4	11.9
22	—	3,871	3,871	—	47	44	—	13.4	11.9
23	—	3,871	3,871	—	47	44	—	13.4	11.9
24	—	3,871	3,871	—	47	44	—	13.4	11.9
25	—	3,871	3,871	—	47	44	—	13.4	11.9

* Refer to Figure 3-1.

† Based on the following:

1. Vehicle mix: Light-duty gas vehicle (LDGV) = 94 percent,
   Light-duty gas truck (LDGT2) = 4 percent,
   Heavy-duty diesel vehicle (HDDV) = 2 percent;
2. Average cold start, hot start, and stabilized operation of 20.6, 27.3, and 52.1 percent, respectively; and
3. Ambient temperature of 59°F.

Source: ESE, 1984.

Table 3-3. Number of Project-Related Vehicles and Emission Factors for 1987, 1989, and 1997 for Each Roadway Link

Link Number*	Project-Related Vehicles† Per Hour			Emission Factor** (g/mile)		
	1987	1989	1997	1987	1989	1997
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	4	4	4	7.0	6.9	7.0
6	4	4	4	32.4	25.9	35.0
7	21	21	21	14.6	21.1	27.9
8	16	16	16	12.5	14.6	24.1
9	10	10	10	24.1	25.9	35.0
10	2	2	2	6.7	6.7	6.7
11	2	2	2	6.7	6.7	6.7
12	2	2	2	25.9	19.7	35.0
13	4	4	4	22.5	18.5	32.4
14	2	2	2	32.4	24.1	35.0
15	2	2	2	32.4	25.9	35.0
16	0	0	0	0	0	0
17	0	0	0	0	0	0
18	0	0	0	0	0	0
19	0	0	0	0	0	0
20	0	0	0	0	0	0
21	0	2	2	0	6.3	6.4
22	0	2	2	0	6.3	6.4
23	0	5	5	0	6.3	6.4
24	0	3	3	0	6.3	6.4
25	0	3	3	0	6.3	6.4

* Refer to Figure 3-1.

† Project-related vehicles due to the proposed resource recovery facility.

** Based on 100-percent heavy-duty diesel vehicles and average vehicle speeds presented in Table 3-2. Emission factors vary for each year due to emission limits and deterioration rates considered for each year.

Source: ESE, 1984.

2. South of the monitor site in an area closer to the intersection (Receptor 2), and
3. Northeast of the intersection at a nearby residence (Receptor 3).

A wind speed of 0.9 meter per second and neutral (D) stability was assumed to represent worst-case meteorological conditions. These conditions are consistent with those previously described for Florida Department of Environmental Regulation (DER) complex source applications. Since peak-hour traffic data were used, the model projections corresponded to the worst-case, 1-hour maximum concentration. Impacts due to the stack emissions from the resource recovery facility are expected to be minimal for these meteorological conditions which are considered to produce the highest concentrations for ground-level sources (i.e. vehicular emissions). Therefore, impacts from the resource recovery facility were not included in addressing air quality impacts.

The relationship between 8-hour and 1-hour maximum concentrations has been studied and is reported by Midurski et al. (1975). The result of this study is reported by EPA (1978a) as follows:

> Conditions in most areas where hot spot analyses are conducted are likely to be somewhat less severe (with regard to traffic conditions and ventilation) than those in the congested area referred to here. Given this assumption, the value of 0.7 is considered "reasonable" for use as a "standard value" to describe the ratio of the maximum 8-hour average concentration to the maximum 1-hour average concentration, for cities and towns lacking sufficient data to permit development of a more specific value.

Maximum 8-hour concentrations from roadway CO contributions were obtained from the following relationship:

$$C_8 = C_1 \times P$$

where: C_8 = the highest predicted 8-hour average concentration,
C_1 = the highest predicted 1-hour average concentration,
and P = the 1- to 8-hour correlation factor of 0.7.

3.4 AMBIENT MONITORING DATA

3.4.1 Review of Existing Monitoring Data

The Broward County EQCB operates and maintains a monitoring station (Site 13) within 0.25 mile of the intersection of Routes 7 and 84, shown in Figure 3-1. Continuous CO concentrations are measured at the station. All monitoring is performed in strict conformance with EPA Procedures, and data are reported to Florida DER on a monthly basis. The monitoring probe is located on the northeast corner of the Broward County Utilities' building. The probe is approximately 12 ft above ground, 30 ft perpendicular from Route 7, and 300 ft from the intersection of Routes 7 and 84.

The maximum 1- and 8-hour average CO concentrations measured at the station for 1982 and 1983 are shown in Table 3-4. Although no violations of AAQS have been measured (i.e., two exceedances of AAQS in a calendar year), the second highest CO concentrations approach the 8-hour AAQS of 9 ppm.

The maximum CO concentrations generally occur during the day between 7 a.m. and 10 p.m. and are associated with the morning and evening peak hourly traffic.

3.4.2 Background Concentrations

To estimate total air quality concentrations, a background concentration must be added to the modeling results. The background concentration is considered to be the air quality concentration contributed by sources not

Table 3-4. Summary of 1- and 8-Hour CO Concentrations Measured at Broward County EQCB Monitoring Site 13*

Year	Number of Observations	CO Concentrations, mg/m3 (ppm)			
		1-Hour		8-Hour	
		Highest	Second-Highest	Highest	Second-Highest
1982	8,268	25 (22)	25 (22)	10.5 (9.2)	9.9 (8.7)
1983	8,579	22.3 (19.5)	20.6 (18)	11.9 (10.4)	10 (8.8)

Note: 1- and 8-hour national and Florida AAQS are 40 and 10 mg/m^3 (35 and 9 ppm), respectively, not to be exceeded more than once per year.

* Site 0420002601.

Source: ESE, 1984.

included in the modeling evaluation. According to EPA modeling guidelines (1978b), air quality data collected in the vicinity of a project site may be used to determine background concentrations. The ambient CO concentrations available from Broward County EQCB Monitoring Site 13 were used for this purpose.

Based on the EPA (1978b) modeling guidelines, background concentrations can be determined by the following procedure:

1. Meteorological conditions are identified for the period and similar periods when the maximum concentration due to the modeled sources occurs.
2. Background concentration for each hour is assumed to be an average of hourly concentrations measured at monitoring sites outside a 90-degree sector downwind of the source.
3. The 1-hour concentrations are then averaged to obtain the background concentration for the averaging time of concern.

Because Routes 7 and 84 are located in directions to the north clockwise through west of the monitoring site, the monitoring site is downwind of the modeled source for these directions. Also, because the monitor is located within 30 ft of Route 7, the monitoring site is within the mixing zone of the roadways for most directions. Therefore, the monitoring data are affected by roadway emissions and are expected to include substantial contributions from roadway emissions for most wind directions. For the short-term averaging periods, these concentrations would not represent background concentration, which would be expected to occur in conjunction with the worst-case meteorology.

As an alternative method to the EPA guideline procedures, a conservative estimate of background CO concentration was assumed to be representative of the hourly average of CO concentrations measured from 10 p.m. to 7 a.m. based on the following assumptions:

1. Maximum hourly concentrations due to roadway emissions occur from 7 a.m. to 10 p.m.
2. Hourly concentrations from 10 p.m. to 7 a.m. are less influenced by roadway emissions (due to lower traffic volumes).

Based on hourly data from 1983, the average hourly CO concentration from 10 p.m. to 7 a.m. produced an assumed background concentration of about 1.8 ppm. A value of 1.8 ppm is consistent with previous background concentrations determined in Broward County (ESE, 1983) and is higher than 1 ppm determined for an urban area by Florida DER (1983). Therefore, for this analysis, a background concentration of 1.8 ppm for the 1-hour averaging period will be added to the impacts due to roadway emissions to determine total air quality concentration.

4.0 MODELING RESULTS

The maximum total 1- and 8-hour average CO concentrations predicted in the vicinity of the intersection of Routes 7 and 84 are shown in Table 4-1. Results are presented for 1987, 1989, and 1997 and indicate the wind direction that produced the maximum concentrations. As shown in Table 4-1, the maximum total CO concentrations are predicted to be below or equal to the 1- and 8-hour national and Florida AAQS of 35 and 9 ppm, respectively, not to be exceeded more than once per year. The CO concentrations are expected to decrease from 1987 to 1989 mainly due to the improved traffic flow conditions that will occur when I-595 is opened in 1989. The CO concentrations are then expected to increase from 1989 to 1997 due to the increased traffic activity.

The highest concentrations for the 3 years are predicted to occur at Receptor 2, which is the closest receptor to the intersection. At this receptor, maximum 1- and 8-hour average concentrations of 12.8 and 9.0 ppm, respectively, are predicted to occur in 1997. The modeled roadway emissions contributed approximately 84 percent to the maximum

Table 4-1. Maximum Total 1- and 8-Hour Average CO Concentrations Predicted in Vicinity of Intersection of Routes 7 and 84

Year	Receptor Number*	Wind Direction (Degrees)	Concentration (ppm) Total 1-Hour Due To: Modeled Links	Background	Total 1-Hour	Total 8-Hour†
1987	1	180	6.5	1.8	8.3	5.8
		190	6.5	1.8	8.3	5.8
	2	190	8.3	1.8	10.1	7.1
	3	290	4.9	1.8	6.7	4.7
1989	1	180	6.2	1.8	8.0	5.6
		190	6.2	1.8	8.0	5.6
	2	190	7.2	1.8	9.0	6.3
	3	290	3.3	1.8	5.1	3.6
1997	1	180	9.5	1.8	11.3	7.9
	2	180	11.0	1.8	12.8	9.0
	3	280	5.8	1.8	7.6	5.3

Note: 1- and 8-hour national and Florida AAQS are 35 and 9 ppm, respectively.

* Receptor 1 is located at Monitoring Site 13.
† 8-hour concentration is equal to 1-hour concentration times 0.7. See text for details.

Source: ESE, 1984.

concentrations. The results for the 8-hour averaging period are conservative because the maximum concentrations due to the modeled roadway emissions are based on peak hourly traffic, which is not expected to persist for 8 hours.

The highest 1- and 8-hour concentrations predicted for the monitoring site for 1997 (i.e., Receptor 1) are 11.3 and 7.9 ppm, respectively. These maximum concentrations are below the applicable AAQS.

For all of the maximum predicted total air quality impacts, the contribution of vehicular traffic associated with the proposed BCRR facility is expected to be minimal. The concentrations calculated for project-related vehicles by CALINE3 were zero. For analysis purposes, since concentrations are rounded to the nearest 0.1 ppm, the 1-hour concentrations could not be any greater than 0.05 ppm. Therefore, as a conservative estimate, project-related concentrations were assumed to be no greater than 0.05 ppm. As shown in Table 4-2, project-related vehicles were assumed to contribute 0.5, 0.6, and 0.4 percent, respectively, to the maximum total 1-hour average CO concentrations for 1987, 1989, and 1997, respectively. Also, the project-related vehicles were assumed to contribute 0.6, 0.6, and 0.4 percent, respectively, to the maximum total 8-hour average CO concentrations for 1987, 1989, and 1997, respectively. Therefore, the air quality impact due to the proposed project will not be significant on CO concentrations predicted in the vicinity of the intersection of Routes 7 and 84.

Table 4.2 Contribution of Project-Related Vehicles to Maximum Total 1- and 8-Hour Average CO Concentrations

Year	Receptor Number	Concentration* (ppm) Total 1-Hour	Total 8-Hour	From Project-Related Vehicles† 1-Hour	From Project-Related Vehicles† 8-Hour	Contribution of Project-Related Vehicles to Total Concentrations (%) 1-Hour	Contribution of Project-Related Vehicles to Total Concentrations (%) 8-Hour
1987	2	10.1	7.1	<0.05	<0.04	<0.5	<0.6
1989	2	9.0	6.3	<0.05	<0.04	<0.6	<0.6
1997	2	12.8	9.0	<0.05	<0.04	<0.4	<0.4

Note: < means less than.

* See Table 4-1 for a summary of the maximum total 1- and 8-hour average CO concentrations.

† The concentrations calculated for project-related vehicles by CALINE3 were zero. For analysis purposes, as a conservative estimate, concentrations were assumed to be no greater than those indicated in this table. See text for details.

Source: ESE, 1984.

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