BIG BEND STATION
UNITS 1 AND 2
FLUE GAS DESULFURIZATION SYSTEM
AIR CONSTRUCTION PERMIT APPLICATION

Prepared for:

TECO
TAMPA ELECTRIC

Prepared by:

ECT
Environmental Consulting & Technology, Inc.
3701 Northwest 98th Street
Gainesville, Florida 32606

ECT No. 98102-0200

June 1998

10/31/98

Revision 2, 10/31/98

BIG BEND STATION
UNITS 1 AND 2
FLUE GAS DESULFURIZATION SYSTEM
AIR CONSTRUCTION PERMIT APPLICATION

Prepared for:

TECO
TAMPA ELECTRIC

Prepared by:

ECT
Environmental Consulting & Technology, Inc.
3701 Northwest 98th Street
Gainesville, Florida 32606

ECT No. 98102-0200

June 1998

Revision 2, 10/31/98

Signatures

Owner/Authorized Representative or Responsible Official

1. Name and Title of Owner/Authorized Representative or Responsible Official:

   Name: Gregory M. Nelson, P.E.
   Title: Manager – Environmental Planning

2. Owner/Authorized Representative or Responsible Official Mailing Address:

   Organization/Firm: Tampa Electric Company
   Street Address: 6944 U.S. Highway 41 North
   City: Apollo Beach State: FL Zip Code: 33572-9200

3. Owner/Authorized Representative or Responsible Official Telephone Numbers:
   Telephone: (813) 641 - 5016 Fax: (813) 641 - 5081

4. Owner/Authorized Representative or Responsible Official Statement:

   I, the undersigned, am the owner or authorized representative of the non-Title V source addressed in this Application for Air Permit or the responsible official, as defined in Rule 62-210.200, F.A.C., of the Title V source addressed in this application, whichever is applicable. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof. I understand that a permit, if granted by the Department, cannot be transferred without authorization from the Department, and I will promptly notify the Department upon sale or legal transfer of any permitted emissions unit.*

Gregory M. Nelson
Signature

11/10/98
Date

* Attach letter of authorization if not currently on file.

4. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this Application for Air Permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

If the purpose of this application is to obtain a Title V source air operation permit (check here [ ] if so), I further certify that each emissions unit described in this Application for Air Permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance schedule is submitted with this application.

If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [✔] if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

If the purpose of this application is to obtain an initial air operation permit or operation permit revision for one or more newly constructed or modified emissions units (check here [ ] if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

Signature

11/6/98
Date

(seal)

*Attach any exception to certification statement.

DOCUMENT II.E.6

SUPPLEMENTAL INFORMATION FOR AIR CONSTRUCTION PERMIT APPLICATION

DOCUMENT II.E.6.2

DISPERSION MODELING DESCRIPTION

BIG BEND STATION
UNITS 1 AND 2
FLUE GAS DESULFURIZATION SYSTEM
AIR DISPERSION MODELING

Prepared for:

TECO
TAMPA ELECTRIC

Prepared by:

ECT
Environmental Consulting & Technology, Inc.
3701 Northwest 98th Street
Gainesville, Florida 32606

ECT No. 98102-0200

June 1998

Revision 2, 10/31/98

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES
(Continued, Page 2 of 2)

LIST OF FIGURES

DISPERSION MODELING TECHNIQUES, INPUTS, AND RESULTS

MODEL SELECTION

The most recent regulatory version of the Industrial Source Complex Short-Term (ISCST3 Version 97363) dispersion model was used in the analyses of ambient sulfur dioxide (SO_2), nitrogen oxides (NO_x), respirable particulate matter (PM_{10}), and carbon monoxide (CO) impacts caused by emissions from Big Bend Station. ISCST3 is a refined model appropriate for use under the following conditions:

- Industrial source complexes (i.e., multiple emission sources).
- Rural or urban areas.
- Flat or rolling terrain.
- Pollutant transport distances less than 50 kilometers (km).
- Multiple averaging periods (i.e., 3-hour, 24-hour, and annual).

ISCST3 was selected because:

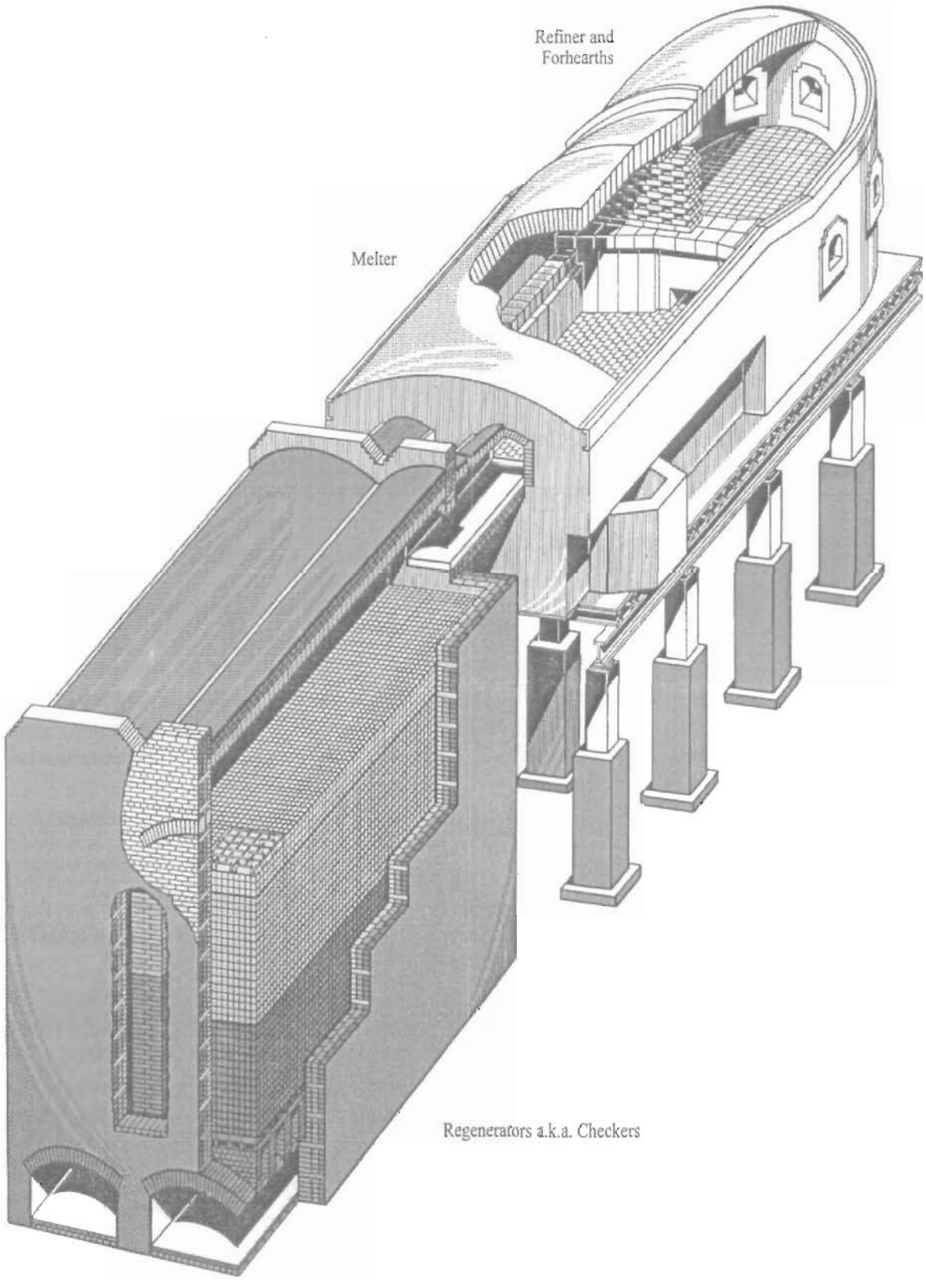
- The Big Bend Station analysis falls within the ISCST3 applicability criteria.
- Per Chapter 40, Code of Federal Regulation (CFR), Part 51, Appendix W, the U.S. Environmental Protection Agency (EPA) has designated ISCST3 a preferred model. This designation means that EPA has determined that ISCST3 performs better under the criteria stated above than any other dispersion model.
- The Florida Department of Environmental Protection (FDEP) is also using ISCST3 to model ambient SO_2 levels from Big Bend Station for Title V permitting purposes.

Previous dispersion modeling of Big Bend Station has been conducted using other models. For example, SO_2 emissions from Big Bend Station were modeled in 1991 to demonstrate compliance for the Unit Nos. 3 and 4 flue gas desulfurization (FGD) integration using an earlier version of ISCST. Several versions of the SCREEN model have also been applied to Big Bend Station emissions. However, these older models were not used

```
CO STARTING
CO TITLEONE TEC Big Bend - All SO2 Emission Sources - 1994
CO TITLETWO Polar Grid Centered On Unit 3 Stack - Scenario 1
CO MODELOPT DFAULT CONC   RURAL
CO AVERTIME 24
CO POLLUTID SO2
CO DCAYCOEF   .000000
CO RUNORNOT RUN
CO ERRORFIL ERRORS.OUT
CO FINISHED

SO STARTING
SO LOCATION B3     POINT   361818.0000 3075061.0000       .0000
SO LOCATION B4     POINT   361818.0000 3075037.0000       .0000
SO LOCATION B12NEW POINT   361716.0000 3074984.0000       .0000
SO LOCATION CT1    POINT   361651.0000 3075235.0000       .0000
SO LOCATION CT2    POINT   361606.0000 3075614.0000       .0000
SO LOCATION CT3    POINT   361631.0000 3075614.0000       .0000
SO LOCATION CGRVGTSP POINT   362818     3082561          0
SO LOCATION CGRVDAP5 POINT   362818     3082561          0
SO LOCATION CGRVCAP7 POINT   362818     3082561          0
SO LOCATION CGRVCAP9 POINT   362818     3082561          0
SO LOCATION CGRVCAP8 POINT   362818     3082561          0
SO LOCATION CGRVAFIS POINT   362818     3082561          0
SO LOCATION FPCBTC2A POINT   383318     3082661          0
SO LOCATION FPCBT03  POINT   383318     3082661          0
SO LOCATION FPCBTC3B POINT   383318     3982661          0
SO LOCATION BAYBORC4 POINT   338718     3071361          0
SO LOCATION FPCHGC23 POINT   389218     3098461          0
SO LOCATION FPCMNC2  POINT   367118     3095961          0
SO LOCATION GLEAD01  POINT   363918     3093561          0
SO LOCATION IAWALC2  POINT   396518     3079161          0
SO LOCATION LAFRG29  POINT   357618     3090661          0
SO LOCATION PINEYPT  POINT   348618     3057361          0
SO LOCATION TECGNC2  POINT   359918     3087561          0
SO LOCATION TECGN03  POINT   359918     3087561          0
SO LOCATION TECGN04  POINT   359918     3087561          0
SO LOCATION TECGN05  POINT   359918     3087561          0
SO LOCATION TECGN06  POINT   359918     3087561          0
SO SRCPARAM B3      1866.6000     149.4000  426.0000   15.6100    7.3000
SO SRCPARAM B4      447.4000      149.4000  326.0000   23.8700    7.3000
SO SRCPARAM B12NEW  830.0000      149.4000  326.0000   18.2900    8.8000
SO SRCPARAM CT1      11.1000       10.7000  817.0000   28.0000    3.4000
SO SRCPARAM CT2      61.0000       22.9000  771.0000   35.4000    5.1000
SO SRCPARAM CT3      61.0000       22.9000  771.0000   35.4000    5.1000
SO SRCPARAM CGRVGTSP  3.83          38.4     325.0      14.19      2.44
SO SRCPARAM CGRVDAP5  2.56          40.4     316.0      16.07      2.13
SO SRCPARAM CGRVCAP7  58.80         45.7     341.5      24.64      1.91
SO SRCPARAM CGRVCAP9  67.20         45.7     350.0      12.66      2.74
SO SRCPARAM CGRVCAP8  58.80         45.7     339.0      12.48      2.44
SO SRCPARAM CGRVAFIS  11.84         41.5     339        15.27      1.83
SO SRCPARAM FPCBTC2A  896.62         91.4     424.8      31.09      2.74
SO SRCPARAM FPCBT03   710.01         91.4     408.2      34.44      3.35
```

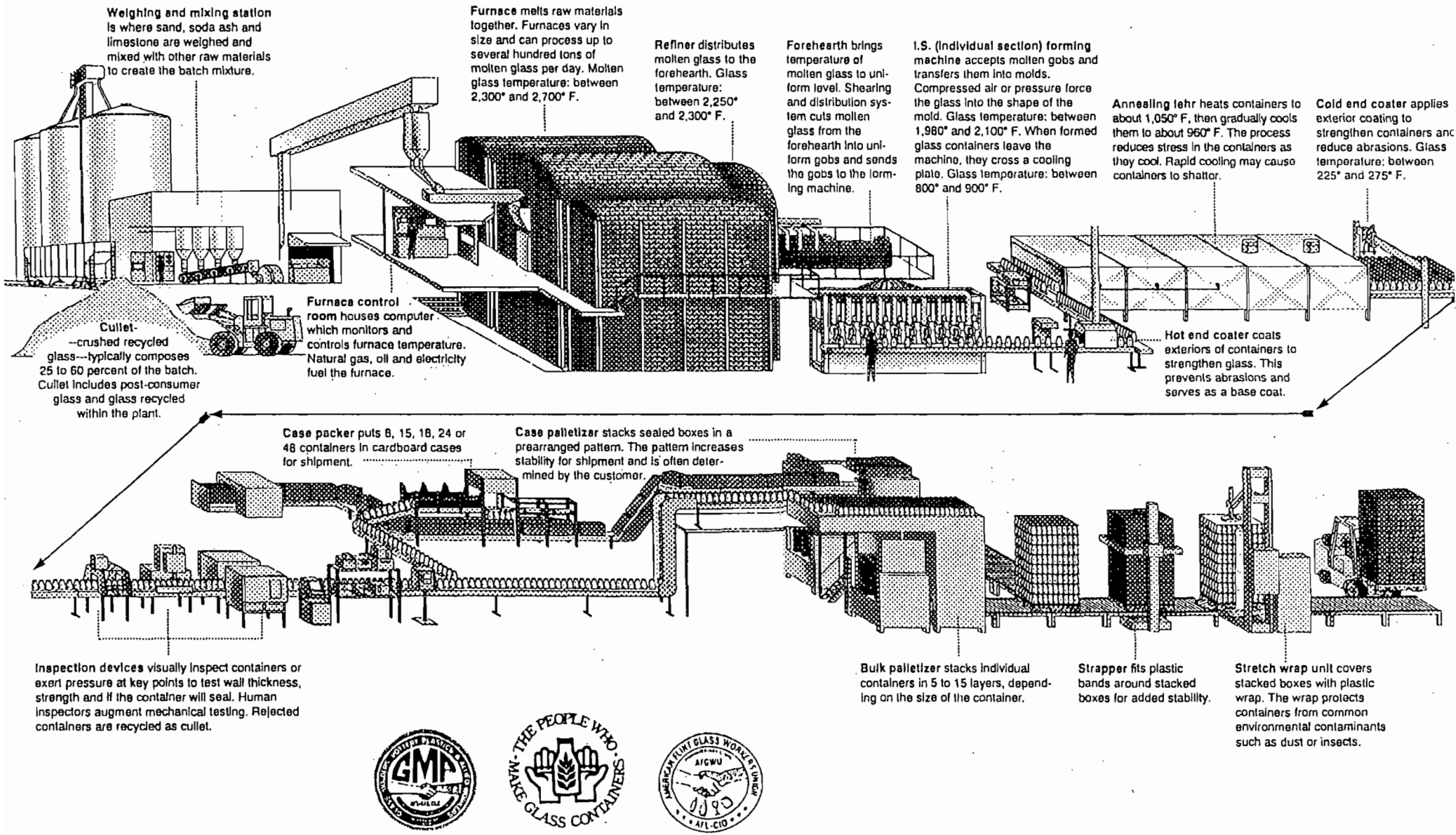
```
SO SRCPARAM FPCBTC3B  192.89      13.7    772      22.25     5.27
SO SRCPARAM BAYBORC4  197.80      12.2    755.4    6.54      5.89
SO SRCPARAM FPCHGC23  539.6       52.9    423.2    6.71      3.81
SO SRCPARAM FPCMNC2   2398        144.8   426      17.1      8
SO SRCPARAM GLEAD01   48.41       45.7    344      37.5902   0.61
SO SRCPARAM IAWALC2   315.0       60.7    350      15.31     2.6
SO SRCPARAM LAFRG29   584         44.5    495      40.24     2.44
SO SRCPARAM PINEYPT   36.8        61.0    350      8.08      2.36
SO SRCPARAM TECGNC2   760.        96.0    409      30.9      3.1
SO SRCPARAM TECGN03   483.5       96.0    416      30.9      3.23
SO SRCPARAM TECGN04   567.3       96      409      24.3      2.93
SO SRCPARAM TECGN05   690.73      96      409      22.4      4.45
SO SRCPARAM TECGN06   1148.5      96      414      15.5      5.36
SO EMISUNIT   .100000E+07 (GRAMS/SEC)      (MICROGRAMS/CUBIC-METER)
SO BUILDHGT B3      80.77  80.77  80.77  80.77  80.77  80.77
SO BUILDHGT B3      80.77  80.77  58.52  58.52  58.52  80.77
SO BUILDHGT B3      80.77  80.77  80.77  80.77  80.77  80.77
SO BUILDHGT B3      80.77  80.77  80.77  80.77  80.77  80.77
SO BUILDHGT B3      80.77  80.77  58.52  58.52  58.52  80.77
SO BUILDHGT B3      80.77  80.77  80.77  80.77  80.77  80.77
SO BUILDWID B3      81.39  85.94  87.88  88.43  87.19  83.31
SO BUILDWID B3      76.89  68.13  61.57  67.84  85.15  87.41
SO BUILDWID B3      93.64  97.02  97.45  94.93  89.51  81.38
SO BUILDWID B3      81.39  85.94  87.88  88.43  87.19  83.31
SO BUILDWID B3      76.89  68.13  61.57  67.84  85.15  87.41
SO BUILDWID B3      93.64  97.02  97.45  94.93  89.51  81.38
SO BUILDHGT B4      80.77  80.77  80.77  80.77  80.77  80.77
SO BUILDHGT B4      48.77   0.00   0.00   0.00  58.52  58.52
SO BUILDHGT B4      58.52  80.77  80.77  80.77  80.77  80.77
SO BUILDHGT B4      80.77  80.77  80.77  80.77  80.77  80.77
SO BUILDHGT B4       0.00   0.00   0.00   0.00  58.52  58.52
SO BUILDHGT B4      58.52  80.77  80.77  80.77  80.77  80.77
SO BUILDWID B4      81.39  85.94  87.88  88.43  87.19  83.31
SO BUILDWID B4      18.02   0.00   0.00   0.00  85.15  99.88
SO BUILDWID B4     111.58  97.02  97.45  94.93  89.51  81.38
SO BUILDWID B4      81.39  85.94  87.88  88.43  87.19  83.31
SO BUILDWID B4       0.00   0.00   0.00   0.00  85.15  99.88
SO BUILDWID B4     111.58  97.02  97.45  94.93  89.51  81.38
SO BUILDHGT B12NEW   58.52  80.77  80.77  80.77  80.77  80.77
SO BUILDHGT B12NEW   48.77  48.77  48.77  48.77   0.00   0.00
SO BUILDHGT B12NEW    0.00   0.00   0.00  58.52  58.52  58.52
SO BUILDHGT B12NEW   58.52  80.77  80.77  80.77  80.77  80.77
SO BUILDHGT B12NEW   48.77  48.77  48.77  48.77   0.00   0.00
SO BUILDHGT B12NEW    0.00   0.00   0.00  58.52  58.52  58.52
SO BUILDWID B12NEW  140.47  85.94  87.88  88.43  87.19  83.31
SO BUILDWID B12NEW   18.02  18.01  18.29  18.01   0.00   0.00
SO BUILDWID B12NEW    0.00   0.00   0.00 133.35 135.02 132.59
SO BUILDWID B12NEW  140.47  85.94  87.88  88.43  87.19  83.31
SO BUILDWID B12NEW   18.02  18.01  18.29  18.01   0.00   0.00
SO BUILDWID B12NEW    0.00   0.00   0.00 133.35 135.02 132.59
SO BUILDHGT CT1       0.00   0.00   0.00   0.00   0.00   0.00
SO BUILDHGT CT1       0.00   0.00   0.00  58.52  58.52  58.52
SO BUILDHGT CT1      58.52  80.77  58.52  58.52  58.52  58.52
SO BUILDHGT CT1       0.00   0.00   0.00   0.00   0.00   0.00
```



TYPICAL END PORT GLASS FURNACE

COMPANY	STATE	DATE	TYPE FURNACE	CAPACITY (tpd)	FUEL		PERMITTED EMISSION LIMIT (lb/ton glass)						COMMENTS
					TYPE	RATE (mmBTU/hr)	NOx	SO2	PM10	VOC	CO	H2SO4	
Cardinal	OK	3/18/2003	Flat Glass; Regen	650	Gas	200	11.0, 9.0,7.(	2.00	1.50	0.10	10.00	0.058	3R Process for NOx Control, No Add-on Control
Cardinal	WI	10/23/1999	Flat Glass; Regen	650	Gas	160	14.77	0.65	0.94	NL	1.89	0.055	Low-NOx Burner; ESP; Dry Scrubber
Cardinal	NC	10/29/1998	Flat Glass; Regen	600	Gas	180	11.0,9.0,7.(	2.00	1.00	NL	BelowPSD	NL	3R Process for NOx (30-day avg), Salt Cake limit for SO2
Owens	IN	3/10/1998	Flat Glass; Regen	533			NL	2.00	1.00	NL			Formulization for SO2, No Add-on Control
Gardian	NY		Flat Glass; Regen	700	Gas	155	6.5	2.07	1.00	NL	0.75	0.170	3R for NOx, Formulization for SO2 & PM, ESPSD for CO
PPG	CA	2/15/1996	Flat Glass;Regen	525	Gas		11		0.88				ESP for PM
Owens	GA	11/15/1994	Container; Regen	229	Gas/Oil		5.5						RACT for NOx

Inside a Typical Glass Container Plant



GMP
THE PEOPLE WHO MAKE GLASS CONTAINERS
AFGWU AFL-CIO

```
SO BUILDWID TECGN05      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN05      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN05      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN05      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN05      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDHGT TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDHGT TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDHGT TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDHGT TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDHGT TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDHGT TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO BUILDWID TECGN06      0.00      0.00      0.00      0.00      0.00      0.00
SO SRCGROUP    ALL
SO FINISHED

ME STARTING
ME INPUTFIL SPG93.ASC
ME ANEMHGHT    6.100 METERS
ME SURFDATA  72211  1993              St. Petersburg
ME UAIRDATA  12842  1993              Ruskin
ME FINISHED

EV STARTING
   EVENTPER H1H24001  24  ALL         93031924        299.79819
   EVENTLOC H1H24001 XR=   361218.00000 YR=  3074461.00000      0.000      0.000
   EVENTPER H2H24001  24  ALL         93031424        283.84293
   EVENTLOC H2H24001 XR=   364818.00000 YR=  3080257.25000      0.000      0.000
   EVENTPER TH240001  24  ALL         93012724        267.01517
   EVENTLOC TH240001 XR=   364041.12500 YR=  3081169.00000      0.000      0.000
   EVENTPER TH240002  24  ALL         93031424        283.46796
   EVENTLOC TH240002 XR=   364041.12500 YR=  3081169.00000      0.000      0.000
   EVENTPER TH240003  24  ALL         93031424        283.84293
   EVENTLOC TH240003 XR=   364818.00000 YR=  3080257.25000      0.000      0.000
   EVENTPER TH240004  24  ALL         93031424        282.73911
   EVENTLOC TH240004 XR=   364943.00000 YR=  3080473.75000      0.000      0.000
   EVENTPER TH240005  24  ALL         93031424        295.05612
   EVENTLOC TH240005 XR=   365068.00000 YR=  3080690.25000      0.000      0.000
   EVENTPER TH240006  24  ALL         93031424        273.72659
   EVENTLOC TH240006 XR=   365193.00000 YR=  3080906.75000      0.000      0.000
   EVENTPER TH240007  24  ALL         93031424        276.16336
   EVENTLOC TH240007 XR=   365514.03100 YR=  3079465.75000      0.000      0.000
   EVENTPER TH240008  24  ALL         93031424        284.51169
   EVENTLOC TH240008 XR=   365674.71900 YR=  3079657.25000      0.000      0.000
   EVENTPER TH240009  24  ALL         93031424        293.09650
   EVENTLOC TH240009 XR=   365835.43800 YR=  3079848.75000      0.000      0.000
   EVENTPER TH240010  24  ALL         93031424        273.27304
   EVENTLOC TH240010 XR=   365996.12500 YR=  3080040.25000      0.000      0.000
   EVENTPER TH240011  24  ALL         93031424        269.78699
   EVENTLOC TH240011 XR=   366222.75000 YR=  3078757.00000      0.000      0.000
   EVENTPER TH240012  24  ALL         93031424        277.13321
   EVENTLOC TH240012 XR=   366414.28100 YR=  3078917.75000      0.000      0.000
   EVENTPER TH240013  24  ALL         93031424        275.38150
   EVENTLOC TH240013 XR=   366605.78100 YR=  3079078.50000      0.000      0.000
   EVENTPER TH240014  24  ALL         93031924        299.79819
   EVENTLOC TH240014 XR=   361218.00000 YR=  3074461.00000      0.000      0.000
```

30°, 6.10km

H2H

H3H

H2H

OK

H2H

OK

High

High

High

High

High

High

High

High

High

ent impact analysis because EPA and FDEP do not recognize superseded models as valid analytical tools.

POLLUTANT EMISSION RATES

The pollutant emission rates for the Big Bend Station combustion units used in the modeling analysis for Big Bend Station are presented in Tables 1 through 4. Three potential FGD operating scenarios were modeled, as follows:

- Scenario 1—Unit Nos. 1, 2, and 4 scrubbed; Unit No. 3 not scrubbed.
- Scenario 2—Unit Nos. 1 and 4 scrubbed; Unit Nos. 2 and 3 not scrubbed.
- Scenario 3—Unit Nos. 1 through 4 scrubbed.
- Scenario 4—Unit No. 2 not scrubbed; Unit Nos. 1, 3, and 4 scrubbed.

The noncombustion emission sources PM_{10} emission rates are presented in Table 5.

A scenario of Unit Nos. 2 and 4 scrubbed and Unit Nos. 1 and 3 not scrubbed was not modeled because this scenario is virtually identical to Scenario 2. A scenario of Unit No. 1 unscrubbed and Unit Nos. 2, 3, and 4 scrubbed was not modeled for the same reason. The existing base case of Unit Nos. 1 and 2 not scrubbed, Unit No. 3 scrubbed or not scrubbed, and Unit No. 4 scrubbed was not modeled because recently completed SO_2 modeling for Title V permit application purposes indicated the base case does not cause an exceedance of the national or Florida ambient air quality standards (AAQS). Because the modeling analysis must evaluate the potential worst-case conditions, all emission rates are based on the maximum permitted rate for the appropriate time period, as noted in the tables.

The SO_2 dispersion modeling to determine the highest second-highest 24-hour modeled concentration also included emission sources not located at Big Bend Station. This offsite emissions inventory has was provided by FDEP to ensure reasonable assurance of compliance.

Table 1. Big Bend Station - Combustion Units - Emission Rates for Dispersion Modeling Scenario 1 - Units 1, 2, and 4 Scrubbed; Unit 3 Not Scrubbed

Emissions Unit	Emission Rate							
	SO_2		NO_x		PM_{10}		CO	
	(lb/MMBtu)	(g/sec)	(lb/MMBtu)	(g/sec)	(lb/MMBtu)	(g/sec)	(lb/MMBtu)	(g/sec)
Unit 1	0.82	417.1	1.545	785.9	0.1	50.9	0.023	11.7
Unit 2	0.82	412.9	1.545	777.9	0.1	50.3	0.023	11.6
Unit 3	3.6	1,866.6	0.70	362.9	0.1	51.8	0.023	11.9
Unit 4	0.82	447.4	0.60	327.3	0.03	16.4	0.029	15.8
CT 1	0.51	11.1	0.698	15.2	0.038	0.8	0.048	1.0
CT 2	0.51	61.0	0.698	83.6	0.038	4.5	0.048	5.7
CT 3	0.51	61.0	0.698	83.6	0.038	4.5	0.048	5.7

Notes:

All emission rates based on maximum permitted operation.

Units 1 and 2 SO_2 emission rates based on design information.

Units 1 and 2 PM_{10} emission rates based on draft Title V operation permit conditions.

Units 1 and 2 NO_x and CO emission rates based on AP-42 emission factors.

Unit 3 SO_2 emission rate based on reducing draft Title V operation permit condition from 6.5 to 3.6 lb/MMBtu.

Unit 3 NO_x and PM_{10} emission rates based on draft Title V operation permit conditions.

Unit 3 CO emission rate based on AP-42 emission factor.

Unit 4 SO_2, NO_x, PM_{10}, and CO emission rates based on draft Title V operation permit conditions.

All CT emission rates based on AP-42 emission factors.

Table 2. Big Bend Station - Combustion Units - Emission Rates for Dispersion Modeling Scenario 2 - Units 1 and 4 Scrubbed; Units 2 and 3 Not Scrubbed

Emissions Unit	Emission Rate							
	SO_2		NO_x		PM_{10}		CO	
	(lb/MMBtu)	(g/sec)	(lb/MMBtu)	(g/sec)	(lb/MMBtu)	(g/sec)	(lb/MMBtu)	(g/sec)
Unit 1	0.82	417.1	1.545	785.9	0.1	50.9	0.023	11.7
Unit 2	2.4	1,208.4	1.545	777.9	0.1	50.3	0.023	11.6
Unit 3	2.4	1,244.4	0.70	362.9	0.1	51.8	0.023	11.9
Unit 4	0.82	447.4	0.60	327.3	0.03	16.4	0.029	15.8
CT 1	0.51	11.1	0.698	15.2	0.038	0.8	0.048	1.0
CT 2	0.51	61.0	0.698	83.6	0.038	4.5	0.048	5.7
CT 3	0.51	61.0	0.698	83.6	0.038	4.5	0.048	5.7

Notes:

All emission rates based on maximum permitted operation.

Unit 1 SO_2 emission rate based on design information.

Unit 2 SO_2 emission rate based on reducing draft Title V operation permit condition from 6.5 to 2.4 lb/MMBtu.

Units 1 and 2 PM_{10} emission rates based on draft Title V operation permit conditions.

Units 1 and 2 NO_x and CO emission rates based on AP-42 emission factors.

Unit 3 SO_2 emission rate based on reducing draft Title V operation permit condition from 6.5 to 2.4 lb/MMBtu.

Unit 3 NO_x and PM_{10} emission rates based on draft Title V operation permit conditions.

Unit 3 CO emission rate based on AP-42 emission factor.

Unit 4 SO_2, NO_x, PM_{10}, and CO emission rates based on draft Title V operation permit conditions.

All CT emission rates based on AP-42 emission factors.

Table 3. Big Bend Station - Combustion Units - Emission Rates for Dispersion Modeling Scenario 3 - Units 1 Through 4 Scrubbed

Emissions Unit	Emission Rate							
	SO_2		NO_x		PM_{10}		CO	
	(lb/MMBtu)	(g/sec)	(lb/MMBtu)	(g/sec)	(lb/MMBtu)	(g/sec)	(lb/MMBtu)	(g/sec)
Unit 1	0.82	417.1	1.545	785.9	0.1	50.9	0.023	11.7
Unit 2	0.82	412.9	1.545	777.9	0.1	50.3	0.023	11.6
Unit 3	0.82	425.2	0.60	311.1	0.1	51.8	0.023	11.9
Unit 4	0.82	447.4	0.60	327.3	0.03	16.4	0.029	15.8
CT 1	0.51	11.1	0.698	15.2	0.038	0.8	0.048	1.0
CT 2	0.51	61.0	0.698	83.6	0.038	4.5	0.048	5.7
CT 3	0.51	61.0	0.698	83.6	0.038	4.5	0.048	5.7

Notes:
All emission rates based on maximum permitted operation.
Units 1and 2 SO_2 emission rates based on design information.
Units 1 and 2 PM_{10} emission rates based on draft Title V operation permit conditions.
Units 1 and 2 NO_x and CO emission rates based on AP-42 emission factors.
Unit 3 SO_2, NO_x, and PM_{10} emission rates based on draft Title V operation permit conditions.
Unit 3 CO emission rate based on AP-42 emission factor.
Unit 4 SO_2, NO_x, PM_{10}, and CO emission rates based on draft Title V operation permit conditions.
All CT emission rates based on AP-42 emission factors.

Table 4. Big Bend Station - Combustion Units - Emission Rates for Dispersion Modeling Scenario 4 - Units 1, 3, and 4 Scrubbed; Unit 2 Not Scrubbed

Emissions	Emission Rate							
	SO_2		NO_x		PM_{10}		CO	
	(lb/MMBtu	(g/sec)	(lb/MMBtu	(g/sec)	(lb/MMBtu	(g/sec)	(lb/MMBtu	(g/sec)
Unit 1	0.82	417.1	1.545	785.9	0.1	50.9	0.023	11.7
Unit 2	2.9	1460.1	1.545	777.9	0.1	50.3	0.023	11.6
Unit 3	0.82	425.2	0.60	311.1	0.1	51.8	0.023	11.9
Unit 4	0.82	447.4	0.60	327.3	0.03	16.4	0.029	15.8
CT 1	0.51	11.1	0.698	15.2	0.038	0.8	0.048	1.0
CT 2	0.51	61.0	0.698	83.6	0.038	4.5	0.048	5.7
CT 3	0.51	61.0	0.698	83.6	0.038	4.5	0.048	5.7

Notes:

All emission rates based on maximum permitted operation.

Unit 1 SO_2 emission rate based on design information.

Unit 2 SO_2 emission rate based on reducing draft Title V operation permit condition from 6.5 to 2.9 lb/MMBtu.

Units 1 and 2 PM_{10} emission rates based on draft Title V operation permit conditions.

Units 1 and 2 NO_x and CO emission rates based on AP-42 emission factors.

Unit 3 SO_2, NO_x, and PM_{10} emission rates based on draft Title V operation permit conditions.

Unit 3 CO emission rate based on AP-42 emission factor.

Unit 4 SO_2, NO_x, PM_{10}, and CO emission rates based on draft Title V operation permit conditions.

All CT emission rates based on AP-42 emission factors.

385-2738

Table 5. Big Bend Station - Noncombustion Emission Sources PM_{10} Emission Rates for Dispersion Modeling

Process Area	Emission Source	Emission Source ID	PM_{10} Emission Rate	
			(lb/hr)	(g/sec)
Fuelyard	Barge Clamshell to Conveyor D1	FH-001	0.17	0.02
	Barge Bucket Elevator to Conveyor A1	FH-002	0.17	0.02
	Conveyor A1 to Conveyor B1	FH-003	0.17	0.02
	Conveyor B1 to Conveyor D1	FH-004	0.17	0.02
	Self-Unloading Barge to Conveyor D1	FH-005	0.17	0.02
	Conveyor D1 to Conveyor E1	FH-006	0.17	0.02
	Conveyor E1 to Conveyor Y or F1	FH-007	0.17	0.02
	Conveyor Y to Conveyor Z	FH-008a	0.17	0.02
	Conveyor Z to West Emergency Storage Pile	FH-008b	0.51	0.06
	West Emergency Storage Pile Maintenance	FH-009	0.95	0.11
	West Emergency Storage Pile Storage	FH-010	1.10	0.13
	West Emergency Storage Pile Reclaim	FH-011a	0.26	0.03
	Portable Conveyor to Conveyor F1	FH-011b	0.17	0.02
	Conveyor Z to Conveyor P	FH-012	0.17	0.02
	Conveyor P to Intermediate Conveyor	FH-013	0.17	0.02
	Intermediate Conveyor to North Stacker	FH-014	0.17	0.02
	North Stacker to North/Center Storage Piles	FH-015	0.51	0.06
	Bucket Elevator Reclaim to North Stacker	FH-016	0.26	0.03
	North Stacker to Conveyor P	FH-017	0.17	0.02
	North Storage Pile Maintenance	FH-018	0.95	0.11
	North Storage Pile Storage	FH-019	27.05	3.15
	Center Storage Pile Maintenance	FH-020	0.95	0.11
	Center Storage Pile Storage	FH-021	21.30	2.48
	Conveyor F1 to South Stacker	FH-022	0.17	0.02
	South Stacker to South/Center Storage Piles	FH-023	0.51	0.06
	South Reclaimer to South Reclaimer Conveyor	FH-024	0.26	0.03
	South Reclaimer Conveyor to Conveyor F1	FH-025	0.17	0.02
	South Storage Pile Maintenance	FH-026	0.95	0.11
	South Storage Pile Storage	FH-027	22.20	2.58
	Conveyor P to Conveyor J2	FH-028	0.17	0.02
	Conveyor J2 to Conveyor Q2	FH-029	0.17	0.02
	Conveyor F1 to Conveyor J1	FH-030	0.17	0.02
	Conveyor J1 to Conveyor Q1	FH-031	0.17	0.02
	Conveyors Q1 and Q2 to Blending Bins	FH-032 - FH-035	0.20	0.02
	Blending Bins to Conveyors T1 and T2	FH-036 - FH-047	0.34	0.04
	Conveyor T1 to Crusher 1	FH-048	0.10	0.01
	Conveyor T2 to Crusher 2	FH-049	0.10	0.01
	Crusher to Conveyor W1	FH-050	0.17	0.02
	Crusher to Conveyor W2	FH-051	0.17	0.02
	Conveyor U to East Emergency Storage Pile	FH-052	0.51	0.06
	East Emergency Storage Pile Maintenance	FH-053	0.95	0.11
	East Emergency Storage Pile Storage	FH-054	0.40	0.05
	Conveyor W1 to Conveyor L1	FH-055	0.17	0.02
	Conveyor W2 to Conveyor L2	FH-056	0.17	0.02

G-TEC98.3/BB-V5.XLS.1-10/5/98

Revision 2, 10/31/98

Table 5. Big Bend Station - Noncombustion Emission Sources
PM_{10} Emission Rates for Dispersion Modeling (Page 2 of 2)

Process Area	Emission Source	Emission Source ID	PM_{10} Emission Rate (lb/hr)	PM_{10} Emission Rate (g/sec)
Fuelyard (Cont.)	East Emergency Storage Pile Reclaim to "K" Feeders	FH-057	0.26	0.03
	"K" Feeders to Conveyors L1 or L2	FH-058	0.17	0.02
	Conveyors L1 and L2 to Fuel Bunkers	FH-059 - FH-062	0.20	0.02
	Transloading Storage Pile Maintenance	FH-063	0.51	0.06
	Transloading Storage Pile Reclaim to Loadout Conveyor	FH-064	0.02	0.002
	Transloading Loadout Conveyor to Rail Loading Conveyor	FH-065	0.01	0.001
	Transloading Railcar Loading	FH-066	0.03	0.003
	Non-TEC Fuel Storage Pile Reclaim to Loadout Conveyor	FH-067	0.02	0.002
	Non-TEC Fuel Truck Loading	FH-068	0.03	0.003
	TEC Fuel Truck Loading	FH-069	0.02	0.002
	Long -Term Storage Pile	FH-070	3.95	0.46
	Long-Term Storage Pile Maintenance	FH-071	0.95	0.11
Fly Ash	Transfers into Silo 1	FA-001	5.16	0.60
	Dry Transfer from Silo 1 to Trucks	FA-002	0.03	0.003
	Wet Transfer from Silo 1 to Trucks	FA-003	0.01	0.001
	Transfer into Silo 2	FA-004	5.16	0.60
	Dry Transfer from Silo 2 to Trucks	FA-005	0.03	0.003
	Transfer into Silo 3	FA-006	0.20	0.02
	Dry Transfer from Silo 3 to Trucks	FA-007	0.03	0.003
	Wet Transfer from Silo 3 to Trucks	FA-008	0.01	0.001
Gypsum	Stacker to North Stackout Pile	GH-001	0.04	0.005
	North Stackout Pile	GH-002	0.33	0.04
	North Stackout Pile Maintenance	GH-003	1.07	0.12
	Transfer from North Stackout Pile to Loadout Conveyor	GH-004a	0.04	0.005
	Loadout Conveyor to Truck	GH-004b	0.04	0.005
	Conveyor GD to Conveyor GE	GH-007	0.01	0.001
	Conveyor GE to Conveyor GF	GH-008	0.01	0.001
	Conveyor GF to Radial Stacker	GH-009	0.01	0.001
	Radial Stacker to South Stackout Pile	GH-010	0.04	0.005
	South Stackout Pile	GH-011	0.31	0.04
	South Stackout Pile Maintenance	GH-012	1.07	0.12
	Long-Term Storage Pile Maintenance	GH-013	1.07	0.12
	Long-Term Storage Pile	GH-014	37.99	4.42
	Transfer from Long-Term Storage to Trucks	GH-015	0.04	0.005
Limestone	Railcar/Truck Unloading to Hoppers	LSH-001	0.58	2.52
	Conveyor LB to Conveyor LC	LSH-002	0.01	0.06
	Conveyor LD to Conveyor LE	LSH-003	0.01	0.06
	Conveyor LE to Conveyor LF and Silo A	LSH-004/005	0.02	0.08
	Conveyor LF toConveyor LG and Silo B	LSH-006/007	0.02	0.08
	Conveyor LG to Silo C	LSH-008	0.01	0.02

STACK PARAMETERS

The stack parameters for the Big Bend Station combustion units used in the modeling analysis for Big Bend Station are presented in Tables 6 through 9. With the exception of Unit Nos. 1 and 2 operations with the FGD system, the stack heights, diameters, and exit temperatures of the boilers were obtained from the appropriate Title V Air Operation Permit application. Stack exit velocities for the boilers were calculated from continuous emissions monitoring system (CEMS) volumetric flow measurements taken in 1995, as summarized in Table 3. CEMS volumetric flow data from 1995 was used because 1995 was the last full year of nonintegrated operation for Units 3 and 4. Stack parameters for the operation of Unit Nos. 1 and 2 with the FGD system were obtained from design data.

All of the combustion turbine stack parameters were obtained from Big Bend Station.

The stack parameters for the noncombustion PM_{10} emission sources are presented in Table 10.

GOOD ENGINEERING PRACTICE/DOWNWASH CONSIDERATIONS

The 1977 Clean Air Act Amendments require that the degree of emission limitation required for control of any pollutant not be affected by a stack height that exceeds good engineering practice (GEP) or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (40 CFR 51), in which GEP stack height is defined as the higher of 65 meters, or a height established by applying the formula:

$$Hg = H + 1.5\ L$$

where: Hg = GEP stack height.
H = height of the structure or nearby structure.
L = lesser dimension (height or projected width)of the nearby structure.

Table 6. Big Bend Station - Combustion Units - Stack Parameters for Dispersion Modeling
Scenario 1 - Units 1, 2, and 4 Scrubbed; Unit 3 Not Scrubbed

Emissions Unit	Stack Height		Stack Gas Temperature		Stack Gas Velocity		Stack Diameter	
	(ft)	(m)	(°F)	(K)	(ft/min)	(m/sec)	(ft)	(m)
Unit 1	490	149.4	127	326	3,600	18.29	29	8.8
Unit 2	490	149.4	127	326	3,600	18.29	29	8.8
Unit 3	490	149.4	308	426	3,072	15.61	24	7.3
Unit 4	490	149.4	127	326	4,698	23.87	24	7.3
CT 1	35	10.7	1011	817	5,510	28.00	11	3.4
CT 2	75	22.9	928	771	6,967	35.40	17	5.1
CT 3	75	22.9	928	771	6,967	35.40	17	5.1

Notes:
Units 1 and 2 share one stack. Stack data represents both units operating at maximum capacity.
Units 1 and 2 stack parameters based on design information.
All other stack parameters based on Title V operation permit SO_2 dispersion modeling inputs.

Table 7. Big Bend Station - Combustion Units - Stack Parameters for Dispersion Modeling Scenario 2 - Units 1 and 4 Scrubbed; Units 2 and 3 Not Scrubbed

Emissions Unit	Stack Height		Stack Gas Temperature		Stack Gas Velocity		Stack Diameter	
	(ft)	(m)	(°F)	(K)	(ft/min)	(m/sec)	(ft)	(m)
Unit 1	490	149.4	127	326	1,800	9.15	29	8.8
Unit 2	490	149.4	294	419	3,478	17.67	24	7.3
Unit 3	490	149.4	308	426	3,072	15.61	24	7.3
Unit 4	490	149.4	127	326	4,698	23.87	24	7.3
CT 1	35	10.7	1011	817	5,510	28.00	11	3.4
CT 2	75	22.9	928	771	6,967	35.40	17	5.1
CT 3	75	22.9	928	771	6,967	35.40	17	5.1

Notes:
Units 1 stack parameters based on design information.
All other stack parameters based on Title V operation permit SO_2 dispersion modeling inputs.

Table 8. Big Bend Station - Combustion Units - Stack Parameters for Dispersion Modeling
Scenario 3 - Units 1 Through 4 Scrubbed

Emissions Unit	Stack Height		Stack Gas Temperature		Stack Gas Velocity		Stack Diameter	
	(ft)	(m)	(^{o}F)	(K)	(ft/min)	(m/sec)	(ft)	(m)
Unit 1	490	149.4	127	326	3,600	18.29	29	8.8
Unit 2	490	149.4	127	326	3,600	18.29	29	8.8
Unit 3	490	149.4	127	326	3,072	15.61	24	7.3
Unit 4	490	149.4	127	326	4,698	23.87	24	7.3
CT 1	35	10.7	1011	817	5,510	28.00	11	3.4
CT 2	75	22.9	928	771	6,967	35.40	17	5.1
CT 3	75	22.9	928	771	6,967	35.40	17	5.1

Notes:
Units 1 and 2 share one stack. Stack data represents both units operating at maximum capacity.
Units 1 and 2 stack parameters based on design information.
All other stack parameters based on Title V operation permit SO_2 dispersion modeling inputs.

Table 9. Big Bend Station - Combustion Units - Stack Parameters for Dispersion Modeling
Scenario 4 - Units 1, 3, and 4 Scrubbed; Unit 2 Not Scrubbed

Emissions Unit	Stack Height		Stack Gas Temperature		Stack Gas Velocity		Stack Diameter	
	(ft)	(m)	(^{o}F)	(K)	(ft/min)	(m/sec)	(ft)	(m)
Unit 1	490	149.4	127	326	1,800	9.15	29	8.8
Unit 2	490	149.4	294	419	3,487	17.72	24	7.3
Unit 3	490	149.4	127	326	3,072	15.61	24	7.3
Unit 4	490	149.4	127	326	4,698	23.87	24	7.3
CT 1	35	10.7	1011	817	5,510	28.00	11	3.4
CT 2	75	22.9	928	771	6,967	35.40	17	5.1
CT 3	75	22.9	928	771	6,967	35.40	17	5.1

Notes:
Unit 1 stack parameters based on design information.
All other stack parameters based on Title V operation permit SO_2 dispersion modeling inputs.

Table 10. Big Bend Station - Noncombustion Emission Sources Emission Parameters for Dispersion Modeling

Process Area	Emission Source ID	Source Type	Exit Height (m)	Exit Temperature* (K)	Exit Veolcity† (m/s)	Exit Diameter (m)
Fuelyard	FH-001	Fugitive	13.8	Ambient	0.001	1.00
	FH-002	Fugitive	13.8	Ambient	0.001	1.00
	FH-003	Fugitive	13.5	Ambient	0.001	1.00
	FH-004	Fugitive	16.8	Ambient	0.001	1.00
	FH-005	Fugitive	4.6	Ambient	0.001	1.00
	FH-006	Fugitive	7.3	Ambient	0.001	1.00
	FH-007	Fugitive	11.4	Ambient	0.001	1.00
	FH-008a	Fugitive	7.0	Ambient	0.001	1.00
	FH-008b	Fugitive	18.3	Ambient	0.001	1.00
	FH-009	Area	8.0	45.0	45.0	N/A
	FH-010	Area	8.0	45.0	45.0	N/A
	FH-011a	Fugitive	1.8	Ambient	0.001	1.00
	FH-011b	Fugitive	1.8	Ambient	0.001	1.00
	FH-012	Fugitive	12.2	Ambient	0.001	1.00
	FH-013	Fugitive	9.6	Ambient	0.001	1.00
	FH-014	Fugitive	9.6	Ambient	0.001	1.00
	FH-015	Fugitive	16.4	Ambient	0.001	1.00
	FH-016	Fugitive	1.5	Ambient	0.001	1.00
	FH-017	Fugitive	4.9	Ambient	0.001	1.00
	FH-018	Area	7.6	396.0	84.0	N/A
	FH-019	Area	7.6	396.0	84.0	N/A
	FH-020	Area	7.6	350.0	61.0	N/A
	FH-021	Area	7.6	350.0	61.0	N/A
	FH-022	Fugitive	9.6	Ambient	0.001	1.00
	FH-023	Fugitive	16.4	Ambient	0.001	1.00
	FH-024	Fugitive	4.6	Ambient	0.001	1.00
	FH-025	Fugitive	9.6	Ambient	0.001	1.00
	FH-026	Area	7.6	366.0	61.0	N/A
	FH-027	Area	7.6	366.0	61.0	N/A
	FH-028	Fugitive	7.4	Ambient	0.001	1.00
	FH-029	Fugitive	14.4	Ambient	0.001	1.00
	FH-030	Fugitive	7.4	Ambient	0.001	1.00
	FH-031	Fugitive	14.4	Ambient	0.001	1.00
	FH-032 - FH-035	Point	7.6	Ambient	21.89	0.51
	FH-036 - FH-047	Fugitive	1.8	Ambient	0.001	1.00
	FH-048	Point	21.8	Ambient	21.89	1.00
	FH-049	Point	21.8	Ambient	21.89	1.00
	FH-050	Fugitive	3.0	Ambient	0.001	1.00
	FH-051	Fugitive	3.0	Ambient	0.001	1.00
	FH-052	Fugitive	12.0	Ambient	0.001	1.00
	FH-053	Area	6.1	18.0	18.0	N/A
	FH-054	Area	6.1	18.0	18.0	N/A
	FH-055	Fugitive	13.0	Ambient	0.001	1.00
	FH-056	Fugitive	13.0	Ambient	0.001	1.00

*East-west length of area source in meters.

†North-south length of area source in meters.

Table 10. Big Bend Station - Noncombustion Emission Sources Emission Parameters for Dispersion Modeling (Page 2 of 2)

Process Area	Emission Source ID	Source Type	Exit Height (m)	Exit Temperature* (K)	Exit Veolcity† (m/s)	Exit Diameter (m)
Fuelyard (Cont.)	FH-057	Fugitive	6.0	Ambient	0.001	1.00
	FH-058	Fugitive	6.0	Ambient	0.001	1.00
	FH-059 - FH-062	Point	57.9	Ambient	21.89	1.00
	FH-063	Area	8.0	45.0	45.0	N/A
	FH-064	Fugitive	1.8	Ambient	0.001	1.00
	FH-065	Fugitive	6.0	Ambient	0.001	1.00
	FH-066	Fugitive	1.8	Ambient	0.001	1.00
	FH-067	Fugitive	6.0	Ambient	0.001	1.00
	FH-068	Fugitive	6.0	Ambient	0.001	1.00
	FH-069	Fugitive	6.0	Ambient	0.001	1.00
	FH-070	Area	7.6	122.0	46.0	N/A
	FH-071	Area	7.6	122.0	46.0	N/A
Fly Ash	FA-001	Point	31.1	394.0	15.85	0.76
	FA-002	Fugitive	3.0	Ambient	0.001	1.00
	FA-003	Fugitive	3.0	Ambient	0.001	1.00
	FA-004	Point	31.1	394.0	15.85	0.76
	FA-005	Fugitive	3.0	Ambient	0.001	1.00
	FA-006	Point	34.4	394	15.58	0.27
	FA-007	Fugitive	3.0	Ambient	0.001	1.00
	FA-008	Fugitive	3.0	Ambient	0.001	1.00
Gypsum	GH-001	Fugitive	10.9	Ambient	0.001	1.00
	GH-002	Area	6.1	38.0	38.0	N/A
	GH-003	Area	6.1	38.0	38.0	N/A
	GH-004a	Fugitive	3.0	Ambient	0.001	1.00
	GH-004b	Fugitive	3.0	Ambient	0.001	1.00
	GH-007	Fugitive	4.2	Ambient	0.001	1.00
	GH-008	Fugitive	4.2	Ambient	0.001	1.00
	GH-009	Fugitive	11.9	Ambient	0.001	1.00
	GH-010	Fugitive	13.9	Ambient	0.001	1.00
	GH-011	Area	6.1	38.0	38.0	N/A
	GH-012	Area	6.1	38.0	38.0	N/A
	GH-013	Area	6.1	244.0	122.0	N/A
	GH-014	Area	6.1	244.0	122.0	N/A
	GH-015	Fugitive	3.0	Ambient	0.001	1.00
Limestone	LSH-001	Point	3.0	Ambient	21.73	0.30
	LSH-002	Point	13.9	Ambient	20.70	0.15
	LSH-003	Point	13.9	Ambient	20.70	0.15
	LSH-004/005	Point	30.8	Ambient	14.29	0.15
	LSH-006/007	Point	30.8	Ambient	14.29	0.15
	LSH-008	Point	30.8	Ambient	7.76	0.15

*East-west length of area source in meters.
†North-south length of area source in meters.

Nearby is defined as a distance up to five times the lesser of the height or width dimension of a structure or terrain feature, but not greater than 800 meters. While GEP stack height regulations require that a stack height used in modeling for determining compliance with AAQS and prevention of significant deterioration (PSD) increments not exceed the GEP stack height, the actual stack height may be greater.

The EPA guidelines for application of the stack height regulations were followed in determining the GEP stack height for each stack.

The complex downwash analysis was performed using the Building Profile Input program (BPIP, version 95086) to determine the appropriate downwash parameters for ISCST3. The Big Bend Station structure locations and heights are provided in Table 11 and are presented in Figure 1. Combustion source stack locations and heights are also provided in this table and figure. Emission locations and heights for the noncombustion PM_{10} emission sources are provided in Table 12.

RECEPTOR LOCATIONS

Receptors were placed at locations considered to be ambient air, which is defined at 40 CFR 50.1(e) as that portion of the atmosphere, external to buildings, to which the general public has access. Those portions of Big Bend Station with restricted access were not considered ambient air.

Receptor locations were selected consistent with the definition of ambient air. Discrete receptors were placed on the restricted area boundaries and in the accessible open water that is within TEC's property boundary. Additional discrete receptors were placed at 10 degree (°) increments, beginning at 10° on rings at 1,000, 1,250, 1,500, and 1,750 meters if the specific point was an ambient air location. Complete rings with receptors located at 10° increments, beginning at 10°, were located at 250 meter increments from 2,000 to 7,000 meters, and at 8,000, 9,000, 10,000, 12,000, 15,000, and 20,000 meters. This

Table 11. Big Bend Station - Stack and Structure Heights and Locations

Stack/Structure Name	Height (ft)	Stack /Structure Location* East/West (ft)	Stack /Structure Location* North/South (ft)	Stack/ Structure Name	Height (ft)	Stack /Structure Location* East/West (ft)	Stack /Structure Location* North/South (ft)
Unit 1/2 Stack (Old)	490	-335	-4	Loft Structure	168	-15	298
Unit 1/2 Stack (New)	490	-335	-254			-49	298
Unit 3 Stack	490	0	0			-49	284
Unit 4 Stack	490	0	-83			-88	284
CT 1 Stack	35	-448	564			-88	298
CT 2 Stack	75	-695	1,814			-197	298
CT 3 Stack	75	-613	1,814			-197	284
Boiler 4 Structure	265	71	155			-236	284
		-38	155			-236	298
		-38	298			-345	298
		-15	298			-345	284
		-15	332			-384	284
		229	332			-384	298
		229	290			-444	298
		214	290			-444	292
		214	277			-473	292
		195	277			-473	338
		195	176			-444	338
		206	176			-444	332
		206	144			-384	332
		71	144			-384	349
Steam Turbine Structure	110	229	332			-345	349
		-49	332			-345	332
		-49	249			-236	332
		-88	349			-236	349
		-88	332			-197	349
		-197	332			-197	332
		-197	349			-88	332
		-236	349			-88	349
		-236	332			-49	349
		-345	332			-49	332
		-345	349			-15	332
		-384	349				
		-384	332				
		-444	332				
		-444	338				
		-473	338				
		-473	495				
		-434	495				
		-434	480				
		229	480				

*Locations are relative to the Unit 3 stack. Positive directions are east and north. Negative directions are west and south.

Table 11. Big Bend Station - Stack and Structure Heights and Locations (Page 2 of 2)

Stack or Structure Name	Height (ft)	Stack /Structure Location* East/West (ft)	Stack /Structure Location* North/South (ft)	Stack or Structure Name	Height (ft)	Stack /Structure Location* East/West (ft)	Stack /Structure Location* North/South (ft)
Boilers 1, 2, and 3 Structure	192	-38	105	Units 1/2 Scrubber†	156	-220	-224
		-61	105				
		-61	96				
		-76	96				
		-76	105				
		-91	105				
		-91	113				
		-153	113				
		-153	122				
		-179	122				
		-179	167				
		-217	167				
		-217	122				
		-285	122				
		-285	184				
		-317	184				
		-317	143				
		-343	143				
		-343	139				
		-418	139				
		-418	214				
		-473	214				
		-473	292				
		-444	292				
		-444	298				
		-384	298				
		-384	284				
		-345	284				
		-345	298				
		-236	298				
		-236	284				
		-197	284				
		-197	298				
		-88	298				
		-88	284				
		-49	284				
		-49	298				
		-38	298				

*Locations are relative to the Unit 3 stack. Positive directions are east and north. Negative directions are west and south.
†Cited location is the center point of a cylindrical scrubber 60 feet in diameter.

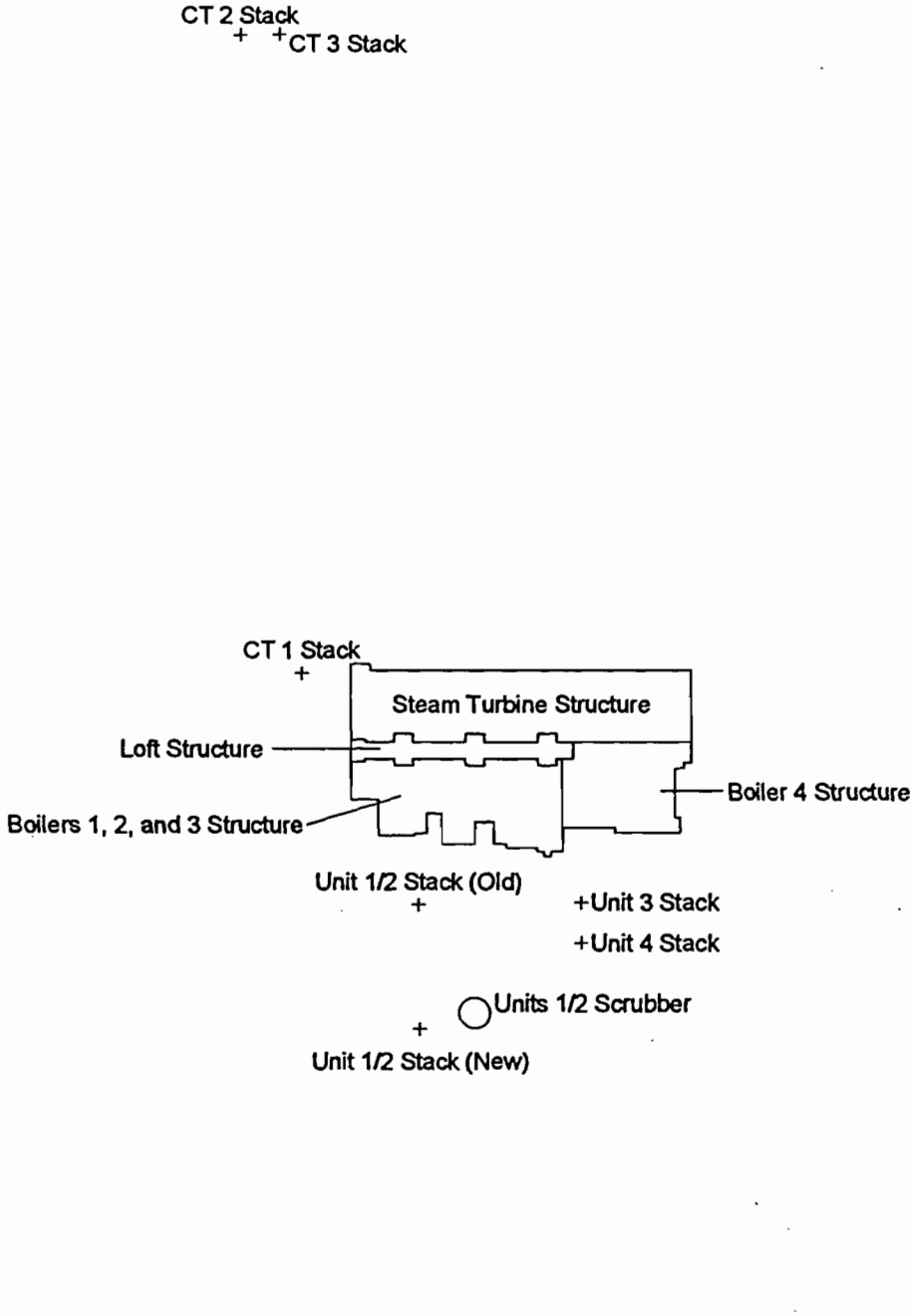


FIGURE 1.

BIG BEND STATION STRUCTURE LOCATIONS
FOR DOWNWASH ANALYSIS

Source: ECT, 1998.

TECO
TAMPA ELECTRIC

Table 12. Big Bend Station - Noncombustion Emission Source Locations

Process Area	Emission Source ID	Location Relative to Unit 3 Stack		UTM Coordinates	
		East-West (ft)	North-South (ft)	Easting (m)	Northing (m)
Fuelyard	FH-001	-3,066	673	360883	3075266
	FH-002	-3,059	595	360885	3075242
	FH-003	-3,059	595	360885	3075242
	FH-004	-3,051	502	360888	3075214
	FH-005	-3,041	381	360891	3075177
	FH-006	-3,028	306	360895	3075154
	FH-007	-2,857	307	360947	3075155
	FH-008a	-2,860	338	360946	3075164
	FH-008b	-2,691	385	360998	3075178
	FH-009	-2,691	385	360998	3075178
	FH-010	-2,691	385	360998	3075178
	FH-011a	-2,765	307	360975	3075155
	FH-011b	-2,765	307	360975	3075155
	FH-012	-2,838	605	360953	3075245
	FH-013	-2,104	612	361177	3075248
	FH-014	-2,077	612	361185	3075248
	FH-015	-2,071	523	361187	3075220
	FH-016	-2,071	523	361187	3075220
	FH-017	-2,044	612	361195	3075248
	FH-018	-2,626	665	361017	3075264
	FH-019	-2,626	665	361017	3075264
	FH-020	-2,511	360	361052	3075171
	FH-021	-2,511	360	361052	3075171
	FH-022	-2,074	320	361186	3075159
	FH-023	-2,073	241	361186	3075134
	FH-024	-2,073	241	361186	3075134
	FH-025	-2,048	321	361194	3075159
	FH-026	-2,519	66	361050	3075081
	FH-027	-2,519	66	361050	3075081
	FH-028	-1,210	610	361449	3075247
	FH-029	-1,215	469	361448	3075204
	FH-030	-1,216	310	361447	3075156
	FH-031	-1,215	452	361448	3075199
	FH-032	-871	680	361552	3075268
	FH-033	-871	610	361552	3075247
	FH-034	-871	541	361552	3075226
	FH-035	-871	464	361552	3075202
	FH-036 - FH-047	-910	583	361541	3075239
	FH-048	-909	59	361541	3075079
	FH-049	-878	58	361550	3075079
	FH-050	-909	89	361541	3075088
	FH-051	-878	89	361550	3075088
	FH-052	-991	90	361516	3075088
	FH-053	-1,017	66	361508	3075081
	FH-054	-1,017	66	361508	3075081
	FH-055	-1,000	305	361513	3075154
	FH-056	-975	317	361521	3075158

Note: UTM coordinates for Unit 3 stack in meters are Zone 17, 361818 E., 3075061 N.

Table 12. Big Bend Station - Noncombustion Emission Source Locations (Page 2 of 2)

Process Area	Emission Source ID	Location Relative to Unit 3 Stack		UTM Coordinates	
		East-West (ft)	North-South (ft)	Easting (m)	Northing (m)
Fuelyard (Cont.)	FH-057	-1,041	305	361501	3075154
	FH-058	-1,041	322	361501	3075159
	FH-059	-358	333	361709	3075163
	FH-060	-209	336	361754	3075163
	FH-061	-62	338	361799	3075164
	FH-062	127	338	361857	3075164
	FH-063	-2,691	385	360998	3075178
	FH-064	-2,622	406	361019	3075185
	FH-065	-2,508	-246	361053	3074986
	FH-066	-2,192	-235	361150	3074989
	FH-067	-1,082	182	361488	3075116
	FH-068	-1,082	182	361488	3075116
	FH-069	-1,267	560	361432	3075232
	FH-070	-2,474	-209	361064	3074997
	FH-071	-2,472	-209	361064	3074997
Fly Ash	FA-001	-343	-147	361713	3075016
	FA-002	-327	-147	361718	3075016
	FA-003	-327	-147	361718	3075016
	FA-004	-59	-145	361800	3075017
	FA-005	-46	-154	361804	3075014
	FA-006	478	157	361964	3075109
	FA-007	475	132	361963	3075101
	FA-008	475	132	361963	3075101
Gypsum	GH-001	1,033	48	362133	3075076
	GH-002	967	-10	362113	3075058
	GH-003	967	-10	362113	3075058
	GH-004a	1,095	-14	362152	3075057
	GH-004b	1,095	-14	362152	3075057
	GH-007	860	-600	362080	3074878
	GH-008	860	-5,600	362080	3073354
	GH-009	2,360	-5,700	362538	3073323
	GH-010	2,360	-5,700	362538	3073323
	GH-011	2,360	-5,825	362538	3073285
	GH-012	2,360	-5,825	362538	3073285
	GH-013	2,360	-5,825	362538	3073285
	GH-014	2,360	-5,825	362538	3073285
	GH-015	2,360	-5,700	362538	3073323
Limestone	LSH-001	715	-305	362036	3074968
	LSH-002	1,289	-267	362211	3074980
	LSH-003	1,245	-137	362198	3075019
	LSH-004/005	790	-106	362059	3075029
	LSH-006/007	790	-134	362059	3075020
	LSH-008	790	-159	362059	3075013

Note: UTM coordinates for Unit 3 stack in meters are Zone 17, 361818 E., 3075061 N.

72221

receptor grid was selected to be consistent with the grid used in the FDEP dispersion modeling. An aerial photograph depicting the close-in receptors is provided in Figure 2.

METEOROLOGICAL DATA

EPA dispersion modeling guidance recommends that modeling be conducted using one year of onsite meteorological, if available. Otherwise, the guidance recommends that modeling be conducted using the most recently available five years of meteorological data collected at a nearby observation station. Following this guidance, the selected meteorological data set included St. Petersburg/Clearwater International Airport (SPG) surface observations and mixing heights derived from SPG surface data and Ruskin (RUS) upper air observations. These data were obtained from the National Climatic Data Center (NCDC) for January 1, 1992, through December 31, 1996. Missing data were replaced following EPA guidance. The data were then prepared for use in ISCST3 using the RAMMET preprocessor. These same data were previously used for the Big Bend Station Title V dispersion modeling analysis.

1998

Two other surface weather observation stations were evaluated for possible use in ISCST but were subsequently rejected. Surface data from Tampa International Airport (TPA) are available through 1994. In 1995, the TPA observation station was automated and sky cover observations were terminated. Because sky cover is a required element for ISCST3, the post-1994 TPA data are unsuitable for use. Surface data from McDill Air Force Base is available through 1992. After 1992, surface observations become more sporadic and no longer meet EPA criteria for data recovery. Because SPG appropriate data are available through 1996, SPG surface data were selected for use over TPA and MAC surface data, consistent with EPA guidance.

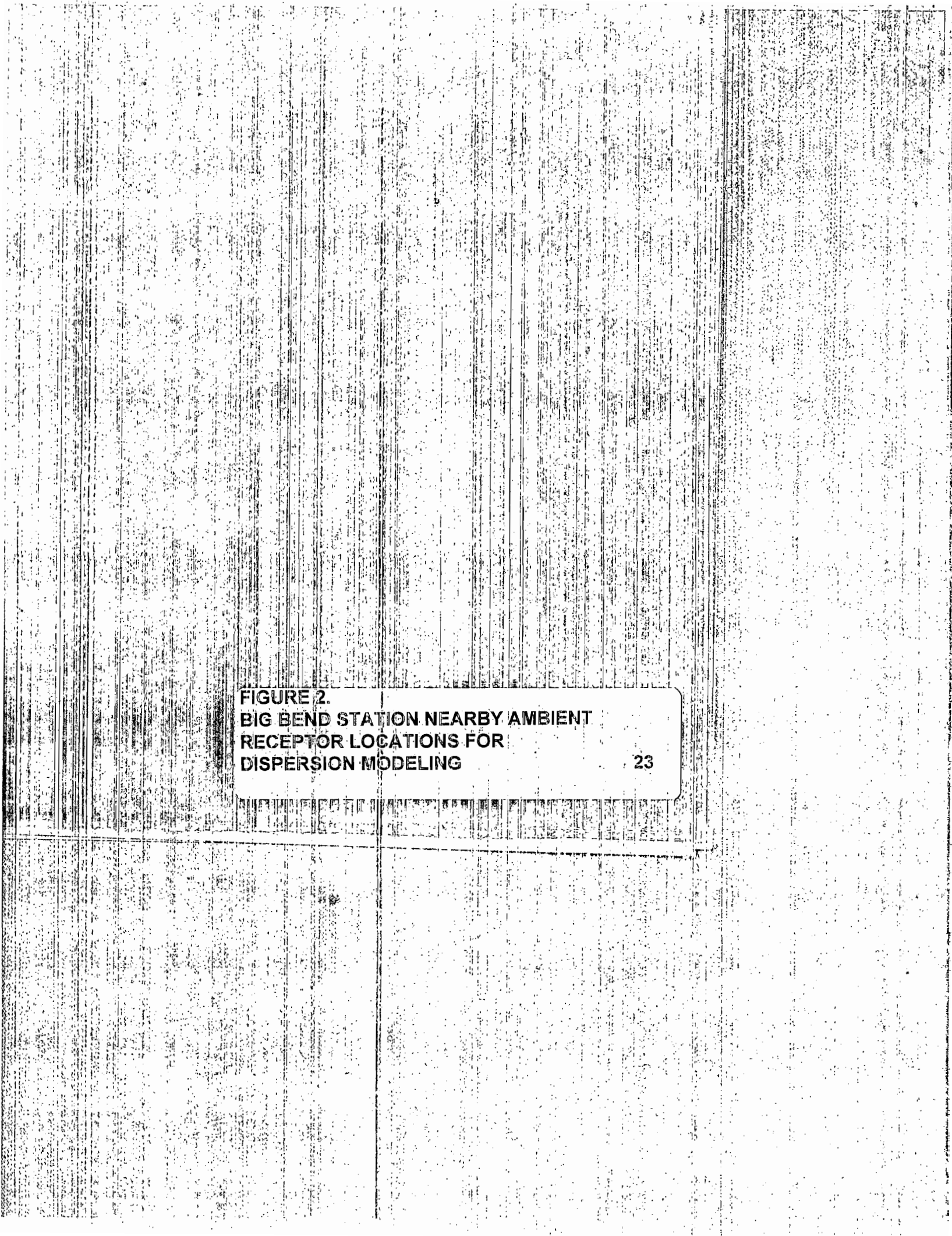
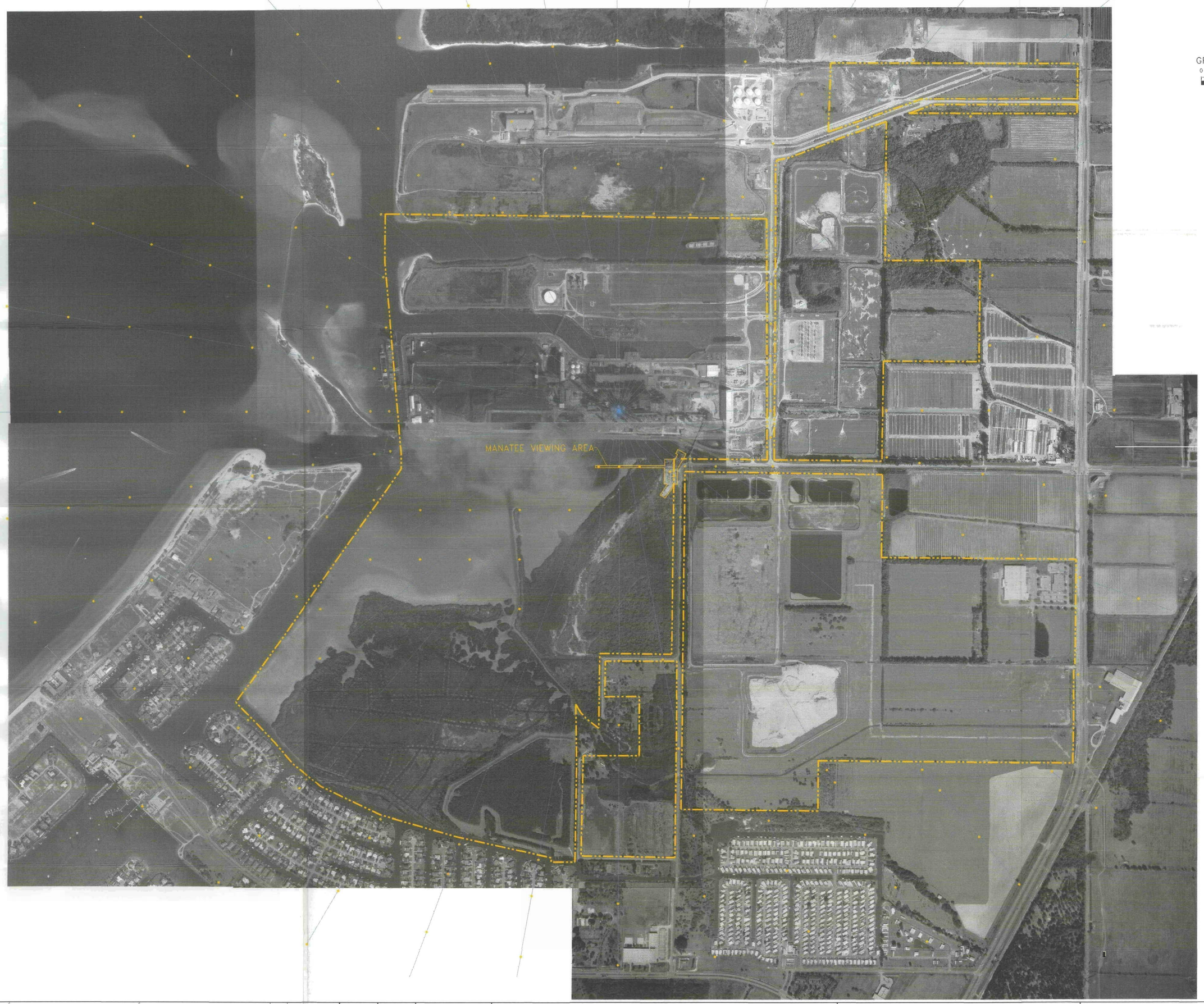


FIGURE 2.
BIG BEND STATION NEARBY AMBIENT
RECEPTOR LOCATIONS FOR
DISPERSION MODELING

05700S7 - 393
Doc#6



GRAPHIC SCALE
0 200 400 800
SCALE IN FEET

NOTE:
1. AERIAL PHOTOGRAPHS TAKEN FEB. 1997 BY GIS/TEC AEROCARTO, INC.

NO.	DATE	REVISION	REVISION	BY	APPROVED

DATE: 08/04/98	DWN: VLC	SCALE: 1"=400'
DATE:	CHK:	PROJECT: 97644-0100
DATE:	APPV:	

TECO
TAMPA ELECTRIC

BIG BEND STATION

1

DISPERSION MODELING RESULTS

The Big Bend Station dispersion modeling results are presented in Tables 13 through 16. During the period January 1, 1992 through December 31, 1996, no modeled exceedances of the national or Florida AAQS were recorded. Supplemental SO_2 dispersion modeling using Big Bend Station and offsite emission sources also demonstrates that Big Bend Station SO_2 emissions do not cause or contribute to any modeled exceedances of the 24-hour Florida AAQS for SO_2. The dispersion model input and output files are provided in electronic format on the enclosed floppy disks.

Table 13. Big Bend Station - Modeled Ambient SO_2 Impacts

Scenario	Averaging Period	Modeled Ambient Impact ($\mu g/m^3$)					Ambient Air Quality Standard ($\mu g/m^3$)	
		1992	1993	1994	1995	1996	National	Florida
Scenario 1	Annual	13.1	14.4	14.0	12.8	13.5	80	60
	H24	246.9	259.1	296.3	189.1	298.1	None	None
	H2H24[*1]	210.6	206.0	202.3	185.5	230.5	365	260
	H3	699.8	717.5	596.7	942.7	849.2	None	None
	H2H3	583.6	584.5	526.6	553.4	595.3	1,300	1,300
Scenario 2	Annual	15.2	12.2	15.9	14.9	13.9	80	60
	H24	238.9	268.7	289.4	206.7	320.7	None	None
	H2H24[*2]	205.2	188.0	217.3	202.5	226.5	365	260
	H3	568.5	582.6	569.0	872.5	873.7	None	None
	H2H3	566.8	518.5	557.1	559.2	569.8	1,300	1,300
Scenario 3	Annual	10.1	11.3	10.5	10.1	9.3	80	60
	H24	163.4	183.9	210.9	142.4	221.2	None	None
	H2H24	147.3	134.7	155.5	141.7	162.2	365	260
	H3	448.4	472.4	424.0	803.0	585.0	None	None
	H2H3	392.5	381.3	407.7	411.7	421.0	1,300	1,300
Scenario 4	Annual	15.2	11.3	15.7	15.1	13.8	80	60
	H24	226.6	251.7	265.4	206.8	294.5	None	None
	H2H24[*3]	204.0	191.0	214.0	198.0	225.3	365	260
	H3	585.5	538.1	540.1	866.4	766.9	None	None
	H2H3	510.4	526.3	518.8	536.0	556.8	1,300	1,300

Notes: H24 = Highest 24-hour average.
H2H24 = Highest second-highest 24-hour average.
H3 = Highest 3-hour average.
H2H3 = Highest second-highest 3-hour average.

Table 13. Big Bend Station - Modeled Ambient SO_2 Impacts (Continued, Page 2 of 2)

---

[1]Includes Big Bend Station emission sources only. Additional dispersion modeling using Big Bend Station and off-site emission sources demonstrates the highest second-highest 24-hour modeled ambient SO_2 average to which Big Bend Station makes a significant (>5.0 $\mu g/m^3$)contribution is 246.4 $\mu g/m^3$, with one exception. This exception is a modeled exceedence in 1994 caused by emissions from F.J. Gannon Station to which emissions from Big bend Station make a small but significant contribution. This modeled exceedence will be eliminated by the SO_2 compliance plan being developed as part of the Title V Air Operation Permit for F.J. Gannon Station.

[2]Includes Big Bend Station emission sources only. Additional dispersion modeling using Big Bend Station and off-site emission sources demonstrates the highest second-highest 24-hour modeled ambient SO_2 average to which Big Bend Station makes a significant (>5.0 $\mu g/m^3$)contribution is 246.6 $\mu g/m^3$, with one exception. This exception is a modeled exceedence in 1994 caused by emissions from F.J. Gannon Station to which emissions from Big bend Station make a small but significant contribution. This modeled exceedence will be eliminated by the SO_2 compliance plan being developed as part of the Title V Air Operation Permit for F.J. Gannon Station.

[3]Includes Big Bend Station emission sources only. Additional dispersion modeling using Big Bend Station and off-site emission sources demonstrates the highest second-highest 24-hour modeled ambient SO_2 average to which Big Bend Station makes a significant (>5.0 $\mu g/m^3$)contribution is less than 246.0 $\mu g/m^3$, with one exception. This exception is a modeled exceedence in 1994 caused by emissions from F.J. Gannon Station to which emissions from Big bend Station make a small but significant contribution. This modeled exceedence will be eliminated by the SO_2 compliance plan being developed as part of the Title V Air Operation Permit for F.J. Gannon Station.

Table 14. Big Bend Station - Modeled Ambient NO_x Impacts

Scenario	Averaging Period	Modeled Ambient Impact ($\mu g/m^3$)					Ambient Air Quality Standard ($\mu g/m^3$)	
		1992	1993	1994	1995	1996	National	Florida
Scenario 1	Annual	10.8	10.9	11.5	10.8	9.8	100	100
Scenario 2	Annual	14.8	10.9	15.2	14.9	13.2	100	100
Scenario 3	Annual	12.3	12.3	12.9	12.3	11.0	100	100
Scenario 4	Annual	16.2	12.3	16.6	16.4	14.4	100	100

Notes: H24 = Highest 24-hour average.
H2H24 = Highest second-highest 24-hour average.
H3 = Highest 3-hour average.
H2H3 = Highest second-highest 3-hour average.

Table 15. Big Bend Station - Modeled Ambient PM_{10} Impacts

Scenario	Averaging Period	Modeled Ambient Impact ($\mu g/m^3$)					Ambient Air Quality Standard ($\mu g/m^3$)	
		1992	1993	1994	1995	1996	National	Florida
Scenario 1	Annual	12.9	14.8	16.6	13.5	14.6	50	50
	H24	120.0	108.4	107.4	81.2	129.3	None	None
	H2H24	64.1	76.6	101.0	59.6	77.1	150	150
Scenario 2	Annual	12.9	14.8	16.6	13.5	14.6	50	50
	H24	120.0	108.4	107.4	81.2	129.3	None	None
	H2H24	64.1	76.7	101.0	59.6	77.1	150	150
Scenario 3	Annual	12.9	14.8	16.6	13.5	14.6	50	50
	H24	120.0	108.4	107.6	81.2	129.3	None	None
	H2H24	64.1	76.9	101.2	59.7	77.1	150	150
Scenario 4	Annual	12.9	14.8	16.6	13.5	14.7	50	50
	H24	120.0	108.4	107.6	81.2	129.3	None	None
	H2H24	64.1	76.9	101.2	59.8	77.1	150	150

Notes: H24 = Highest 24-hour average.
H2H24 = Highest second-highest 24-hour average.
H3 = Highest 3-hour average.
H2H3 = Highest second-highest 3-hour average.

Table 16. Big Bend Station - Modeled Ambient CO Impacts

Scenario	Averaging Period	Modeled Ambient Impact ($\mu g/m^3$)					Ambient Air Quality Standard ($\mu g/m^3$)	
		1992	1993	1994	1995	1996	National	Florida
Scenario 1	H8	9.8	9.4	10.1	9.3	8.3	None	None
	H2H8	7.5	8.9	7.7	7.6	6.8	10,000	10,000
	H1	30.4	30.1	30.0	31.0	31.1	None	None
	H2H1	29.3	29.7	27.7	27.3	30.4	40,000	40,000
Scenario 2	H8	10.2	9.4	10.1	9.3	8.3	None	None
	H2H8	8.1	8.9	7.9	8.3	6.8	10,000	10,000
	H1	30.4	30.1	30.0	31.0	31.1	None	None
	H2H1	29.3	29.7	27.7	27.3	30.4	40,000	40,000
Scenario 3	H8	11.3	10.5	10.8	10.2	10.3	None	None
	H2H8	8.6	9.5	8.8	9.1	8.1	10,000	10,000
	H1	34.4	35.2	34.4	36.5	35.7	None	None
	H2H1	30.5	33.9	32.3	32.0	34.4	40,000	40,000
Scenario 4	H8	11.8	10.5	10.8	10.1	10.3	None	None
	H2H8	9.4	9.5	9.3	9.8	8.1	10,000	10,000
	H1	34.4	34.2	34.7	36.5	35.7	None	None
	H2H1	30.5	33.9	32.3	32.0	34.4	40,000	40,000

Notes: H24 = Highest 24-hour average.
H2H24 = Highest second-highest 24-hour average.
H3 = Highest 3-hour average.
H2H3 = Highest second-highest 3-hour average.

APPENDIX

EMISSION CALCULATIONS

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station | **CS-001a**

EMISSION SOURCE TYPE

COAL COMBUSTION - CRITERIA POLLUTANTS | **Figure:**

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	Unit No. 1, Pulverized Fuel - Wet Bottom
Emission Control Method(s)/ID No.(s):	Electrostatic Precipitator (ESP), Flue Gas Conditioning
Emission Point ID:	CS-001a

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Heat Input (MMBtu/hr) x Pollutant Emission Rate (lb/MMBtu)

Emission (tpy) = Heat Input (MMBtu/hr) x Pollutant Emission rate (lb/MMBtu) x Operating Period (hr/yr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: 24 Hrs/Day | 7 Days/Wk | 8,760 Hrs/Yr

Criteria Pollutant	Maximum Heat Input (MMBtu/hr)	Pollutant Emission Factor (lb/MMBtu)	Pollutant Emission Rate (lb/hr)	Pollutant Emission Rate (tpy)
SO_2[4]	4,037	6.500	26,240.5	114,933.4
NO_x	4,037	1.545	6,239.0	27,326.8
PM/PM_{10}[1]	4,037	0.300	1,211.1	2,210.3
CO	4,037	0.023	91.8	401.9
VOC[2]	4,037	0.00182	7.3	32.1

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Maximum Heat Input	TEC, 1998.
Emission Factors: SO_2, NO_x, and CO[3]	Table 1.1-3., Section 1.1, AP-42, January 1995.
Emission Factor: PM/PM_{10}	TEC, 1998. Design data.
Emission Factor: VOC[3]	Table 1.1-18., Section 1.1, AP-42, January 1995.

NOTES AND OBSERVATIONS

[1]Annual PM/PM_{10} emission rate based on 0.3 lb/MMBtu for 3 hr/day (soot blowing) and 0.1 lb/MMBtu for 21 hr/day.

[2]VOC emission rate represents non-methane total organic compounds (NMTOC).

[3]Emission factors based on coal heat content of 11,000 Btu/lb.

[4]Emission rate is applicable when Units 1 and 2 FGD system is not in use.

DATA CONTROL

Data Collected by:	T. Davis	Date:	10/31/98
Evaluated by:	T. Davis	Date:	10/31/98
Data Entered by:	T. Davis	Date:	10/31/98
Reviewed by:	G. Nelson	Date:	10/31/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station

CS-001a

EMISSION SOURCE TYPE

COAL COMBUSTION - CRITERIA POLLUTANTS | Figure:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	Unit No. 1, Pulverized Fuel - Wet Bottom
Emission Control Method(s)/ID No.(s):	Electrostatic Precipitator (ESP), Flue Gas Conditioning
Emission Point ID:	CS-001a

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Heat Input (MMBtu/hr) x Pollutant Emission Rate (lb/MMBtu)

Emission (tpy) = Heat Input (MMBtu/hr) x Pollutant Emission rate (lb/MMBtu) x Operating Period (hr/yr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: 24 Hrs/Day | 7 Days/Wk | 8,760 Hrs/Yr

Criteria Pollutant	Maximum Heat Input (MMBtu/hr)	Pollutant Emission Factor (lb/MMBtu)	Pollutant Emission Rate (lb/hr)	Pollutant Emission Rate (tpy)
SO_2[4]	4,037	2.400	9,688.8	42,436.9
NO_x	4,037	1.545	6,239.0	27,326.8
PM/PM_{10}[1]	4,037	0.300	1,211.1	2,210.3
CO	4,037	0.023	91.8	401.9
VOC[2]	4,037	0.00182	7.3	32.1

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Maximum Heat Input	TEC, 1998.
Emission Factors: SO_2, NO_x, and CO[3]	Table 1.1-3., Section 1.1, AP-42, January 1995.
Emission Factor: PM/PM_{10}	TEC, 1998. Design data.
Emission Factor: VOC[3]	Table 1.1-18., Section 1.1, AP-42, January 1995.

NOTES AND OBSERVATIONS

[1]Annual PM/PM_{10} emission rate based on 0.3 lb/MMBtu for 3 hr/day (soot blowing) and 0.1 lb/MMBtu for 21 hr/day.

[2]VOC emission rate represents non-methane total organic compounds (NMTOC).

[3]Emission factors based on coal heat content of 11,000 Btu/lb.

[4]Emission rate is applicable when Units 2 and 4 are scrubbed, and when Units 1 and 3 are not scrubbed.

DATA CONTROL

Data Collected by:	T. Davis	Date:	10/31/98
Evaluated by:	T. Davis	Date:	10/31/98
Data Entered by:	T. Davis	Date:	10/31/98
Reviewed by:	G. Nelson	Date:	10/31/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station

CS-001a

EMISSION SOURCE TYPE

COAL COMBUSTION - CRITERIA POLLUTANTS | Figure:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	Unit No. 1, Pulverized Fuel - Wet Bottom
Emission Control Method(s)/ID No.(s):	Electrostatic Precipitator (ESP), Flue Gas Conditioning
Emission Point ID:	CS-001a

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Heat Input (MMBtu/hr) x Pollutant Emission Rate (lb/MMBtu)

Emission (tpy) = Heat Input (MMBtu/hr) x Pollutant Emission rate (lb/MMBtu) x Operating Period (hr/yr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: 24 Hrs/Day 7 Days/Wk 8,760 Hrs/Yr

Criteria Pollutant	Maximum Heat Input (MMBtu/hr)	Pollutant Emission Factor (lb/MMBtu)	Pollutant Emission Rate (lb/hr)	Pollutant Emission Rate (tpy)
SO_2[4]	4,037	2.900	11,707.3	51,278.0
NO_x	4,037	1.545	6,239.0	27,326.8
PM/PM_{10}[1]	4,037	0.300	1,211.1	2,210.3
CO	4,037	0.023	91.8	401.9
VOC[2]	4,037	0.00182	7.3	32.1

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Maximum Heat Input	TEC, 1998.
Emission Factors: SO_2, NO_x, and CO[3]	Table 1.1-3., Section 1.1, AP-42, January 1995.
Emission Factor: PM/PM_{10}	TEC, 1998. Design data.
Emission Factor: VOC[3]	Table 1.1-18., Section 1.1, AP-42, January 1995.

NOTES AND OBSERVATIONS

[1]Annual PM/PM_{10} emission rate based on 0.3 lb/MMBtu for 3 hr/day (soot blowing) and 0.1 lb/MMBtu for 21 hr/day.

[2]VOC emission rate represents non-methane total organic compounds (NMTOC).

[3]Emission factors based on coal heat content of 11,000 Btu/lb.

[4]Emission rate is applicable when Units 2, 3, and 4 are scrubbed, and when Unit 1 is not scrubbed.

DATA CONTROL

Data Collected by:	T. Davis	Date:	10/31/98
Evaluated by:	T. Davis	Date:	10/31/98
Data Entered by:	T. Davis	Date:	10/31/98
Reviewed by:	G. Nelson	Date:	10/31/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station

CS-001b

EMISSION SOURCE TYPE

COAL COMBUSTION - CRITERIA POLLUTANTS

Figure:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	Unit No. 1, Pulverized Fuel - Wet Bottom
Emission Control Method(s)/ID No.(s):	Electrostatic Precipitator (ESP), Flue Gas Desulfurization (FGD)
Emission Point ID:	CS-001b

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Heat Input (MMBtu/hr) x Pollutant Emission Rate (lb/MMBtu)

Emission (tpy) = Heat Input (MMBtu/hr) x Pollutant Emission rate (lb/MMBtu) x Operating Period (hr/yr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: 24 Hrs/Day 7 Days/Wk 8,760 Hrs/Yr

Criteria Pollutant	Maximum Heat Input (MMBtu/hr)	Pollutant Emission Factor (lb/MMBtu)	Pollutant Emission Rate (lb/hr)	Pollutant Emission Rate (tpy)
SO_2[4]	4,037	0.82	3,310.3	14,499.3
NO_x	4,037	1.545	6,239.0	27,326.8
PM/PM_{10}[1]	4,037	0.300	1,211.1	2,210.3
CO	4,037	0.023	91.8	401.9
VOC[2]	4,037	0.00182	7.3	32.1

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Maximum Heat Input	TEC, 1998.
Emission Factors: NO_x and CO[3]	Table 1.1-3., Section 1.1, AP-42, January 1995.
Emission Factor: SO_2	TEC, 1998. Design data.
Emission Factor: PM/PM_{10}	TEC, 1998. Design data.
Emission Factor: VOC[3]	Table 1.1-18., Section 1.1, AP-42, January 1995.

NOTES AND OBSERVATIONS

[1]Annual PM/PM_{10} emission rate based on 0.3 lb/MMBtu for 3 hr/day (soot blowing) and 0.1 lb/MMBtu for 21 hr/day.

[2]VOC emission rate represents non-methane total organic compounds (NMTOC).

[3]Emission factors based on coal heat content of 11,000 Btu/lb.

[4]Emission rate is applicable when Units 1 and 2 FGD system is in use.

DATA CONTROL

Data Collected by:	T. Davis	Date:	10/31/98
Evaluated by:	T. Davis	Date:	10/31/98
Data Entered by:	T. Davis	Date:	10/31/98
Reviewed by:	G. Nelson	Date:	10/31/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station

CS-001a

EMISSION SOURCE TYPE

COAL COMBUSTION - CRITERIA POLLUTANTS | Figure:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	Unit No. 2, Pulverized Fuel - Wet Bottom
Emission Control Method(s)/ID No.(s):	Electrostatic Precipitator (ESP), Flue Gas Conditioning+C34
Emission Point ID:	CS-001a

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Heat Input (MMBtu/hr) x Pollutant Emission Rate (lb/MMBtu)

Emission (tpy) = Heat Input (MMBtu/hr) x Pollutant Emission rate (lb/MMBtu) x Operating Period (hr/yr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: 24 Hrs/Day | 7 Days/Wk | 8,760 Hrs/Yr

Criteria Pollutant	Maximum Heat Input (MMBtu/hr)	Pollutant Emission Factor (lb/MMBtu)	Pollutant Emission Rate (lb/hr)	Pollutant Emission Rate (tpy)
SO_2[4]	3,996	6.500	25,974.0	113,766.1
NO_x	3,996	1.545	6,175.6	27,049.3
PM/PM_{10}[1]	3,996	0.300	1,198.8	2,187.8
CO	3,996	0.023	90.8	397.8
VOC[2]	3,996	0.00182	7.3	31.8

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Maximum Heat Input	TEC, 1998.
Emission Factors: SO_2, NO_x, and CO[3]	Table 1.1-3., Section 1.1, AP-42, January 1995.
Emission Factor: PM/PM_{10}	TEC, 1998. Design data.
Emission Factor: VOC[3]	Table 1.1-18., Section 1.1, AP-42, January 1995.

NOTES AND OBSERVATIONS

[1]Annual PM/PM_{10} emission rate based on 0.3 lb/MMBtu for 3 hr/day (soot blowing) and 0.1 lb/MMBtu for 21 hr/day.

[2]VOC emission rate represents non-methane total organic compounds (NMTOC).

[3]Emission factors based on coal heat content of 11,000 Btu/lb.

[4]Emission rate is applicable when Units 1 and 2 FGD system is not in use.

DATA CONTROL

Data Collected by:	T. Davis	Date:	10/31/98
Evaluated by:	T. Davis	Date:	10/31/98
Data Entered by:	T. Davis	Date:	10/31/98
Reviewed by:	G. Nelson	Date:	10/31/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station | **CS-001a**

EMISSION SOURCE TYPE

COAL COMBUSTION - CRITERIA POLLUTANTS | **Figure:**

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	**Unit No. 2, Pulverized Fuel - Wet Bottom**
Emission Control Method(s)/ID No.(s):	**Electrostatic Precipitator (ESP), Flue Gas Conditioning+C34**
Emission Point ID:	**CS-001a**

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Heat Input (MMBtu/hr) x Pollutant Emission Rate (lb/MMBtu)

Emission (tpy) = Heat Input (MMBtu/hr) x Pollutant Emission rate (lb/MMBtu) x Operating Period (hr/yr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: **24 Hrs/Day** **7 Days/Wk** **8,760 Hrs/Yr**

Criteria Pollutant	Maximum Heat Input (MMBtu/hr)	Pollutant Emission Factor (lb/MMBtu)	Pollutant Emission Rate (lb/hr)	Pollutant Emission Rate (tpy)
SO_2[4]	3,996	2.400	9,590.4	42,006.0
NO_x	3,996	1.545	6,175.6	27,049.3
PM/PM_{10}[1]	3,996	0.300	1,198.8	2,187.8
CO	3,996	0.023	90.8	397.8
VOC[2]	3,996	0.00182	7.3	31.8

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Maximum Heat Input	TEC, 1998.
Emission Factors: SO_2, NO_x, and CO[3]	Table 1.1-3., Section 1.1, AP-42, January 1995.
Emission Factor: PM/PM_{10}	TEC, 1998. Design data.
Emission Factor: VOC[3]	Table 1.1-18., Section 1.1, AP-42, January 1995.

NOTES AND OBSERVATIONS

[1]Annual PM/PM_{10} emission rate based on 0.3 lb/MMBtu for 3 hr/day (soot blowing) and 0.1 lb/MMBtu for 21 hr/day.

[2]VOC emission rate represents non-methane total organic compounds (NMTOC).

[3]Emission factors based on coal heat content of 11,000 Btu/lb.

[4]Emission rate is applicable when Units 1 and 4 are scrubbed, and when Units 2 and 3 are not scrubbed.

DATA CONTROL

Data Collected by:	**T. Davis**	**Date:**	**10/31/98**
Evaluated by:	**T. Davis**	**Date:**	**10/31/98**
Data Entered by:	**T. Davis**	**Date:**	**10/31/98**
Reviewed by:	**G. Nelson**	**Date:**	**10/31/98**

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station

CS-001a

EMISSION SOURCE TYPE

COAL COMBUSTION - CRITERIA POLLUTANTS | Figure:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	Unit No. 2, Pulverized Fuel - Wet Bottom
Emission Control Method(s)/ID No.(s):	Electrostatic Precipitator (ESP), Flue Gas Conditioning+C34
Emission Point ID:	CS-001a

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Heat Input (MMBtu/hr) x Pollutant Emission Rate (lb/MMBtu)

Emission (tpy) = Heat Input (MMBtu/hr) x Pollutant Emission rate (lb/MMBtu) x Operating Period (hr/yr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: 24 Hrs/Day 7 Days/Wk 8,760 Hrs/Yr

Criteria Pollutant	Maximum Heat Input (MMBtu/hr)	Pollutant Emission Factor (lb/MMBtu)	Pollutant Emission Rate (lb/hr)	Pollutant Emission Rate (tpy)
SO_2[4]	3,996	2.900	11,588.4	50,757.2
NO_x	3,996	1.545	6,175.6	27,049.3
PM/PM_{10}[1]	3,996	0.300	1,198.8	2,187.8
CO	3,996	0.023	90.8	397.8
VOC[2]	3,996	0.00182	7.3	31.8

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Maximum Heat Input	TEC, 1998.
Emission Factors: SO_2, NO_x, and CO[3]	Table 1.1-3., Section 1.1, AP-42, January 1995.
Emission Factor: PM/PM_{10}	TEC, 1998. Design data.
Emission Factor: VOC[3]	Table 1.1-18., Section 1.1, AP-42, January 1995.

NOTES AND OBSERVATIONS

[1]Annual PM/PM_{10} emission rate based on 0.3 lb/MMBtu for 3 hr/day (soot blowing) and 0.1 lb/MMBtu for 21 hr/day.

[2]VOC emission rate represents non-methane total organic compounds (NMTOC).

[3]Emission factors based on coal heat content of 11,000 Btu/lb.

[4]Emission rate is applicable when Units 1, 3, and 4 are scrubbed, and when Unit 2 is not scrubbed.

DATA CONTROL

Data Collected by:	T. Davis	Date:	10/31/98
Evaluated by:	T. Davis	Date:	10/31/98
Data Entered by:	T. Davis	Date:	10/31/98
Reviewed by:	G. Nelson	Date:	10/31/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station | **CS-001b**

EMISSION SOURCE TYPE

COAL COMBUSTION - CRITERIA POLLUTANTS | **Figure:**

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	Unit No. 2, Pulverized Fuel - Wet Bottom
Emission Control Method(s)/ID No.(s):	Electrostatic Precipitator (ESP), Flue Gas Desulfurization (FGD)
Emission Point ID:	CS-001b

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Heat Input (MMBtu/hr) x Pollutant Emission Rate (lb/MMBtu)

Emission (tpy) = Heat Input (MMBtu/hr) x Pollutant Emission rate (lb/MMBtu) x Operating Period (hr/yr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: 24 Hrs/Day 7 Days/Wk 8,760 Hrs/Yr

Criteria Pollutant	Maximum Heat Input (MMBtu/hr)	Pollutant Emission Factor (lb/MMBtu)	Pollutant Emission Rate (lb/hr)	Pollutant Emission Rate (tpy)
SO_2[4]	3,996	0.82	3,276.7	14,352.0
NO_x	3,996	1.545	6,175.6	27,049.3
PM/PM_{10}[1]	3,996	0.300	1,198.8	2,187.8
CO	3,996	0.023	90.8	397.8
VOC[2]	3,996	0.00182	7.3	31.8

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Maximum Heat Input	TEC, 1998.
Emission Factors: NO_x and CO[3]	Table 1.1-3., Section 1.1, AP-42, January 1995.
Emission Factor: SO_2	TEC, 1998. Design data.
Emission Factor: PM/PM_{10}	TEC, 1998. Design data.
Emission Factor: VOC[3]	Table 1.1-18., Section 1.1, AP-42, January 1995.

NOTES AND OBSERVATIONS

[1]Annual PM/PM_{10} emission rate based on 0.3 lb/MMBtu for 3 hr/day (soot blowing) and 0.1 lb/MMBtu for 21 hr/day.

[2]VOC emission rate represents non-methane total organic compounds (NMTOC).

[3]Emission factors based on coal heat content of 11,000 Btu/lb.

[4]Emission rate is applicable when Units 1 and 2 FGD system is in use.

DATA CONTROL

Data Collected by:	T. Davis	Date:	10/31/98
Evaluated by:	T. Davis	Date:	10/31/98
Data Entered by:	T. Davis	Date:	10/31/98
Reviewed by:	G. Nelson	Date:	10/31/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station | **LSH-001**

EMISSION SOURCE TYPE

MATERIAL TRANSFER - CONTROLLED EMISSION SOURCES | **Figure:**

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	**Limestone Handling - Railcar/Truck Unloading**
Emission Control Method(s)/ID No.(s):	**Baghouse**
Emission Point ID:	**LSH-001**

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Flow Rate (scfm) x (1 lb/7,000 grain) x (60 min/hr)

Emission (tpy) = Flow Rate (scfm) x 1 lb/7,000 grain) x (60 min/hr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: **24 Hrs/Day** **7 Days/Wk** **8,760 Hrs/Yr**

Transfer Points Controlled By Common Control Device	Transfer Point ID No.	Exhaust Flow Rate (scfm)	Exit Grain Loading (gr/scf)	Potential PM/PM_{10} Emission Rates (lb/hr)	Potential PM/PM_{10} Emission Rates (tpy)
Railcar/Truck Unloading to Hoppers	LS-T1	33,600	0.002	0.58	2.52
West Hopper to Conveyor LA1	LS-T2				
East Hopper to Conveyor LA2	LS-T3				
Conveyors LA1 and LA2 to Conveyor LA	LS-T4				

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Exhaust Flow Rate	TEC, 1998.
Exit Grain Loading	ECT, 1998. Estimate based on high moisture content of limestone.

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	**A. Trbovich**	**Date:**	**5/19/98**
Evaluated by:	**A. Trbovich**	**Date:**	**5/19/98**
Data Entered by:	**A. Trbovich**	**Date:**	**5/19/98**
Reviewed by:	**G. Nelson**	**Date:**	**6/12/98**

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station | **LSH-002**

EMISSION SOURCE TYPE

MATERIAL TRANSFER - CONTROLLED EMISSION SOURCES | **Figure:**

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	**Limestone Handling - Conveyor LB to Conveyor LC**
Emission Control Method(s)/ID No.(s):	**Baghouse**
Emission Point ID:	**LSH-002**

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Flow Rate (scfm) x (1 lb/7,000 grain) x (60 min/hr)

Emission (tpy) = Flow Rate (scfm) x 1 lb/7,000 grain) x (60 min/hr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: **24 Hrs/Day** **7 Days/Wk** **8,760 Hrs/Yr**

Transfer Points Controlled By Common Control Device	Transfer Point ID No.	Exhaust Flow Rate (scfm)	Exit Grain Loading (gr/scf)	Potential PM/PM_{10} Emission Rates (lb/hr)	Potential PM/PM_{10} Emission Rates (tpy)
Conveyor LB to Conveyor LC	LS-T5	800	0.002	0.01	0.06
(two pickup points on drop)					

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Exhaust Flow Rate	TEC, 1998.
Exit Grain Loading	ECT, 1998. Estimate based on high moisture content of limestone.

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	**A. Trbovich**	**Date:**	**5/19/98**
Evaluated by:	**A. Trbovich**	**Date:**	**5/19/98**
Data Entered by:	**A. Trbovich**	**Date:**	**5/19/98**
Reviewed by:	**G. Nelson**	**Date:**	**6/12/98**

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station | **LSH-003**

EMISSION SOURCE TYPE

MATERIAL TRANSFER - CONTROLLED EMISSION SOURCES | **Figure:**

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	**Limestone Handling - Conveyor LD to Conveyor LE**
Emission Control Method(s)/ID No.(s):	**Baghouse**
Emission Point ID:	**LSH-003**

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Flow Rate (scfm) x (1 lb/7,000 grain) x (60 min/hr)

Emission (tpy) = Flow Rate (scfm) x 1 lb/7,000 grain) x (60 min/hr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: **24 Hrs/Day** **7 Days/Wk** **8,760 Hrs/Yr**

Transfer Points Controlled By Common Control Device	Transfer Point ID No.	Exhaust Flow Rate (scfm)	Exit Grain Loading (gr/scf)	Potential PM/PM_{10} Emission Rates (lb/hr)	Potential PM/PM_{10} Emission Rates (tpy)
Conveyor LD to Conveyor LE	LS-T8	800	0.002	0.01	0.06
(two pickup points on drop)					

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Exhaust Flow Rate	TEC, 1998.
Exit Grain Loading	ECT, 1998. Estimate based on high moisture content of limestone.

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	**A. Trbovich**	**Date:**	**5/19/98**
Evaluated by:	**A. Trbovich**	**Date:**	**5/19/98**
Data Entered by:	**A. Trbovich**	**Date:**	**5/19/98**
Reviewed by:	**G. Nelson**	**Date:**	**6/12/98**

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station

LSH-004
LSH-005

EMISSION SOURCE TYPE

MATERIAL TRANSFER - CONTROLLED EMISSION SOURCES | **Figure:**

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	**Limestone Handling - Conveyor LE to Conveyor LF and Silo A**
Emission Control Method(s)/ID No.(s):	**Baghouse**
Emission Point ID:	**LSH-004, 005**

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Flow Rate (scfm) x (1 lb/7,000 grain) x (60 min/hr)

Emission (tpy) = Flow Rate (scfm) x 1 lb/7,000 grain) x (60 min/hr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: **24 Hrs/Day** **7 Days/Wk** **8,760 Hrs/Yr**

Transfer Points Controlled By Common Control Device	Transfer Point ID No.	Exhaust Flow Rate (scfm)	Exit Grain Loading (gr/scf)	Potential PM/PM_{10} Emission Rates (lb/hr)	Potential PM/PM_{10} Emission Rates (tpy)
Conveyor LE to Conveyor LF	LS-T9	1,104	0.002	0.02	0.08
Conveyor LF to Silo A	LS-T10				

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Exhaust Flow Rate	TEC, 1998.
Exit Grain Loading	ECT, 1998. Estimate based on high moisture content of limestone.

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	**A. Trbovich**	**Date:**	**5/19/98**
Evaluated by:	**A. Trbovich**	**Date:**	**5/19/98**
Data Entered by:	**A. Trbovich**	**Date:**	**5/19/98**
Reviewed by:	**G. Nelson**	**Date:**	**6/12/98**

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station

LSH-006
LSH-007

EMISSION SOURCE TYPE

MATERIAL TRANSFER - CONTROLLED EMISSION SOURCES | **Figure:**

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	**Limestone Handling - Conveyor LF to Conveyor LG and Silo B**
Emission Control Method(s)/ID No.(s):	**Baghouse**
Emission Point ID:	**LSH-006, 007**

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Flow Rate (scfm) x (1 lb/7,000 grain) x (60 min/hr)

Emission (tpy) = Flow Rate (scfm) x 1 lb/7,000 grain) x (60 min/hr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: **24 Hrs/Day** **7 Days/Wk** **8,760 Hrs/Yr**

Transfer Points Controlled By Common Control Device	Transfer Point ID No.	Exhaust Flow Rate (scfm)	Exit Grain Loading (gr/scf)	Potential PM/PM_{10} Emission Rates (lb/hr)	Potential PM/PM_{10} Emission Rates (tpy)
Conveyor LF to Conveyor LG	LS-T11	1,104	0.002	0.02	0.08
Conveyor LF to Silo B	LS-T12				

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Exhaust Flow Rate	TEC, 1998.
Exit Grain Loading	ECT, 1998. Estimate based on high moisture content of limestone.

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	**A. Trbovich**	**Date:**	**5/19/98**
Evaluated by:	**A. Trbovich**	**Date:**	**5/19/98**
Data Entered by:	**A. Trbovich**	**Date:**	**5/19/98**
Reviewed by:	**G. Nelson**	**Date:**	**6/12/98**

EMISSION INVENTORY WORKSHEET

Tampa Electric Company - Big Bend Station | **LSH-008**

EMISSION SOURCE TYPE

MATERIAL TRANSFER - CONTROLLED EMISSION SOURCES | **Figure:**

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	**Limestone Handling - Conveyor LG to Silo C**
Emission Control Method(s)/ID No.(s):	**Baghouse**
Emission Point ID:	**LSH-008**

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = Flow Rate (scfm) x (1 lb/7,000 grain) x (60 min/hr)

Emission (tpy) = Flow Rate (scfm) x 1 lb/7,000 grain) x (60 min/hr) x (1 ton/2,000 lb)

Source: ECT, 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Operating Hours: **24 Hrs/Day** **7 Days/Wk** **8,760 Hrs/Yr**

Transfer Points Controlled By Common Control Device	Transfer Point ID No.	Exhaust Flow Rate (scfm)	Exit Grain Loading (gr/scf)	Potential PM/PM_{10} Emission Rates (lb/hr)	Potential PM/PM_{10} Emission Rates (tpy)
Conveyor LG to Silo C	LS-T13	300	0.002	0.01	0.02

SOURCES OF INPUT DATA

Variable	Data Source
Operating Hours	TEC, 1998.
Exhaust Flow Rate	REC, 1998.
Exit Grain Loading	ECT, 1998. Estimate based on high moisture content of limestone.

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	**A. Trbovich**	**Date:**	**5/25/98**
Evaluated by:	**A. Trbovich**	**Date:**	**5/25/98**
Data Entered by:	**A. Trbovich**	**Date:**	**5/25/98**
Reviewed by:	**G. Nelson**	**Date:**	**6/12/98**

EMISSION INVENTORY WORKSHEET

Tampa Electric Company – Big Bend Station

GH–001

EMISSION SOURCE TYPE

MATERIAL TRANSFER – FUGITIVE EMISSION SOURCES

Project:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description: Gypsum Handling – Stacker Conveyor to North Stackout Pile

Emission Control Method(s)/ID No.(s): None

Emission Point ID: GH–001

Transfer Point ID(s):

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = 0.0011 x material transferred (ton/hr) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100)

Emission (tpy) = 0.0011 x material transferred (tpy) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100) x (1/2000)

Source: Section 13.2.4 – Aggregate Handling and Storage Piles, AP–42, Fifth Edition, January 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Mean Wind Speed (mph)	Actual Quantity Transferred (ton/hr)	Actual Quantity Transferred (ton/yr)	Material Moisture Content (pct)	Control Efficiency (pct)	Actual PM_{10} Emission Rates (lb/hr)	Actual PM_{10} Emission Rates (tpy)
8.6	160	1,353,000	10.0	0.0	0.04	0.16

SOURCES OF INPUT DATA

Parameter	Data Source
Mean Wind Speed	Tampa, FL, Climate of the States, Third Edition, 1985.
Actual Quantity Transferred	TEC, 1998.
Material Moisture Content	Average gypsum moisture content; TEC, 1998.
Control Efficiency	N/A

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	A. Angelopulos	Date:	04/02/98
Evaluated by:	A. Trbovich	Date:	04/09/98
Data Entered by:	A. Trbovich	Date:	04/09/98
Reviewed by:	G. Nelson	Date:	06/12/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company – Big Bend Station

GH–004a

EMISSION SOURCE TYPE

MATERIAL TRANSFER – FUGITIVE EMISSION SOURCES

Project:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description: Gypsum Handling – Dozer Transfer from North Stackout Pile to Loadout Conveyor

Emission Control Method(s)/ID No.(s): None

Emission Point ID: GH–004a

Transfer Point ID(s):

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = 0.0011 x material transferred (ton/hr) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100)

Emission (tpy) = 0.0011 x material transferred (tpy) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100) x (1/2000)

Source: Section 13.2.4 – Aggregate Handling and Storage Piles, AP–42, Fifth Edition, January 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Mean Wind Speed (mph)	Actual Quantity Transferred (ton/hr)	Actual Quantity Transferred (ton/yr)	Material Moisture Content (pct)	Control Efficiency (pct)	Actual PM_{10} Emission Rates (lb/hr)	Actual PM_{10} Emission Rates (tpy)
8.6	160	1,353,000	10.0	0.0	0.04	0.16

SOURCES OF INPUT DATA

Parameter	Data Source
Mean Wind Speed	Tampa, FL, Climate of the States, Third Edition, 1985.
Actual Quantity Transferred	TEC, 1998.
Material Moisture Content	Average gypsum moisture content; TEC, 1998.
Control Efficiency	N/A

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	A. Angelopulos	Date:	04/02/98
Evaluated by:	A. Trbovich	Date:	04/09/98
Data Entered by:	A. Trbovich	Date:	04/09/98
Reviewed by:	G. Nelson	Date:	06/12/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company – Big Bend Station

GH–004b

EMISSION SOURCE TYPE

MATERIAL TRANSFER – FUGITIVE EMISSION SOURCES

Project:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description: Gypsum Handling – Dozer Transfer from Loadout Conveyor to Truck

Emission Control Method(s)/ID No.(s): None

Emission Point ID: GH–004b

Transfer Point ID(s):

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = 0.0011 x material transferred (ton/hr) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100)

Emission (tpy) = 0.0011 x material transferred (tpy) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100) x (1/2000)

Source: Section 13.2.4 – Aggregate Handling and Storage Piles, AP–42, Fifth Edition, January 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Mean Wind Speed (mph)	Actual Quantity Transferred (ton/hr)	Actual Quantity Transferred (ton/yr)	Material Moisture Content (pct)	Control Efficiency (pct)	Actual PM_{10} Emission Rates (lb/hr)	Actual PM_{10} Emission Rates (tpy)
8.6	160	1,353,000	10.0	0.0	0.04	0.16

SOURCES OF INPUT DATA

Parameter	Data Source
Mean Wind Speed	Tampa, FL, Climate of the States, Third Edition, 1985.
Actual Quantity Transferred	TEC, 1998.
Material Moisture Content	Average gypsum moisture content; TEC, 1998.
Control Efficiency	N/A

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	A. Angelopulos	Date:	04/02/98
Evaluated by:	A. Trbovich	Date:	04/09/98
Data Entered by:	A. Trbovich	Date:	04/09/98
Reviewed by:	G. Nelson	Date:	06/12/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company – Big Bend Station

GH–007

EMISSION SOURCE TYPE

MATERIAL TRANSFER – FUGITIVE EMISSION SOURCES

Project:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description: Gypsum Handling – Conveyor GD to Conveyor GE

Emission Control Method(s)/ID No.(s): Enclosure

Emission Point ID: GH–007

Transfer Point ID(s):

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = 0.0011 x material transferred (ton/hr) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100)

Emission (tpy) = 0.0011 x material transferred (tpy) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100) x (1/2000)

Source: Section 13.2.4 – Aggregate Handling and Storage Piles, AP–42, Fifth Edition, January 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Mean Wind Speed	Actual Quantity Transferred		Material Moisture Content	Control Efficiency	Actual PM_{10} Emission Rates	
(mph)	(ton/hr)	(ton/yr)	(pct)	(pct)	(lb/hr)	(tpy)
8.6	160	1,353,000	10.0	90.0	<0.01	0.02

SOURCES OF INPUT DATA

Parameter	Data Source
Mean Wind Speed	Tampa, FL, Climate of the States, Third Edition, 1985.
Actual Quantity Transferred	TEC, 1998.
Material Moisture Content	Average gypsum moisture content; TEC, 1998.
Control Efficiency	Table 3–16, Fugitive Emissions From Coal–Fired Power Plants, EPRI, June 1984.

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	A. Angelopulos	Date:	04/02/98
Evaluated by:	A. Trbovich	Date:	04/09/98
Data Entered by:	A. Trbovich	Date:	04/09/98
Reviewed by:	G. Nelson	Date:	06/12/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company – Big Bend Station

GH–008

EMISSION SOURCE TYPE

MATERIAL TRANSFER – FUGITIVE EMISSION SOURCES

Project:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description: Gypsum Handling – Conveyor GE to Conveyor GF

Emission Control Method(s)/ID No.(s): Enclosure

Emission Point ID: GH–008

Transfer Point ID(s):

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = 0.0011 x material transferred (ton/hr) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100)

Emission (tpy) = 0.0011 x material transferred (tpy) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100) x (1/2000)

Source: Section 13.2.4 – Aggregate Handling and Storage Piles, AP–42, Fifth Edition, January 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Mean Wind Speed (mph)	Actual Quantity Transferred (ton/hr)	Actual Quantity Transferred (ton/yr)	Material Moisture Content (pct)	Control Efficiency (pct)	Actual PM_{10} Emission Rates (lb/hr)	Actual PM_{10} Emission Rates (tpy)
8.6	160	1,353,000	10.0	90.0	<0.01	0.02

SOURCES OF INPUT DATA

Parameter	Data Source
Mean Wind Speed	Tampa, FL, Climate of the States, Third Edition, 1985.
Actual Quantity Transferred	TEC, 1998.
Material Moisture Content	Average gypsum moisture content; TEC, 1998.
Control Efficiency	Table 3–16, Fugitive Emissions From Coal–Fired Power Plants, EPRI, June 1984.

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	A. Angelopulos	Date:	04/02/98
Evaluated by:	A. Trbovich	Date:	04/09/98
Data Entered by:	A. Trbovich	Date:	04/09/98
Reviewed by:	G. Nelson	Date:	06/12/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company – Big Bend Station

GH–009

EMISSION SOURCE TYPE

MATERIAL TRANSFER – FUGITIVE EMISSION SOURCES

Project:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description: Gypsum Handling – Conveyor GF to Radial Stacker

Emission Control Method(s)/ID No.(s): Enclosure

Emission Point ID: GH–009

Transfer Point ID(s):

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = 0.0011 x material transferred (ton/hr) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100)

Emission (tpy) = 0.0011 x material transferred (tpy) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100) x (1/2000)

Source: Section 13.2.4 – Aggregate Handling and Storage Piles, AP–42, Fifth Edition, January 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Mean Wind Speed (mph)	Actual Quantity Transferred (ton/hr)	Actual Quantity Transferred (ton/yr)	Material Moisture Content (pct)	Control Efficiency (pct)	Actual PM_{10} Emission Rates (lb/hr)	Actual PM_{10} Emission Rates (tpy)
8.6	160	1,353,000	10.0	90.0	<0.01	0.02

SOURCES OF INPUT DATA

Parameter	Data Source
Mean Wind Speed	Tampa, FL, Climate of the States, Third Edition, 1985.
Actual Quantity Transferred	TEC, 1998.
Material Moisture Content	Average gypsum moisture content; TEC, 1998.
Control Efficiency	Table 3–16, Fugitive Emissions From Coal–Fired Power Plants, EPRI, June 1984.

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	A. Angelopulos	Date:	04/02/98
Evaluated by:	A. Trbovich	Date:	04/09/98
Data Entered by:	A. Trbovich	Date:	04/09/98
Reviewed by:	G. Nelson	Date:	06/12/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company – Big Bend Station

GH–010

EMISSION SOURCE TYPE

MATERIAL TRANSFER – FUGITIVE EMISSION SOURCES

Project:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description:	Gypsum Handling – Radial Stacker to South Stackout Pile	
Emission Control Method(s)/ID No.(s):	None	
Emission Point ID:	GH–010	**Transfer Point ID(s):**

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = 0.0011 x material transferred (ton/hr) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100)

Emission (tpy) = 0.0011 x material transferred (tpy) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100) x (1/2000)

Source: Section 13.2.4 – Aggregate Handling and Storage Piles, AP–42, Fifth Edition, January 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Mean Wind Speed (mph)	Actual Quantity Transferred (ton/hr)	Actual Quantity Transferred (ton/yr)	Material Moisture Content (pct)	Control Efficiency (pct)	Actual PM_{10} Emission Rates (lb/hr)	Actual PM_{10} Emission Rates (tpy)
8.6	160	1,353,000	10.0	0.0	0.04	0.16

SOURCES OF INPUT DATA

Parameter	Data Source
Mean Wind Speed	Tampa, FL, Climate of the States, Third Edition, 1985.
Actual Quantity Transferred	TEC, 1998.
Material Moisture Content	Average gypsum moisture content; TEC, 1998.
Control Efficiency	N/A

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	A. Angelopulos	**Date:**	04/02/98
Evaluated by:	A. Trbovich	**Date:**	04/09/98
Data Entered by:	A. Trbovich	**Date:**	04/09/98
Reviewed by:	G. Nelson	**Date:**	06/12/98

EMISSION INVENTORY WORKSHEET

Tampa Electric Company – Big Bend Station

GH–015

EMISSION SOURCE TYPE

MATERIAL TRANSFER – FUGITIVE EMISSION SOURCES

Project:

FACILITY AND SOURCE DESCRIPTION

Emission Source Description: Gypsum Handling – Dozer Transfer from Long–Term Storage Pile to Trucks

Emission Control Method(s)/ID No.(s): None

Emission Point ID: GH–015

Transfer Point ID(s):

EMISSION ESTIMATION EQUATIONS

Emission (lb/hr) = 0.0011 x material transferred (ton/hr) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100)

Emission (tpy) = 0.0011 x material transferred (tpy) x [(average wind speed (mph)/5)$^{1.3}$ / (moisture content (%)/2)$^{1.4}$] x (100–control[%]/100) x (1/2000)

Source: Section 13.2.4 – Aggregate Handling and Storage Piles, AP–42, Fifth Edition, January 1995.

INPUT DATA AND EMISSIONS CALCULATIONS

Mean Wind Speed (mph)	Actual Quantity Transferred (ton/hr)	Actual Quantity Transferred (ton/yr)	Material Moisture Content (pct)	Control Efficiency (pct)	Actual PM_{10} Emission Rates (lb/hr)	Actual PM_{10} Emission Rates (tpy)
8.6	160	1,353,000	10.0	0.0	0.04	0.16

SOURCES OF INPUT DATA

Parameter	Data Source
Mean Wind Speed	Tampa, FL, Climate of the States, Third Edition, 1985.
Actual Quantity Transferred	TEC, 1998.
Material Moisture Content	Average gypsum moisture content; TEC, 1998.
Control Efficiency	N/A

NOTES AND OBSERVATIONS

DATA CONTROL

Data Collected by:	A. Angelopulos	Date:	04/02/98
Evaluated by:	A. Trbovich	Date:	04/09/98
Data Entered by:	A. Trbovich	Date:	04/09/98
Reviewed by:	G. Nelson	Date:	06/12/98