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COMMENTS ON STATE OF OHIO PROPOSED SO2 STATE IMPLEMENTATION PLAN (SIP) REVISIONS

06/28/90

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DOE-FSO/OEPA
16
LETTER

Department of Energy
FMPC Site Office
P.O. Box 398705
Cincinnati, Ohio 45239-8705
(513) 738-6319

June 28, 1990
DOE-1374-90

Ms. Mary Cavin
Hearing Clerk
Ohio EPA
1800 WaterMark Drive
Columbus, Ohio 43215

Dear Ms. Cavin,

COMMENTS ON STATE OF OHIO PROPOSED SO_2 STATE IMPLEMENTATION PLAN (SIP) REVISIONS

Reference: April 27, 1990 Ohio EPA Public Notice for revision to the SIP for OAC Rule 3745-18, Sections 03, 04, and 37.

The Department of Energy, Feed Materials Production Center (FMPC) is providing these comments for the hearing record during the public comment period in association with the proposed SO_2 SIP revision for Hamilton County as proposed on April 27, 1990.

MODEL INPUT PARAMETERS

The base elevation for both FMPC boilers should be 179.0 meters instead of 192.0. Also, the effluent velocities for both boilers should be 12.70 m/s instead of the 7.20 m/s value used on the one boiler.

ISCST MODELING RESULTS

With the aid of computer modeling, the Ohio EPA has proposed a revision to the SO_2 SIP that calls for a 54% reduction in SO_2 emissions from the two coal fired boilers located at the FMPC. The FMPC attempted to duplicate the OEPA SO_2 concentration predicted at receptor 699.747, 4353.524 (760'). The enclosure provides specific details of the PC version of the ISCST model used and the input parameters. FMPC results show a concentration of approximately 5 ug/m^3 (without background) instead of 2599.3 ug/m^3 obtained by OEPA. Since the 5 ug/m^3 plus background of approximately 100 ug/m^3 is below the 3-hour standard of 1300 ug/m^3, there is a concern that the proposed SO_2 emission limit specified in the reference may be unwarranted in the case of the FMPC. We suggest FMPC and OEPA resolve the discrepancies of the modeling results before any emission limits are finalized. This could be

done by having OEPA run the PC-version of the ISCST model using FMPC inputs or run the mainframe version of the model using only FMPC inputs. Depending on the outcome of the comparison of the results of the 3-hour scenario, OEPA may want to consider an independent confirmation of their model results.

SITE SPECIFIC METEOROLOGY

When the discrepancies between the PC and mainframe versions of the ISCST model are resolved, we request that OEPA model the FMPC emissions using site specific meteorology. Site specific meteorology would provide a more accurate assessment of SO_2 concentrations. However, some time will be required to obtain all the input meteorological data and format for use in the ISCST. This effort will take place over the next several months and require continued input and support of OEPA. Consequently, DOE requests a six month extension of the public comment period to allow for resolution of the modeling discrepancies and completion of the site specific meteorology effort.

If you have any questions or require additional information, please contact Behram Shroff of my staff at 513-738-6003.

Sincerely,

Gerald W. Westerbeck
FMPC Site Manager

DP-84:Shroff

Enclosure: As stated

cc: w/ enclosure

B. L. Queener, SE-31,ORO
S. M. Beckman, WMCO

Enclosure

Attached is the Industrial Source Complex Short Term (ISCST) model input data used at the FMPC to estimate maximum SO_2 concentrations (due to the FMPC Boiler House's SO_2 emissions) for a 3 hour time period. The ISCST model used was downloaded from the SCRAM (Support Center for Regulatory Air Models) BBS (Bulletin Board System) operated by the Source Receptor Branch of the U. S. Environmental Protection Agency. The model was run on an HP Vectra ES/12.

The input data used for a 3 hour time period attempted to duplicate the OEPA result for a downwind receptor . Theoretically, the concentration predicted by the PC version ISCST used by the FMPC and the OEPA mainframe ISCST version should be similar. As shown in this Attachment (Pg 11 of 13), the maximum SO_2 concentration predicted by the PC version at the downwind receptor of interest was about 5 ug/m^3. The OEPA reported a concentration of 2599.3 ng/m^3 which was later identified as a typographical error by OEPA. The correct concentration was verbally confirmed by OEPA as 2599.3 ug/m^3.

With a few minor exceptions, the input parameters used by WMCO and OEPA are the same. The exceptions include differences associated with the models running on different systems (mainframe vs. PC), meteorological data file inputs (preprocessed vs. manual input), number of stacks (PC version modeled two stacks as one), stack velocity and plant base elevation. As far as the differences are concerned, theoretically only the stack velocity and plant base elevation would affect any calculational results. (Note: The stack velocities and base elevations used by OEPA were slightly different from the Boiler House parameters. However, even using the OEPA stack data and base elevation inputs, FMPC still could not change the predicted concentration much above 5 ug/m^3.

The attached ISCST input and output printouts are unmodified and show a "wraparound" format due to page width limitations. However, all the inputs are present and can be read from the printouts.

Description of ISCST file downloaded from SCRAM

ISCST (DATED 88348)

ABSTRACT

THE INDUSTRIAL SOURCE COMPLEX SHORT-TERM MODEL IS A STEADY-STATE GAUSSIAN PLUME MODEL WHICH CAN BE USED TO ASSESS POLLUTANT CONCENTRATIONS FROM A WIDE VARIETY OF SOURCES ASSOCIATED WITH AN INDUSTRIAL SOURCE COMPLEX. THIS MODEL CAN ACCOUNT FOR SETTLING AND DRY DEPOSITION OF PARTICULATES, DOWNWASH, AREA, LINE AND VOLUME SOURCES, PLUME RISE AS A FUNCTION OF DOWNWIND DISTANCE, SEPARATION OF POINT SOURCES, AND LIMITED TERRAIN ADJUSTMENT. AVERAGE CONCENTRATION OR TOTAL DEPOSITION MAY BE CALCULATED IN 1-, 2-, 3-, 4-, 6-, 8-, 12- AND/OR 24-HOUR TIME PERIODS. AN 'N' -DAY AVERAGE CONCENTRATION (OR TOTAL DEPOSITION) OR AN AVERAGE CONCENTRATION (OR TOTAL DEPOSITION) OVER THE TOTAL NUMBER OF HOURS MAY ALSO BE COMPUTED. ISCST IS A PREFERRED MODEL FOR REGULATORY APPLICATIONS IN SIMPLE RURAL OR URBAN TERRAIN AS LISTED IN TABLE 4-1 OF THE GUIDELINE ON AIR QUALITY MODELS (REVISED).

REFERENCES

ENVIRONMENTAL PROTECTION AGENCY, 1987. INDUSTRIAL SOURCE COMPLEX (ISC) DISPERSION MODEL USER'S GUIDE - SECOND EDITION (REVISED). VOLUMES 1 AND 2. EPA-450/4-88-002A AND B. OFFICE OF AIR QUALITY PLANNING AND STANDARDS. RESEARCH TRIANGLE PARK, NC 27711. (AVAILABLE ONLY FROM NTIS, ACCESSION NUMBER PB88-171475 AND PB88-171483.)

COMMENTS ON OPERATION

ISCST accepts input from UNIT 5, output to UNIT 6. On a PC, UNIT 5 defaults to the keyboard and UNIT 6 to the screen. For most applications, the input data set is stored on a file, and output is intended for a file or printer. This can be accomplished on a PC using the "<" and ">" redirection features of the DOS (Disk Operating System) of your PC. To run the test case and place the output in a file named TEST.OUT, enter the following command:

```
ISCST < ISCST.EXP > TEST.OUT
```

The ISCST program will read input data from the file ISCST.EXP, which is the test case supplied with the model. The output will be written to TEST.OUT and should be identical to the test case output contained in ISCST.LST.

The ISCST program was compiled for PC applications using the IBM PROFORT compiler and requires a SET command for input data files that may be required other than the UNIT 5 input file. Other models on the BBS were compiled using the Microsoft FORTRAN compiler and does not require the SET command. If an option for input is exercised that requires meteorological input data, the model could be executed using the following commands:

```
SET FORT9=file.met
ISCST < iscst.inp > iscst.prt
```

where

file.met = The filename of the input MET data
iscst.inp = The card image, UNIT 5 input data
iscst.prt = The printed output

If your PC does not have enough environment space for the SET command, or the SET command does not work, the input meteorological data file can be named FORT9 and the SET command not used.

Input File Data for ISCST Model (3 Hour Test Case) Pg 3 of 13

```
ISCST SCREENING MODEL FMPC BOILER HOUSE
 1 1 1-1 0 2 0 0 1 0 0 0 0 0 0 0 0 1 1 2 0 1 1 0 1 2 0 0 0 0 1 1
     1     0     0     6     1     0     3     1
     447.0     924.0     231.6
     100.0     100.0     200.0
     200.0     200.0     270.0
     300.0     800.0     200.0
     400.0     900.0     200.0
     500.0    1200.0     200.0
   1
     1
 10.000000
 10000000.00E+00                                                    5 3
    100 00 22.68     0.0     0.0 179.0 33.07 533.20 12.70 1.52 -27.0  36.0  36.0
 0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
 0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
 0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
 0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
 0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
 0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00  0.00
       1    70.0   2.1     668.0  290.0              6
       1    30.0   1.5     464.0  289.00             7
       1    20.0   1.5     261.0  289.0              7
```

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ISCST (DATED 88348)

```
 1 1 1-1 0 2 0 0 1 0 0 0 0 0 0 0 1 1 2 0 1 1 0 1 2 0 0 0 0 1 1 0 0 0 0 0 0 0 0
0
     1     0     0     6     1     0     3     1
   0.44700E+03   0.92400E+03   0.23160E+03   0.00000E+00
   0.10000E+03   0.10000E+03   0.20000E+03   0.00000E+00
   0.20000E+03   0.20000E+03   0.27000E+03   0.00000E+00
   0.30000E+03   0.80000E+03   0.20000E+03   0.00000E+00
   0.40000E+03   0.90000E+03   0.20000E+03   0.00000E+00
   0.50000E+03   0.12000E+04   0.20000E+03   0.00000E+00
   1
     1
   0.10000E+02     0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00
0.00000E+00
   0.10000E+07   0.00000E+00                                                5 3
   1 0 0 0 0   2.268E+1   0.000E-1   0.000E-1   1.790E+2   3.307E+1   5.332E+2
1.270E+1  1.520E+0 -2.700E+1  3.600E+1  3.600E+1
   0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00
0.00000E+00   0.00000E+00   0.00000E+00
   0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00
0.00000E+00   0.00000E+00   0.00000E+00
   0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00
0.00000E+00   0.00000E+00   0.00000E+00
   0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00
0.00000E+00   0.00000E+00   0.00000E+00
   0.00000E+00   0.00000E+00   0.00000E+00   0.00000E+00
   0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00
0.00000E+00   0.00000E+00   0.00000E+00
   0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00
0.00000E+00   0.00000E+00   0.00000E+00
   0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00
0.00000E+00   0.00000E+00   0.00000E+00
   0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00     0.00000E+00
0.00000E+00   0.00000E+00   0.00000E+00
   0.00000E+00   0.00000E+00   0.00000E+00   0.00000E+00
```

ISCST SCREENING MODEL FMPC BOILER HOUSE

***

CALCULATE (CONCENTRATION=1,DEPOSITION=2)
ISW(1) = 1
RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)
ISW(2) = 1
DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)
ISW(3) = 1
TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)
ISW(4) = 1
CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)
ISW(5) = 0
LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)
ISW(6) = 2

COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
WITH THE FOLLOWING TIME PERIODS:
HOURLY (YES=1,NO=0)
ISW(7) = 0
2-HOUR (YES=1,NO=0)
ISW(8) = 0
3-HOUR (YES=1,NO=0)
ISW(9) = 1
4-HOUR (YES=1,NO=0)
ISW(10) = 0
6-HOUR (YES=1,NO=0)
ISW(11) = 0
8-HOUR (YES=1,NO=0)
ISW(12) = 0
12-HOUR (YES=1,NO=0)
ISW(13) = 0
24-HOUR (YES=1,NO=0)
ISW(14) = 0
PRINT 'N'-DAY TABLE(S) (YES=1,NO=0)
ISW(15) = 0

PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
SPECIFIED BY ISW(7) THROUGH ISW(14):
DAILY TABLES (YES=1,NO=0)
ISW(16) = 0
HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)
ISW(17) = 1
MAXIMUM 50 TABLES (YES=1,NO=0)
ISW(18) = 1
METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)
ISW(19) = 2
RURAL-URBAN OPTION (RU.=0,UR. MODE 1=1,UR. MODE 2=2,UR. MODE
3=3) ISW(20) = 0
WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)
ISW(21) = 1
VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3)
ISW(22) = 1

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SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)

ISW(23) = 0
PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)

ISW(24) = 1
PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)

ISW(25) = 2
PROGRAM USES BUOYANCY INDUCED DISPERSION (YES=1,NO=2)

ISW(26) = 0
CONCENTRATIONS DURING CALM PERIODS SET = 0 (YES=1,NO=2)

ISW(27) = 2
REG. DEFAULT OPTION CHOSEN (YES=1,NO=2)

ISW(28) = 0
TYPE OF POLLUTANT TO BE MODELLED (1=SO2,2=OTHER)

ISW(29) = 0
DEBUG OPTION CHOSEN (YES=1,NO=2)

ISW(30) = 1
ABOVE GROUND (FLAGPOLE) RECEPTORS USED (YES=1,NO=0)

ISW(31) = 1

NUMBER OF INPUT SOURCES

NSOURC = 1
NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)

NGROUP = 1
TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)

IPERD = 0
NUMBER OF X (RANGE) GRID VALUES

NXPNTS = 0
NUMBER OF Y (THETA) GRID VALUES

NYPNTS = 0
NUMBER OF DISCRETE RECEPTORS

NXWYPT = 6
NUMBER OF HOURS PER DAY IN METEOROLOGICAL DATA

NHOURS = 3
NUMBER OF DAYS OF METEOROLOGICAL DATA

NDAYS = 1
SOURCE EMISSION RATE UNITS CONVERSION FACTOR

TK =.10000E+07
HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED

ZR = 10.00 METERS
LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA

IMET = 5
ALLOCATED DATA STORAGE

LIMIT = 43500 WORDS
REQUIRED DATA STORAGE FOR THIS PROBLEM RUN

MIMIT = 554 WORDS

*** ISCST SCREENING MODEL FMPC BOILER HOUSE ***

*** NUMBER OF SOURCE NUMBERS REQUIRED TO DEFINE SOURCE GROUPS ***
(NSOGRP)

1,

*** SOURCE NUMBERS DEFINING SOURCE GROUPS ***
(IDSOR)

1,

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** X,Y COORDINATES OF DISCRETE RECEPTORS ***
(METERS)

(447.0, 924.0), (100.0, 100.0), (200.0, 200.0), (300.0, 800.0), (400.0, 900.0),
(500.0, 1200.0), (

*** ISCST SCREENING MODEL FMPC BOILER HOUSE ***

* ELEVATION HEIGHTS IN METERS

* FOR THE DISCRETE RECEPTOR POINTS

- X -	- Y -	ELE.	- X -	- Y -	ELE.
447.0	924.0	231.60001	100.0	100.0	200.00000
200.0	200.0	270.00000			
300.0	800.0	200.00000	400.0	900.0	200.00000
500.0	1200.0	200.00000			

*** ISCST SCREENING MODEL FMPC BOILER HOUSE ***

* ABOVE GROUND RECEPTOR HEIGHTS IN METERS *

* FOR THE DISCRETE RECEPTOR POINTS *

- X -	- Y -	HGT.	- X -	- Y -	HGT.
447.0	924.0	0.00000	100.0	100.0	0.00000
200.0	200.0	0.00000			
300.0	800.0	0.00000	400.0	900.0	0.00000
500.0	1200.0	0.00000			

*** ISCST SCREENING MODEL FMPC BOILER HOUSE ***

*** SOURCE DATA ***

SOURCE NUMBER	P A R T. CATS.	K E E	EMISSION RATE TYPE=0,1 (GRAMS/SEC) *PER METER**2	BLDG. TYPE=2 (METERS)	BLDG. TYPE=2 (METERS)	BLDG. TYPE=2 (METERS)	X (METERS)	Y (METERS)	BASE ELEV. (METERS)	VERT.DIM HEIGHT (METERS)	TEMP. TYPE=0 (DEG.K);	EXIT VEL. TYPE=0 (M/SEC);	HORZ.DIM DIAMETER TYPE=1,2 (METERS)
1	0	0 0	0.22680E+02	12.70	1.52	-27.00	0.0	0.0	179.0	33.07	533.20	36.00	36.00

*** ISCST SCREENING MODEL FMPC BOILER HOUSE ***

*** DIRECTION SPECIFIC BUILDING DIMENSIONS ***

SOURCE 1

IFV	BH	BW	IFV	BH	BW	IFV	BH	BW	IFV	BH	BW
1	0.0,	0.0,	2	0.0,	0.0,	3	0.0,	0.0,	4	0.0,	0.0,
5	0.0,	0.0,	6	0.0,	0.0,						
7	0.0,	0.0,	8	0.0,	0.0,	9	0.0,	0.0,	10	0.0,	0.0,
11	0.0,	0.0,	12	0.0,	0.0,						
13	0.0,	0.0,	14	0.0,	0.0,	15	0.0,	0.0,	16	0.0,	0.0,
17	0.0,	0.0,	18	0.0,	0.0,						
19	0.0,	0.0,	20	0.0,	0.0,	21	0.0,	0.0,	22	0.0,	0.0,
23	0.0,	0.0,	24	0.0,	0.0,						
25	0.0,	0.0,	26	0.0,	0.0,	27	0.0,	0.0,	28	0.0,	0.0,
29	0.0,	0.0,	30	0.0,	0.0,						
31	0.0,	0.0,	32	0.0,	0.0,	33	0.0,	0.0,	34	0.0,	0.0,
35	0.0,	0.0,	36	0.0,	0.0,						

MET. DATA

DAY 1
*** ISCST SCREENING MODEL FMPC BOILER HOUSE
***

* METEOROLOGICAL DATA FOR DAY 1 *

STABILITY CATEGORY	WIND PROFILE EXPONENT	HOUR	FLOW VECTOR (DEGREES)	WIND SPEED (MPS)	MIXING HEIGHT (METERS)	TEMP. (DEG. K)	POT. TEMP. GRADIENT (DEG. K PER METER)
		1	70.0	2.10	668.0	290.0	0.0350
6	0.5500	0.000000E+00					
		2	30.0	1.50	464.0	289.0	0.0350
6	0.5500	0.000000E+00					
		3	20.0	1.50	261.0	289.0	0.0350
6	0.5500	0.000000E+00					

HIGH

3-HR

SGROUP# 1

*** ISCST SCREENING MODEL FMPC BOILER HOUSE ***

* HIGHEST 3-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *

* FROM SOURCES: 1,
* FOR THE DISCRETE RECEPTOR POINTS *

- Y -	- X - CON.	- Y - (DAY,PER.)	CON.	(DAY,PER.)	- X -
	447.0	924.0	5.80148	(1, 1)	100.0
100.0	0.00109	(1, 1)			
	200.0	200.0	0.00561	(1, 1)	300.0
800.0	4.53691	(1, 1)			
	400.0	900.0	1.24536	(1, 1)	500.0
1200.0	4.41698	(1, 1)			