

Paolo Zannetti

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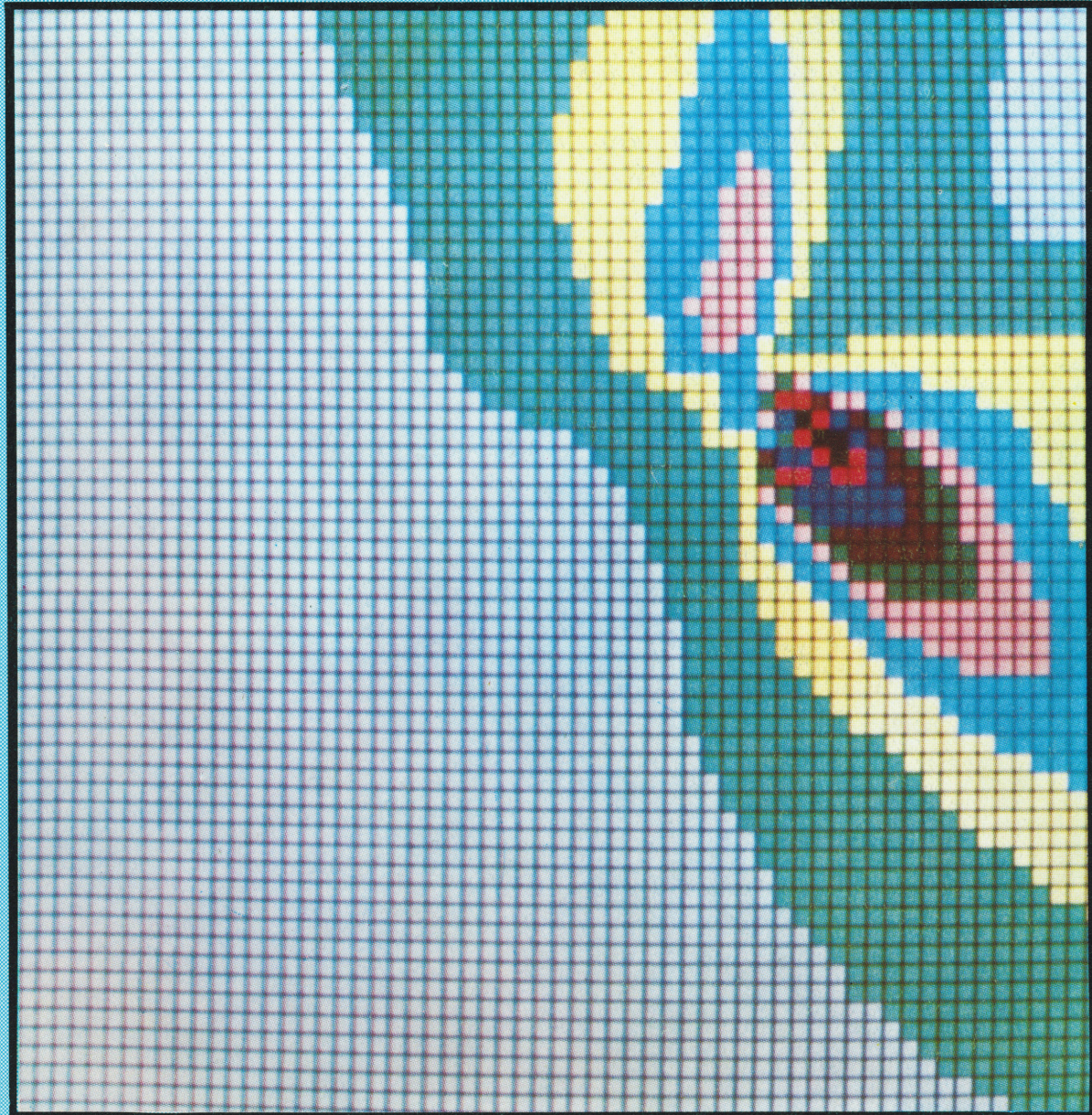


FINAL REPORT

Air pollution dispersion and prediction model for Shuaiba Industrial Area

EES-45

Volume V — Data and Program Listings



SUBMITTED TO: SHUAIBA AREA AUTHORITY

KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH
P. O. BOX 24885 SAFAT
KUWAIT

JULY 1983

The cover picture provides a graphic representation of the ground level NO_x concentration field in the Shuaiba region as simulated by a numerical diffusion computation; darker colors indicate higher concentrations. This picture was produced using the HAZIENDA image processing system at the Kuwait Scientific Center of IBM. We thank Mr. Jesus Rueda of IBM for the preparation and the production of this picture.



FINAL REPORT

**AIR POLLUTION DISPERSION AND PREDICTION MODEL
FOR SHUAIBA INDUSTRIAL AREA**

VOLUME V – LISTINGS

EES-45

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ENVIRONMENTAL AND EARTH SCIENCES DIVISION

SUBMITTED TO
SHUAIBA AREA AUTHORITY

"RESTRICTED"

**KUWAIT INSTITUTE FOR SCIENTIFIC RESEARCH
P. O. BOX 24885 SAFAT
KUWAIT**

AUGUST 1983

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Acknowledgement

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Preface

This report is Volume V of a five-volume final report to the SAA for the project "Air Pollution Dispersion and Prediction Model for Shuaiba Industrial Area", EES-45. These five volumes contain:

- I : Executive Summary
- II : Technical Report
- III : Special Studies and Appendices
- IV : Software User's Manuals
- V : Data and Program Listings (this volume)

This volume contains a list of computer data files and programs related to this project. A full computer print-out of these data and programs is too large to be enclosed to this volume and, therefore, has been separately provided to SAA.

At SAA's request, data and programs can be also available on computer tape.

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1.

Data Files

This section presents an index (Table 1-1) of all the data files of the project. A brief summary of the content of these files is presented below.

- Files 1 through 73 represent the airport hourly observations of the wind data (last ten-minute average). The file names are Ayyymm where yy indicates the year and mm the month (e.g., A8012 is the wind data for December 1980).
- Files 74 through 77 represent the 24-hour average air quality data collected at 15 stations in the Shuaiba Area. The file names are AVGyymm where yy is the year and mm the month. (e.g., AVG811 contains the air quality data for January 1981).
- Files 77 through 104 represent Mina Al-Ahmadi wind data (observations made every three hours, five times a day at 0300, 0600, 0900, 1200 and 1500 GMT). The file names are Dyymm.
- Files 105 through 177 represent the hourly meteorological observations at the airport, where the recorded wind data are hourly averages. The file names are DAYyymm.
- Files 178 through 187 represent the emission data of the different companies in the Shuaiba Industrial Area. The file names are Exxxx, where xxxx is the company abbreviation. For example, ESNPS is the emission data file for the Shuaiba North Power Station and ESSPS is the emission data for the Shuaiba South Power Station.
- Files 188 through 194 represent the hourly averages of the air quality data in Shuaiba. The files names are HAVGyymm.
- Files 195 through 216 represent the hi-volume sampler data (24-hour averages). The file names are Hxxxymm, where xxx is the station abbreviation, for example HSSP8209 is the hi-volume sampler data collected from the station located at the Shuaiba South Power Station during September 1982.

- Files 217 through 222 represent the inversion data. The file names are INVyy.
- Files 223 through 230 represent the mixing height data. The file names are MIXyy.

Table 1-1. Data File Index

FN	FT	FM	FILE #
A7512	DATA	AI	1
A761	DATA	AI	2
A762	DATA	AI	3
A763	DATA	AI	4
A764	DATA	AI	5
A765	DATA	AI	6
A766	DATA	AI	7
A767	DATA	AI	8
A768	DATA	AI	9
A769	DATA	AI	10
A7610	DATA	AI	11
A7611	DATA	AI	12
A7612	DATA	AI	13
A771	DATA	AI	14
A772	DATA	AI	15
A773	DATA	AI	16
A774	DATA	AI	17
A775	DATA	AI	18
A776	DATA	AI	19
A777	DATA	AI	20
A778	DATA	AI	21
A779	DATA	AI	22
A7710	DATA	AI	23
A7711	DATA	AI	24
A7712	DATA	AI	25
A781	DATA	AI	26
A782	DATA	AI	27
A783	DATA	AI	28
A784	DATA	AI	29
A785	DATA	AI	30
A786	DATA	AI	31
A787	DATA	AI	32
A788	DATA	AI	33
A789	DATA	AI	34
A7810	DATA	AI	35
A7811	DATA	AI	36
A7812	DATA	AI	37
A791	DATA	AI	38
A792	DATA	AI	39
A793	DATA	AI	40
A794	DATA	AI	41
A795	DATA	AI	42
A796	DATA	AI	43
A797	DATA	AI	44
A798	DATA	AI	45
A799	DATA	AI	46
A7911	DATA	AI	47
A7912	DATA	AI	48
A801	DATA	AI	49
A802	DATA	AI	50

2.

Computer Programs

The computer programs developed and used in this project have been fully described in Volume III of this final report. A listing is provided below containing the program names in the same order as the computer listing separately provided to SAA.

2.1 Programs for Data Analysis

2.1.1 Data Entry, Formatting and Checking

AIREXTR	APL
AIRSKPMS	APL
CHANGE	EXEC
CHBHAQ	FORTRAN
CHECK	EXEC
CHHVL	FORTRAN
CHKKW	FORTRAN
CHTMW	FORTRAN
CHTKW	FORTRAN
FOEMI	FORTRAN
FOHAQ1	FORTRAN
FQHAQ2	FORTRAN
FOINV	FORTRAN
FOMET	FORTRAN
FOMIX	FORTRAN
FO24AQ	FORTRAN
FORMAT	EXEC
INVEXTR	APL
INVS KPMS	APL
MEXTR	APL
MIXEXTR	APL
MSKIPMISS	APL
MXSKPM	APL
READFILE	APL

REAWR1	EXEC
RWHVL	EXEC
RWHVL	FORTRAN
RWMET	FORTRAN
RW24AQ	FORTRAN
TETH	EXEC
TETH	FORTRAN

2.1.2 Analysis of Meteorological and Emission Data

AIRD	EXEC
AIRD1	SAS
AIRD	FORTRAN
DMYS	SAS
BAR	SAS
EM	EXEC
EM	FORTRAN
EM	SAS
EM1	SAS
MANA1	EXEC
MANA1	FORTRAN
STB	EXEC
STB	FORTRAN

2.1.3 Computation and Display of Wind and Stability

CMS	APL
ERASE	APL
MEXTR	APL
PRT	APL
PRTWS EES	APL
PRTΔC	APL
PRTΔCR	APL
PRTΔEES	APL
READFILE	APL
SSTTABLE	APL

STAVG	APL
STDOIT	APL
STEXTR	APL
STROSES	APL
STTABLE	APL
SWRDOIT	APL
SWRTABLE	APL
WRAVG	APL
WRDOIT	APL
WRIN	APL
WRITE	APL
WRITEV	APL
WROSES	APL
WRTABLE	APL
YSTTABLE	APL
YWRDOIT	APL
YWRTABLE	APL
<u>TBL</u>	APL
WROSES	EXEC
STROSES	EXEC
STROSES	FORTRAN
WROSES	FORTRAN

2.2 Model Input Preparation

CRSMETK	FORTRAN
DCREAT	APL
EEDLT	EXEC
EEDLT	FORTRAN
EEDST	EXEC
EEDST	FORTRAN
LTDATA	APL
MDOIT	APL
MEXTR	APL

MIXDOIT	APL
MIXEXTR	APL
MIXMISS	APL
MIXPROC	APL
MMISS	APL
MPROC	APL
PROC	EXEC
PROCREAD	FORTRAN
READFILE	APL
READP	EXEC
SEAS	APL
SLTMIX	APL
SLTTEMP	APL
STAR	APL
WRITE	APL

2.3 Diffusion Models

ISCST	FORTRAN
ISCLTM	FORTRAN
PTMAX	FORTRAN
PTMTP	FORTRAN
CDM	FORTRAN
MC-LAGPAR	APL

where the last model is in an APL workspace containing the following APL functions:

CHEMDECAY
 CMSΔ
 DELETE
 DISCA
 DRYDEP
 FICOMP
 FUNC
 INITPUFF

LOCATE
MCLAGPAR
MEDVAR
MOVEPAR
NEWUVWPR
NORMAL
PRT
PRTWS
PUFFSTAT
READEMIS
READFILE
READGRID
READMETEO
READPAR
ROTATION
SAVECONC
TESTDOM1
TESTDOM2
TURB
WIND
WNOISE
WORKADISC

2.4 Data Base

Main program

Subroutines:

RECENT
LOCATE
DISP
DAYCOUNT
HELP
EXTRACT
ANTINGOR
USEREX

Logical funtions:

ICOND

CONJ



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