

**PACKAGE ID** - 000613IBMPC00 DIAN1D

**KWIC TITLE** - One-Dimensional SO2 Predictions for Duct Injection

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**LIMITATION CODE** -UNL                   **AUDIENCE CODE** - UNL

**COMPLETION DATE** - 09/30/1993   **PUBLICATION DATE** - 11/01/1992

**DESCRIPTION** - DIAN1D is a one-dimensional model that predicts SO2 absorption by slurry droplets injected into a flue gas stream with two-fluid atomizers. DIANUI is an interactive user interface for DIAN1D. It prepares the input file for DIAN1D from plant design specifications and process requirements.

**PACKAGE CONTENTS** - Media Directory; Software Abstract; Numerical Models For SO2 Absorption By Duct Injection; Media Includes Source Code, User's Guide, Executable Module, Sample Problem Input and Output;

**SOURCE CODE INCLUDED?** - Yes

**MEDIA QUANTITY** - 1 3.5 Diskette

**METHOD OF SOLUTION** - DIAN1D is based on energy and mass conservation applied to the slurry droplets and the flue gas. The atomizing jet is assumed to expand and entrain flue gas along the duct length. Slurry droplets within the atomizing jet evaporate and absorb SO2. Flue gas and droplet conditions are predicted along the duct using an explicit matching procedure. The timestep is adjusted to achieve specified solution tolerances. The flow entrained by the atomizer jet is specified as a linear function of distance from the atomizer.

**COMPUTER** - IBM PC

**OPERATING SYSTEMS** - DIAN1D Microsoft DOS 3.1 or higher and Unix, DIANUI Microsoft DOS 3.1 or higher

**PROGRAMMING LANGUAGES** - DIAN1D Fortran; DIANUI Turbo Pascal

**SOURCE CODE AVAILABLE (Y/N)** - Y

**UNIQUE FEATURES** - The entrainment of the flue gas by the atomizer jet is a special feature of DIAN1D not usually included in one-dimensional models. The input required by DIANUI is identical to data normally available from design specifications or tabulations of experimental data. Supplemental external calculations to convert data are usually not required. Default

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**UNIQUE FEATURES - (CONT)** values are presented for every input field. Tables of properties for representative coals and typical two-fluid atomizers are provided for convenience. DIANUI interactively calculates energy and material balances, allowing the user to estimate how calcium to sulfur ratio, approach to adiabatic saturation temperature and recycle affect SO<sub>2</sub> removal prior to running DIAN1D.

**RELATED SOFTWARE** - Program DIANUI.EXE requires the library packages turboMagic 2.01 and Object Professional 1.1 to compile from source. These libraries aren't included in the package and must be purchased separately to recompile the source code. The DIAN1D program can be run on a SUN Sparc station, but the DIANUI program can't.

**OTHER PROG/OPER SYS INFO** - DIANUI should be compiled with Turbo Pascal, Version 6.0X or later. Other versions of Turbo Pascal may be acceptable, but have not been tested. DIANUI uses procedures from two commercial libraries, turboMagic, Version 2.01, from Sophisticated Software and Object Professional, Version 1.1, from Turbo Power Software. These libraries must be purchased separately. To compile DIANUI, the MAGIC.TPU unit must be modified to add floating point real variables. Permission has been obtained from Sophisticated Software to include the source code and Pascal units generated by turboMagic. The OPDATE, OPDOS, and OPSTRING units from Object Professional are also required to compile DIANUI. The Object Professional units cannot be provided with DIANUI. User's guide is in Postscript Printer File. Source Code, Sample Problem Input and Output are in an ASCII file.

**HARDWARE REQS** - DIAN1D; a) IBM compatible 286 PC with a math coprocessor and 640 Kb memory or b) Sun SparcStation. DIANUI: IBM compatible PC with 640K memory.

**TIME REQUIREMENTS** - DIAN1D: Ranges from 15 seconds to 30 minutes on a 486 PC. DIANUI: Interactive.

**REFERENCES** - Duct Injection Technology Prototype Development, Subtask 3: Mathematical Model Development, Topical Report 6, Volumes 1 and 2, DOE Contract DE-AC22-88PC88852, September 1993.

**ABSTRACT STATUS** - Submitted October 4, 1993. Released AS-IS October 12, 1993.

**SUBJECT CLASS CODE** - HU

**KEYWORDS** -  
COMPUTER PROGRAM DOCUMENTATION  
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E S T S C  
ENERGY SCIENCE & TECHNOLOGY SOFTWARE CENTER  
SOFTWARE ABSTRACT

PAGE 3  
DATE 03/11/2002

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ABSORPTION  
FLUE GAS  
POWER PLANTS  
THREE-DIMENSIONAL CALCULATIONS  
DUCTS  
INJECTION  
REMOVAL  
GAS FLOW

**EDB SUBJECT CATEGORIES** -  
990200 010800 020800 540120 200202

**SPONSOR** - DOE/FE

**PACKAGE TYPE** - AS - IS