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Interactive Rapid Dose Assessment Model (IRDAM)

User's Guide

Prepared by R. W. Poeton, M. P. Moeller, G. J. Laughlin, A. E. Desrosiers

Pacific Northwest Laboratory
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Battelle Memorial Institute

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U.S. Nuclear Regulatory
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ABSTRACT

As part of the continuing emphasis on emergency preparedness the U.S. Nuclear Regulatory Commission (NRC) sponsored the development of a rapid dose assessment system by Pacific Northwest Laboratory (PNL). This system, the Interactive Rapid Dose Assessment Model (IRDAM) is a micro-computer based program for rapidly assessing the radiological impact of accidents at nuclear power plants.

This User's Guide provides instruction in the setup and operation of the equipment necessary to run IRDAM. Instructions are also given on how to load the magnetic disks and access the interactive part of the program. Two other companion volumes to this one provide additional information on IRDAM. Reactor Accident Assessment Methods (NUREG/CR-3012, Volume 2) describes the technical bases for IRDAM including methods, models and assumptions used in calculations. Scenarios for Comparing Dose Assessment Models (NUREG/CR-3012, Volume 3) provides the results of calculations made by IRDAM and other models for specific accident scenarios.

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As part of the continuing emphasis on emergency preparedness the U.S. Nuclear Regulatory Commission (NRC) sponsored the development of a rapid dose assessment system by Pacific Northwest Laboratory (PWL). This system, the Interactive Rapid Dose Assessment Model (IRDAM) is a micro-computer based program for rapidly assessing the radiological impact of accidents at nuclear power plants.

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INTRODUCTION

IRDAM (Interactive Rapid Dose Assessment Model) is a micro-computer based program designed to provide rapid assessments of the radiological impact of accidents at nuclear power plants. The format for data input is highly interactive, requiring little or no computer expertise on the part of the user. This document describes the proper setup and operation of the Osborne 1 computer, the C. Itoh printer, and the magnetic disks.

EQUIPMENT SETUP

The Osborne keyboard is held in place on the closed unit by two exterior latches. Releasing these will permit removal of the keyboard. The keyboard is connected to the main body of the computer at the connection labeled KEYBOARD. It is not necessary to disconnect the keyboard before closing up the unit. On newer Osbornes there is a sliding cover on the top of the main unit at the back (carrying handle) edge. This panel provides ventilation and should be slid open whenever the unit is energized.

The Osborne with its attached keyboard forms a self-sufficient unit and, together with the necessary magnetic disks, is all that is required to run IRDAM. Other peripherals may be connected, however (see Figure 1). In particular, a C. Itoh printer can be used by connecting a parallel cable connector to the IEEE-488 interface on the Osborne. This connection should be made so that the cable emerges from the lower part of the connector rather than the upper; otherwise the printer will not function. The other end of the cable connects to the back of the printer in the standard manner. Other types of printers may work off the same interface or off the RS-232 type serial interface provided (in which case the MBASIC system disk must be used rather than the MBASIC with Parallel Printer). It is also possible to use the EXTERNAL VIDEO connection to augment the built-in Osborne screen. The black plug normally installed in this connection should be removed only with the power off. A MONDAPT (Esoteric Engineering, Inc.) adaptor with standard RCA-type phono plug may be used with a video monitor, or an RF modulator may be used to connect to a standard TV.

The C. Itoh printer may be operated either using pin-fed paper or standard size sheets using friction feed. There is a white lever on the top of the printer for selecting feed type. There are hinged covers over the pin-feed mechanisms which must be lifted to insert pin-fed paper. The pin-feed mechanisms can be adjusted horizontally by flipping the adjacent white levers. Once the paper is in place, the power may be turned on using the rocker switch on the left side of the printer. The select or SEL button must be pressed to turn on its green light on the front of the printer. This light, as well as the green power light, must be on for the printer to operate properly. The red PE light will come on when paper is needed, and the SEL light will go off. Once more paper has been supplied, printing may be resumed by pressing the SEL button. This process may be used to run IRDAM using standard paper fed into

the printer one sheet at a time, much as paper is fed into a typewriter. The LF and TOF buttons can be operated when the SEL light is off. These feed one line at a time (line feed) and feed one page (top of form) respectively.

Both the printer and the Osborne operate off standard 110 volt AC outlets. The Osborne power is turned on by a rocker switch located on the back right hand side of the case. On energizing the unit, the red light over disk drive B (the right hand drive) will flash briefly and an audible "beep" should be heard. In a few seconds the screen should display a message telling the user to place a disk in disk drive A (the left hand drive) and press the return key. Before going any further, adjust the brightness and contrast controls as necessary.

FIGURE 1. Osborne 1 Features

LOADING AND RUNNING

Running the IRDAM program requires the use of two magnetic disks, the first is "MBASIC with Parallel Printer". Open the gate to disk drive A and insert this disk with the label facing up and the oblong window on the disk going in first. Close the gate and press the RETURN key. The light over disk drive A should come on while the computer loads the MBASIC language. If it is necessary to load the MBASIC from disk drive B, this can be done by inserting the disk in drive B and pressing the SHIFT and quote (") keys at the same time. When loading is complete, the red light will go off and the computer will display an OK prompt. Place the second disk (labelled IRDAM) into disk drive B in the same manner as the first disk was placed in disk drive A. To run the program type RUN"B:IRDAM.COM" and hit the RETURN key. The red light over disk drive B will come on and the screen will display an introductory statement about IRDAM, followed by the first portion of the interactive section of the program. IRDAM may also be run from disk drive A by inserting the disk and typing RUN"A:IRDAM.COM".

If it is desired to test the printer setup before running IRDAM, this may be done by substituting LDAD for RUN in the RUN command. When the OK prompt is given, type the following: LLIST 10-15 and hit the return key. If everything is properly connected this should cause the printer to print the first two lines of the IRDAM program. Next simply type RUN and hit the return key and the program will run.

AUTOSTART

If disks are available which contain autostart capability, the procedure for loading and running IRDAM can be greatly simplified. In this case load the disk labelled "A:IRDAM.COM" into disk drive A and the disk labelled "B:IRDAMCAL.COM" into disk drive B. Press the return key and the program will automatically be loaded and run.

INTERACTIVE FORMAT

IRDAM input is structured as a series of questions or options. These are displayed sequentially on the screen and the user is asked to respond to each before proceeding to the next. Detailed descriptions of methods and models used are included in NUREG/CR-3012, Volume 2 (Poeton, Moeller, Laughlin and Desrosiers, 1982). Numerous opportunities are provided to change input and review previous answers. The extent of this review capability is governed by the response to the first question which asks the user to select a help level (most, some, or little help). In responding to questions it is helpful to know that "Y" is sufficient to indicate "yes" and "N" is sufficient for "no." After each response the RETURN key must be pressed to indicate to the computer that the response is complete. Incorrect entries can be erased (before the

return key is pressed) by pressing the key with the left-directed arrow on it. Numerical input is flexible, with most formats (integer, decimal, scientific) being accepted.

After all input is complete, IRDAM will print an input summary and ask if all the information is correct. This is the user's last chance to change input prior to calculations. If the response is "yes", the calculations will be made. If it is "no", IRDAM will provide an opportunity to change input as described under rerunning IRDAM, below.

USE WITHOUT PRINTER

When IRDAM reaches a point where it is necessary to display information (e.g., input summary or calculation results), it will first ask whether the printer is properly connected. If the user responds "yes", the program will use the printer to print the necessary information. If the response is "no", the information will be displayed on the screen instead. The information will be displayed in blocks to accommodate the screen size. To see the next block, follow the instructions on the screen to hit the RETURN key. Generally speaking, it is not possible to scroll back to previous blocks of information, so important data should be copied down as it is displayed.

RERUNNING IRDAM

After completion of its calculations, IRDAM will ask the user if he/she wishes to run the program again. If the response is "no", IRDAM will sign off. If the response is "yes", IRDAM will request (in order) name, date and time from the user. If the name and date are the same as on the previous run, the return key may be hit in response to these two requests, and the previously input name and date will be retained. It is necessary to input a new time, however. Next, IRDAM will ask if that was the only information to be changed. If the user responds "yes" the program will run with the same input values (except name, date, and time) as on the previous run. If the user responds "no", IRDAM will present a list dividing the data input into the following groups:

- (1) User/reactor specifics (name, date, time, reactor name)
- (2) Type of release (ground or elevated, windspeed, direction)
- (3) Meteorological data (windspeed, direction, stability class)
- (4) Release rate (isotopic, gross, containment leakage, coolant leakage)
- (5) Age of released material (time intervals - shutdown, duration, age)
- (6) Iodine presence and filter (iodine to noble gas ratio, filtration and filter efficiency).

To change a particular input value, choose that group which contains the input to be changed, and IRDAM will ask for new input in that area. Areas for change may be chosen in any order and as frequently as necessary. It is important to remember that any input not specifically changed remains as it

was on the previous run. If changes involve more than two or three of the six input sections above, it may be easier to simply reload the program and run from the beginning. This may be done by letting the program sign off (as described above) and then typing RUN"B:IRDAM.COM".

UNLOADING

IRDAM execution or data input may be interrupted by pressing the CNTRL and C keys at the same time. This is only an interruption. To start again, it is either necessary to type RUN (in which case the program will complete its run and ask if you wish run again), or to reload the program by typing RUN"B:IRDAM.COM" (in which case any input will be lost). Another way to start over is to press the RESET button. This will unload both IRDAM and the MBASIC language, restoring the unit to the condition it was in when first energized. Both the MBASIC and IRDAM must then be reloaded in order to run.

DISK REMOVAL

It is important that disks not be removed from disk drives while the disk drive is operating and its red light is on. It is best to power the unit up before inserting disks and to remove the disks before shutting the power off.

DISK CARE

Normal caution should be observed when handling the magnetic disks. Avoid placing the disks near equipment which may have strong magnetic fields and/or passing the disks through X-ray or metal detector search equipment at airport terminals and plant security facilities.

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Poeton, R. W., M. P. Moeller, G. J. Laughlin and A. E. Desrosiers. 1982. Interactive Rapid Dose Assessment Model (IRDAM) for Reactor Accidents. NUREG/CR-3012, Volume 2, PNL-4510, Pacific Northwest Laboratory, Richland, Washington.

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