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THE APPLICATION AND DEVELOPMENT ON RADIATION MONITORING MICROCOMPUTER MANAGEMENT SYSTEM IN DESIGN OF A CERTAIN PROJECT

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ABSTRACT A scheme of a radiation monitoring system with a RMMMS (Radiation Monitoring Microcomputer Management System) has been designed for the first time in the radiation protection design of a certain nuclear project undertaken by the BINE (Beijing Institute of Nuclear Engineering). Meanwhile, we accepted the research task of the RMMMS that can manage 40 monitoring channels. The key factors of radiation monitors, microcomputer, information management and systematic design method are considered in the development of the RMMMS. This paper presents briefly the scheme and functions of the RMMMS.

1. Introduction

In the year 1991, we, the branch of RADIATION PROTECTION, have designed a scheme of radiation monitoring system with a Radiation Monitoring Microcomputer Management System (RMMMS) for the first time in the design of a certain nuclear project undertaken by the BINE (Beijing Institute of Nuclear Engineering). The block diagram for radiation monitoring is shown in Figure 1. The RMMMS is a part of radiation monitoring design in a project, but it is a relative independent work having a clear distinction between the work of developing a RMMMS and the work of the project design. There are three key links in the process of developing the RMMMS. The first is to work out the technical requirements for a RMMMS according to the plan of the preliminary design for radiation monitoring in a certain project; it is necessary to revise and alter continuously this technical requirements in the stage of detailed design for radiation monitoring and in the process of implementation of the RMMMS. The second link is to draw up the general working program in which the research contents, scopes, technical indices of the RMMMS, quality control measures, working conditions, finances as well as how to check and accept the result of the RMMMS are prescribed clearly. The last one is to debug on line the RMMMS with radiation monitors; It is key step to make the RMMMS to reach the practical stage.

2. Functions carried out by the RMMMS

The RMMMS is able to manage in line for 40 monitoring channels for measurement the area γ radiation level, the radiation level and radioactive gas concentration in hot cells, the radioactivity of gaseous effluents released into the

environment from the stack. The functions of the RMMMS are to acquire periodically the measurement data and display them on the screen to provide the overall radiation scenario as well as the detailed information in the controlled areas of the building, store the measurement results and printout various kinds of statistical report forms etc.

Meanwhile, the RMMMS is also able to manage all of radiation monitoring results for some unfixed monitors using respectively the in-foreground and in-background methods. Because selected measurement devices of radioactive aerosol and liquid can not be linked with the computer, their measurement data are inputted into the computer by hand to be managed as a data base.

3. Organization of the RMMMS

3.1 Hardware

To ensure reliable running, the industrial control computer is selected. To satisfy the needs of data acquisition, data processing velocity and files memory capacity for 40 channels, the key features of the computer are the following:

CPU:	80386 IPC 610
RAM:	4MB
Display Card:	1024×768 VGA
Monitor:	14" VGA color
Hard Disk:	120 MB
In/Out Ports:	ext. 4 serial, 2 parallel
1.2 MB FDD:	2
Mouse:	1
Keyboard:	101 keys
POWER:	UPS-500 SANTAK
Printer:	CR 3240
Operating system:	MS-DOS V 5.00

3.2 Software

We have compiled a special program called ZHY40. This program is able to acquire and process periodically the measurement information of 40 channels and display what operator wants on the screen and store data as a file into hard disk for inquiry and printout. The specifications are as follows:

(1) The software is able to manage the measurement information of 40 channels at most;

(2) The normal inquiry cycle can not exceed 30 seconds for the largest possible channels;

(3) The display of measurement results on the screen of color monitor is arranged on several pages that can be selected by the operator.

In normal case, the overall information about 40 channels can be displayed on the screen including the following :

* The serial number and identifier for each channel
* The instantaneous measurement value for each channel
* The background color of entire rectangle representing each channel shows the range of measuring value.

The background color of steady green represents that a certain channel is in the condition of safe status. If the low alarm threshold of S1 is exceeded, the color turns a flashing orange. If the high alarm threshold of S2 is exceeded, the color turns a flashing red. The grey color expresses that the channel is in the condition of fault. A sample is shown in the Figures 2 and 3.

The above display can be turned to the special display such as:
* The working parameters for a certain channel
* The changing curve for the average measuring value per minute in a day for a certain channel
* The accumulated dose per day in a year
* The accumulated dose between two given data and time.

(4) Stored files can keep the average minutely measurement value in 7 days and the daily accumulated dose in a year and the status of over-threshold for all channels.

(5)The program can ensure the function of acquiring periodically measurement data for all channels while printout the report forms. Under the operation environment of WINDOW 3.1 the acquisition of data is in background, and the computer can simultaneously do other things in foreground.

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