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SAVANNAH RIVER LABORATORY DATA BANKS FOR RISK ASSESSMENT

by

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ABSTRACT

The Savannah River Laboratory maintains a series of computerized data banks primarily as an aid in probabilistic risk assessment studies for the Savannah River Plant (SRP) facilities. These include component failure rates, generic incidents, and reports of specific deviations from normal operating conditions. In addition to providing data for probability studies, these banks have served as a valuable aid in trend analyses, equipment histories, process hazards analyses, consequence assessments, incident audits, process problem solving, and training.

DATA BANKS

The data are derived from many sources both on-site and off-site. The Component Failure Rate Data Bank was abstracted primarily from information in the open literature and is increasingly supplemented by analysis of SRP experience. This bank contains the failure rate, error bounds where available, and the source of information. Currently, about 1300 entries are catalogued.

The Generic Incidents Data Bank is a listing of those incidents that can affect each of the unit operations associated with fuel reprocessing. Included with each of the generic incidents are the causes; consequencs; and safety features to prevent, detect, or mitigate the incident. These incidents were derived from safety analyses of existing or planned fuel reprocessing plants, analyses by commercial engineering firms, and from SRP experience. Currently, about 1000 incidents are catalogued. This bank serves as the primary basis for about thirty preliminary hazards analyses for new or upgraded facilities at SRP. Use of this data bank enables facility designers to recognize potential incidents at the onset

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of design which minimizes expensive redesign or retrofitting after construction has been completed.

Specific deviations from normal operating conditions are stored in the computer as a Fault Tree Data Bank. Incidents in the Fault Tree Data Banks are coded by four sets of specifications: the plant area, facility, unit operation, and key words. Data may be recalled by using from one to four of these specifications in any combination. Data may also be recalled by month, year, or source of information. In addition, "and" or "not" logic may be applied to the key word sorts as an added screening measure. Sorting by words or phrases imbedded in the text may also be performed. Either terminal display or hard copy options are available.

These banks contain data primarily from experience at SRP, but do include a small amount of data from the Idaho facility and from the Nuclear Fuel Services plant in New York. Internal sources include daily and monthly reports, incident reports, operating logs, and a linkage with the computerized maintenance records. These data banks currently contain about 120,000 entries. The original bank, containing about 115,000 entries, was compiled for the fuel reprocessing facilities and has been maintained for about ten years.

Methods of data retrieval are a function of the volume of material in the bank and the nature of the retrieval mission. The failure rate library is the simplest. One exercises the "find" option available for our computer system. For example, if thermocouple failure rates are desired, one merely accesses the data bank and types "find thermocouple" as the input command. Data are displayed at the terminal.

Generic incidents are stored as individual members (named records) for each unit operation. These are recalled by directly accessing the desired member for terminal display or hard copy.

Data banks are under the control of the Environmental Safety Group of the Savannah River Laboratory. This is the organization responsible for data collection, coding, editing, sorting, storing, and analysis. With a single responsible organization, source documents are funneled to coordinators on a timely basis, such that an even workload can be achieved. Internally published documents are accumulated for one month, then abstracted and coded so that the data may be read into the computer banks. Maximum lag time between a documented occurrence and its availability in the data bank is about two months. Data from operating logs lag about six months to 1-1/2 years because a single log book may take from one month to one year to complete. This imposes a minimum of interference with plant operations if only completed log books are abstracted. The computerized maintenance records are accessed on an annual basis.

Data banks are recorded on disk packs with magnetic tape backup in case of destruction of the disks. In addition, the Fault Tree Data Bank has a punch card file that is stored in a building remote from the computer operations center.

Access to the data is restricted to the Environmental Safety Group to protect against accidental erasure, alteration, or unauthorized use of the data. Information from the data banks can be made available through the Savannah River Operations Office of the Department of Energy; however, raw data are of little legitimate use to those outside of SRP because of cryptic notation, jargon, a lack of knowledge of when process changes were initiated, and not knowing when certain data abstracting began. We are, however, in the process of publishing selected data sorts that are of interest to the nuclear community. These are in the form of DOE research and development reports (DP reports) and contain necessary interpretive information for those outside of SRP.

One of the agonies of putting together data banks is making them all things to all people. Information that is one person's trash is the next person's treasure. Even this varies for an individual depending on the problem under consideration at the moment. Unfortunately, one finds those who become irritated if the data sorts do not contain exactly the information being sought.

Although it has not been a problem at SRP, data bank compilers tend to forget that the mission of a production facility is to produce a product, not to collect statistical data. If one works within existing reporting systems, the quality of the data can be quite satisfactory. If a complex reporting system is imposed, data from the low-consequence end of the spectrum will become suspect.

We have developed statistical analysis programs that can calculate a number of parameters directly from the Fault Tree Data Bank. Details of this method are the subject of another paper to be presented at this conference.

POSITION AND AREA OF RESPONSIBILITY

William S. Durant is a Research Associate in the Environmental Analysis Division of the Savannah River Laboratory with 28 years experience in safety-related R&D work. He is primarily responsible for the development of probabilistic risk assessment methodologies for the fuel reprocessing facilities at the Savannah River Plant and for the development of safety-related data banks for the entire plant.