New Mistakes Uncovered at Diablo Canyon Reactors

When an employee of the Pacific Gas and Electric Company found that an incorrect diagram had been used for design of its nuclear power plant at Diablo Canyon, the utility assured the public that its work was otherwise impeccable, and that all repairs would cause only a brief delay. The Nuclear Regulatory Commission (NRC), which began an inquiry within days, took what has turned out to be a far more realistic view. "If a young engineer can casually discover one [error], what do you think an army of highly trained experts will find when they really start looking?" asked an NRC spokesman.

The answer, to the utility's dismay, is plenty. At least two new errors in the power plant's design have been discovered since the NRC's investigation began in earnest on 9 October (*Science*, 30 October, p. 528). Each is apparently unrelated to the first, with the result that new areas of the plant may have to be redesigned before the two reactors there can begin operation. A delay of months, not weeks, now appears likely.

Discovery of the new errors has prompted the NRC to widen its audit of the plant's construction. The agency staff was initially interested in events leading up to the incorrect use of a diagram showing stresses on pipes in the event of an earthquake. The plant is located 2½ miles from an active earthquake fault. The agency says now that it will probably look at all aspects of PG & E's seismic analysis.

One of the known errors involves miscalculation of the weight of various equipment within the reactors' containment buildings. Pipes, cables, and steel grating that are supported by a ring of steel and concrete inside the building were somehow unnoticed during analysis of potential strain on the ring. As a result, it might not be strong enough. Another known error involves the use of incorrect specifications for equipment supporting the containment buildings' spray system, which would be used to reduce heat and pressure if the reactors lost their coolant.

Revelation of these mistakes has caused the governor of California, Edmund G. Brown, Jr., to intensify his pressure on the NRC to order an independent audit of the plant's entire design and construction.

—R. Jeffrey Smith

Computer Data Banks: The Delights and Dangers

The Abbé Faria in *The Count of Monte Cristo* assembled everything that was then worth knowing into nine precious volumes. Modern knowledge is not so compressible, but for those who had abandoned hope of such access to omniscience, the computerized data bank system has perhaps come to the rescue.

Last week this reporter attended a data bank course, and entered a new world that can only be described as an indexer's paradise.

Present operators of data banks include the System Development Corporation of Santa Monica, Bibliographic Retrieval Services of Latham, New York, and Dialog of Palo Alto. The data banks run on similar principles but the course attended was run by Dialog. The system is a collection of approximately 150 different data bases, comprising a total of some 50 billion bytes of on-line information. With the aid of a computer terminal, a password, and the merest smattering of Boolean algebra, you can search through this mountain of data to find just the byte you want.

For my first practice search I decided to see what was on record about the interaction of the monarch butterfly with its food plant, the milkweed. I learned that BIOSIS Previews, a data base of biological abstracts, contains 129 items that mention the common name milkweed. Calling up the text of one of them showed that the milkweed family, the Asclepiadaceae, has been assigned the biosystematic code of 25600, which seemed a better handle by which to search. A sample of the file's 58 items relating to monarch provided a code number for Lepidoptera, the order of butterflies and moths. Asked for items that mentioned these two code numbers, the computer replied that it had 461 items relating to the Asclepiadaceae, 12445 that referred to Lepidoptera, and 39 that cited the two together.

On request, it typed out citations for the first ten of these 39 references. The most recent was a paper entitled "Birds can overcome the cardenolide defense of monarch butterflies *Danaus plexippus* in Mexico" by L. S. Fink and L. P. Brower (Nature 291, 67–70, 1981).

The same 39 papers could doubtless have been found in other ways, but not so quickly. When the search was completed, the computer informed me I had taken up 9.3 minutes of its time and would be billed $8.53, including $0.93 for Tymnet charges.

The system's data bases consist generally of citations or abstracts, not of raw data. In essence, every single word is indexed, which means that each data base is highly searchable. In addition, some bases can be searched by special indices, such as by author, year, or biosystematic code number. Once the searcher has located the items he wants in a data base, he can have them typed out on-line, or printed off-line and mailed. The raw data to which the items refer can be obtained from a library or in many cases from the supplier of the data base.

Typical data bases include Medline, the Science and Social Science Citation Index, Excerpta Medica, and Agricola. A magazine file covers 370 popular American magazines, and a newspaper file has indexed almost every item except horoscopes that has appeared since 1 January 1979 in the *Christian Science Monitor*, the *Wall Street Journal*, and the *New York Times*.

Although some data bases are exclusive to one company, many suppliers prefer to be as widely available as possible. These operators of data banks are expanding their collections at a rapid rate. The System Development Corporation's ORBIT, which started commercial operation in 1973, now has 90 data bases on-line. Bibliographic Retrieval Services, which set up in 1976, at present offers 62 data bases.

The unlikely origin of Dialog was as an in-house information system for the Lockheed Missile and Space Company. Lockheed then won a contract from NASA to computer-index the half-million documents generated by the space program, and started

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