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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offering commercial service with the system in 1972. The system's heart is 200 hard disk drives. Its head is two mainframe computers, an IBM 3033 and an AS-9000, one of which handles calls arriving through Tymnet and the other calls from Telenet.

Conversations with data bank systems are instructive but highly dangerous. Like Circe with Odysseus' crew, the system continually tempts the visitor to linger longer, to have a little more, to browse for a while in rich pastures of arcane knowledge that deaden the mind to the computer's silent but relentless accountancy function. When you start to your senses and escape from the spell, you learn that you have been made to pay for every microsecond of pleasurable dalliance.—***Nicholas Wade***

Weak Creationist Bill Filed in Maryland

Maryland is the latest state to face a legislative initiative on the teaching of creationism in public schools. The bill as it stands does not conform to the successful formula that has been enacted in the states of Arkansas and Louisiana, but its sponsor, Patrick Scanello, told *Science* that he expects to amend the wording substantially when the legislative session begins in January.

If enacted in its present form, the bill would not mandate creationist teaching but would merely allow it. "If students in a public, elementary, or secondary school in this State are taught evolution the students may be taught creationism," states the bill.

Opponents to the measure interpret this cautious wording as a tactic to achieve easy passage. Others say that the bill is redundant because there is nothing in the state legislation that prevents the teaching of creationism. Such teaching could be challenged as unconstitutional, whether or not the bill was passed.

The bill's formulation may however be the result of hasty drafting rather than careful tactics. "I just wrote it up and shot it in," says Scanello. "Yes, I'll change that 'may' to 'shall,' and there will be lots of other changes too."

Scanello says he introduced the bill because of a promise made to some of his constituents when he was elected in 1978. "There's no pressure group or religious body behind it," he says. "I just want the religious alternative to evolution taught in the schools, and to be taught as science."

In contrast to the Arkansas and Louisiana bills, Scanello's does not assiduously avoid religious overtones. For instance, in its definition of creationism, the bill states that "matter and life were spontaneously created by a deity." However, Scanello hopes to obtain a copy of the Arkansas bill and he plans to base his amendments on it.

Scanello, who is a Roman Catholic, has yet to study the creationist literature. He says he does not agree with the creationists' literal interpretation of a 6-day creation, which conflicts with the view taken by the Catholic Church and by other branches of the Christian religion. "I hope to be able to read some of their magazines and books before January," says Scanello.

In the absence of coordinated and articulate support that the creationists have mustered elsewhere, the prospects for the Maryland bill look poor.—***Roger Lewin***

Peace Commission Calls for Federal Establishment

Supporters of a national peace academy believe the nation is now closer than ever to realizing an idea that has been batting around since the 1790's. A congressionally mandated commission on 20 October presented to the President a report recommending the creation of a federally subsidized United States Academy of Peace for research, education, and training in conflict resolution. Legislation to that effect will be introduced shortly in both the Senate and the House of Representatives.

For close to 200 years, there has been talk of setting up an office or department of peace to balance the country's war-making apparatus. The modern version of the idea has been the subject of an organized campaign since 1976. Although repeatedly rebuffed by Congress throughout the years, proponents believe the time is now ripe for a peace academy because, they claim, conflict resolution is well on its way to becoming a mature and scientific discipline.

According to Milton Mapes, director of the National Peace Academy Campaign, the theoretical progenitor of the academy is economist Kenneth Boulding, who set up a center for conflict resolution at the University of Michigan in the late 1950's. His wife Elise, head of the sociology department at Dartmouth University, served on the commission, which was headed by Senator Spark Matsunaga (D–Hawaii). Other prominent supporters are James H. Laue, director of the Center for Metropolitan Studies at the University of Missouri, and Roger Fisher, professor of law at Harvard University, who has been involved in developing methods of international conflict resolution.

The proposed academy would be an independent, nonprofit corporation and would receive money from outside sources as well as government appropriations. It would be primarily a training academy, according to Mapes, designed as a degree-granting graduate school for mid-career professionals working in such fields as diplomacy, labor, and human services. The main focus would be on international problems but domestic and community conflicts will be studied too. Headquartered in Washington, D.C., the academy would also have 15 regional centers associated with universities and other institutions were it to come into being and develop as fully as its supporters hope it will.

Getting the academy idea through Congress may not be easy. As Matsunaga remarked, "peace is one of the most difficult things to sell to the Congress" because members tend to equate it with a weakening of the national defense. The State Department has always been cool to the concept, perceiving an attempted intrusion on its turf (Edmund Muskie has been the only Secretary of State to support the idea). Other critics think a peace academy should not be tied with the federal government.

Matsunaga and Senator Jennings Randolph (D–W.Va.), who delivered the report to the President, said that Reagan, while not endorsing the academy idea, seemed "comfortable" with it.—***Constance Holden***