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Chernobyl Design Said to Resemble Many in U.S.

FRONT PAGE

CHERNOBYL DESIGN FOUND TO INCLUDE NEW SAFETY PLANS

U.S. Experts Say Construction Is Similar in Some Ways to Plants in America

By STUART DIAMOND

The nuclear power plant that exploded in the Soviet Union last month had more safety features and was closer to American reactor designs than Western experts had assumed in the days soon after the accident, nuclear experts say.

Although it probably would not have met United States safety standards, the experts say, the Chernobyl plant incorporated enough of the advanced safety features used in American reactors to raise questions among some experts about the effectiveness of nuclear plant designs in this country.

The conclusions are based on technical drawings and other information obtained through Government and international scientific sources by American nuclear experts in recent days.

The experts say it has become clear that a large structure of heavy steel and concrete surrounded the No. 4 reactor at Chernobyl, and that at least some of this containment structure was designed to withstand pressures similar to those in many American reactors. The roof of the Chernobyl plant was blown off by a hydrogen explosion April 26, allowing large amounts of radiation to spread over the Ukraine, Eastern Europe and parts of Scandinavia.

Safety Features Described

In addition to the containment structure, Western nuclear experts say, the Chernobyl reactor had a large basement water pool to absorb excessive steam pressure; a chamber of nitrogen around the reactor that, unlike oxygen, will not support fires; duplicate and well-protected power cables; modern control equipment of the same type used in Western reactors; and valves and seals that could be used to separate problem areas from the rest of the plant. All these features are similar to safety devices used in American commercial nuclear power plants.

There is still uncertainty over how effective the Soviet safety systems are in curbing a major accident compared with those used in the United States. And most experts believe the Soviet unit is missing important features that would make its containment structure leak-proof.

But the new data make it clear that the three-year-old Chernobyl unit 4, the newest unit at the site, had more safety features than many other Soviet units and more than was widely assumed here just after the accident.

"Our first impression was that it had

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no containment, based on other designs we had of older Soviet plants," said Robert M. Bernero, a top safety official at the Nuclear Regulatory Commission. Such information was communicated widely to the public by Federal officials, Western nuclear experts and officials of the American nuclear energy industry.

"But then we found out through the C.I.A., technical literature and other means that it was a newer plant," Mr. Bernero added. "The Soviets in fact have tried to incorporate containment features that were adapted and backfitted in the middle of their product line." Most of the walls around the reactor, he said, are "truly massive and sturdy."

It took days to assemble the technical specifications of the Chernobyl reactor, many of which had to be translated from Russian. The material was not in wide circulation, American experts said.

Just how much the extra features will affect American plants is yet unclear, but many experts said it would be wrong to dismiss the accident as unrelated to reactors here.

"There are a lot of implications," said Dr. Richard Wilson, professor of physics at Harvard University and chairman of a 1985 American Physical Society study on severe nuclear accidents. For one thing, he said, the huge water pool in the basement of Chernobyl was designed, as in American reactors, to relieve excessive pressure. "I'm just a little nervous that we have the same design and it didn't work," he said.

Also, experts said there was a chance, albeit very small, that some types of accidents could breach the containment of American reactors and release at least as much radiation as the Soviet unit did, causing many deaths. It is uncertain if the probability of failure of the Chernobyl plant, as calculated by the Russians, was any higher than that for the probability of failure of an American plant.

"The Soviets would not have operated that reactor if their estimated probability of failure was as big as it turned out to be," Dr. Wilson said. "They are not fools."

He added that "this tells us something else went wrong, something that so far has been left out" from the list of possible causes of accidents.

Graphite Core Is Called Less Safe

Most Western experts agreed that Chernobyl's graphite core was inherently less safe than American reactor designs, which use water to moderate the nuclear chain reaction. The graphite and the massive amount of zirconium "cladding" used to shield the fuel rods in the Soviet reactor can generate much more hydrogen under superhot accident conditions than can American designs. Hydrogen gas is believed to have caused the explosion.

Those experts said that Soviet nuclear safety practices were less rigorous and that American units had more defenses to prevent releases of radiation, such as extra cooling and equipment to remove hydrogen. But having said that, many experts were reluctant to make specific safety comparisons between Soviet and American reactors based on the scant information released by the Russians on the Chernobyl accident.

In an interview Saturday, Sergei Kislyak, first secretary of the Soviet Embassy in Washington, said all new Soviet plants had been upgraded to include the latest safety features, and he strongly disagreed with the suggestions that the Soviet plants are unsafe. "We have very stringent safety designs for reactors in our country," he said. "Safety is a top priority, not just economics. When you are on the edge of technological change, accidents can happen, just as the Challenger disaster."

Mr. Kislyak said there were no Soviet officials in the United States able to answer detailed technical questions about the Chernobyl reactor's design. Attempts to reach nuclear technology officials in Moscow were unsuccessful.

"We don't know enough about them to say whether they are not as good as, or better than, U.S. containments," said Dr. Brian W. Sheron, deputy director of safety review and oversight for the Nuclear Regulatory Commission, who has seen technical drawings of Soviet nuclear plants similar to Chernobyl.

Victor Gilinsky, a physicist and former N.R.C. commissioner who has also reviewed technical diagrams of the Chernobyl plant, said, "The result of a detailed comparison may be extremely favorable to our reactors, but it also may be very unfavorable."

Nuclear proponents and industry officials have tried to minimize Chernobyl's relevance to American nuclear power plant operation by contending that American units have better safety features.

In a mailing to reporters last week, the Atomic Industrial Forum, the nuclear industry trade association, said: "At the Chernobyl RBMK-1000 reactor, no containment building is provided. The building housing the reactor apparently was constructed for structural rather than containment integrity."

In newspaper advertisements, the U.S. Committee for Energy Awareness, a utility-supported group, said that "many Soviet reactors — including those at Chernobyl — lack such containment structures" as American reactors have, including steel and reinforced concrete.

"We have not and will not have a Chernobyl-type plant accident here," Sherwood Smith, the chairman of the Edison Electric Institute, said at a news conference on Wednesday. But Steven C. Sholly of MHB Technical Associates of San Jose, Calif., a consulting company that has often been critical of American nuclear designs, said statements about the lack of Soviet containment were "very misleading." He added: "If they are trying to say that the plant has no containment, they are 100 percent wrong. A containment is there for all to see."

"There are scenarios lurking out there where the containment will rupture and release large amounts of radiation," he added. "There are potentially many accidents more severe than Three Mile Island."

The Three Mile Island nuclear power plant near Harrisburg, Pa., sustained a partial fuel meltdown in March 1979, releasing some radiation into the atmosphere but causing no injuries.

Representative Edward J. Markey, Democrat of Massacusetts, who is planning hearings on reactor safety and has oversight on nuclear matters, said in a statement Saturday: "The