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Nobody should feel complacent about the Chernobyl disaster. Nuclear accidents can develop in some bizarre ways, warns Walt Patterson

The cloud that could cast a shadow anywhere

"It can't happen here."

Even as the radioactive cloud from Chernobyl drifts over Europe, a cloud of official obfuscation is billowing up from Britain's nuclear establishment. In one pronouncement after another speakers from the Government and the Central Electricity Generating Board have tried to insist that Chernobyl's RBMK reactors are a bizarre and dangerous anomaly, whose catastrophic malfunction has no relevance to British nuclear power policy.

The CEBG chairman Lord Marshall, for instance, made much of the fact that the RBMK design includes a graphite moderator with fuel and individual pressure tubes cooled by water that boils in the tubes. He also asserted that the Chernobyl units had no "containment", unlike - he said - the CEBG's power reactors. Before these arguments go too far it is worth noting that the CEBG's own Magnox and advanced gas-cooled reactor stations all use a graphite moderator, and that from 1974 until 1976 Britain was preparing to build a series of stations with fuel in individual pressure tubes cooled by ordinary water boiling in the tubes.

Canada's Candu reactors use pressure tubes. US General Electric, Japanese and European reactor manufacturers have sold dozens of reactors cooled by boiling ordinary water.

Furthermore, Britain's early Magnox stations have boilers connected to the reactors by exposed pipework that cannot by any interpretation be called a "containment" as the word is used in nuclear parlance. Even the later Magnox and AGR stations have numerous penetrations through their massive pre-stressed concrete structures, for refuelling and steam lines. The Soviet RBMK is to be sure a hybrid; but it is a hybrid of features well known throughout the whole nuclear world.

Atomic Energy Authority safety experts have declared that it would be unacceptably risky to use water and graphite in conjunction because of the possibility of steam reacting with graphite to form explosive hydrogen - the probable cause of the blast that shattered the top of Unit 4 at Chernobyl. The graphite-steam reaction is not, however, the only possible way to produce hydrogen inside a misbehaving nuclear reactor.

During the accident in the pressurised-water reactor at Three Mile Island, steam reacted with the zirconium alloy fuel cladding. The hydrogen thus produced exploded inside the pressure vessel on the second day of the accident - fortunately without sufficient force to fracture the vessel. It then formed a bubble that frightened the nuclear engineers for more than 24 hours before it mysteriously disappeared of its own accord.

As yet we know very few hard facts about the events at Chernobyl; but what we do know is that an accident is by definition unexpected; and the Soviets have no monopoly on bizarre and unexpected nuclear incidents. Who could have foreseen that a kitchen candle or a 25 cent light bulb would come close to writing off a nuclear reactor? Nevertheless in 1975 two technicians checking for air leaks with a lighted candle set fire to insulation in electric cable trays under the control room at the Brown's Ferry nuclear station in the US. The fire in the electric cables disabled most of the plant's control systems, including emergency systems.

Before it was extinguished, site staff had to improvise jerry rigged pumps to forestall a major disaster. Three years later, a technician replacing a midget light bulb on a control panel at the Rancho Seco nuclear plant in California dropped the bulb into the wiring under the panel. It short-circuited key electrical connections, with the result that the control computer went slowly haywire, stopping and starting pumps and opening and closing valves by itself while the site staff studied their spinning dials and gauges in helpless consternation. At one stage the steam generators boiled dry; at another they filled completely, sending water into the steam turbines. The reactor was out of control for more than an hour.

The accident at Three Mile Island in 1979 involved a valve that stuck open while a panel indicator showed it closed; a pressure reading indicating that the reactor was dangerously full of water, although in fact it was dangerously empty; technicians who therefore switched off the emergency water injection when it was crucial to have it switched on; and so much confusion from alarms and warnings in the control room that no one thought to close a back-up valve until almost the last minute. Nor had anyone paid sufficient attention to a previous incident at the Davis- Besse power plant, involving an almost identical reactor in an almost identical sequence of malfunctions.

More recently the Salem 1 power plant, a Westinghouse PWR in New Jersey, twice in four days failed to shut itself down automatically in response to system malfunction warnings that should have triggered a "scram" and dropped in control rods.

Only rapid action by the reactor operator to initiate manual shutdown prevented a possible major accident. Investigators found that these "transients without scram" had occurred because no one had lubricated a key relay for a decade.

The catalogue could be extended indefinitely. Until Chernobyl the world's nuclear industry could claim that no one had died as direct result of an accident in a nuclear power station. But this nuclear power industry is a young industry and there have already been some dismaying near-misses. At Chernobyl the industry's luck ran out.

Every nuclear accident is unique. But "unique" does not mean "irrelevant", no matter what Britain's nuclear promoters would have you believe.

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