committee, Edwin Kintner, director of the Office of Fusion Energy, said, "All three of these paces retain the basic internal logic of the [department's] policy for fusion in (1) demonstration of scientific feasibility, (2) development of an engineering data base, (3) maintenance of a strong scientific and technological base, and (4) research into attractive alternate concepts."

Opinion among fusion scientists and engineers seems largely to back up Kintner's testimony. Even in the absence of any experimental data from the TFTR, there seems to be little doubt among physicists that the ETF will work about as it is supposed to (that is, it will maintain a "burning" plasma). Marshall Rosenbluth of the Institute for Advanced Study, who has been called the undisputed dean of Tokamak theory, says that "the science looks good enough that if we decided not to go ahead with the ETF right now, the results of the TFTR experiments would look very favorable, and we would feel unhappy that 5 or 6 years were lost." Somewhat more concern has been expressed for the jump between the ETF and the demonstration reactor. Weston Stacey of the Georgia Institute of Technology, for example, says that there must be at least 10 years (15 years is better) between starting the ETF and starting a demonstration reactor, if use of experimental data from ETF is to be used in the latter's design. A demonstration reactor by the year 2000 is just reachable by this criterion but one by 1995 is not, says the Georgia Tech engineer.

One objection that has been raised in the past to a too-fast development of fusion power is that the best fusion technology may get locked out in the rush to get something running. The biggest danger to fusion, says John Holdren of the University of California at Berkeley, is that by rushing too fast into a crash program, the resulting fusion reactor may be so unattractive that utilities will not buy it, government agencies would not license it, and local groups would protest any attempt to locate it nearby. For example, while not nearly the hazard of radioactive wastes from fission reactors, wastes from fusion reactors will not be radiation free. In addition to the need to handle large amounts of radioactive tritium in a deuterium-tritium reactor, the high-energy neutrons have two effects on stainless steel, the likely structural material in first generation reactors. The first is to cause radiation damage, so that eventually the material must be replaced. The second is to cause neutron activation, so that the replaced stainless steel is radioactive and must be securely stored.

While fusion advocates argue that a demonstration reactor is exactly what is needed to answer such questions, there seems to be enough diversity of opinion and enough more pressing energy concerns that McCormack will have to work hard to convince the Administration and the Congress that now is the time to move ahead with fusion.

—ARTHUR L. ROBINSON

A New Call for Abolishing the NRC

Report from the commission's own Three Mile Island inquiry says an executive branch agency should be set up—the White House disagrees

A new call for abolishing the Nuclear Regulatory Commission (NRC) has been heard from a special Three Mile Island inquiry group even though President Carter and key members of Congress are committed to saving it. This latest recommendation to replace the NRC with an executive agency headed by a single administrator has come from a $3-million inquiry commissioned by the NRC itself.

"We have found the [NRC] an organization that is not so much badly managed as it is not managed at all," said the report from this study, which was directed by Mitchell Rogovin, a Washington attorney, under an NRC contract. According to the report, which was made public 24 January, "A radical reorganization of the commission's structure and management is called for, now."

The President's Three Mile Island commission headed by John G. Kemeny, president of Dartmouth College, arrived at the same conclusion in its report last fall. The congressional reaction to this recommendation was distinctly negative, chiefly because an independent agency headed by several commissioners obviously is more responsive to Congress than an executive agency accountable to the President.

On 7 December, President Carter, acting partly in deference to the powers-that-be on Capitol Hill, announced (*Science*, 21 December) the main outlines of a reorganization plan that would strengthen the authority of the NRC chairman but leave the commission intact as a five-member collegial body. He also announced that a new chairman will be appointed from outside the agency later this year, and that, as an interim arrangement, commissioner John Ahearne was taking over as chairman from Joseph Hendrie.

The Rogovin report, taking note of these White House decisions, observes that the President has urged the commission to bring about "prompt implementation" of needed reforms. It then adds caustically: "Apparently the new chairman from the outside is to arrive to preside over a house already in order."

The report, prepared with the help of a large staff on which several dozen NRC employees served, described the present situation at the NRC in unsparing terms:

> [The commission] can make no decisions and take no action without a majority of the commissioners in agreement. In 1975, the original NRC legislation was amended to make the chairman of the commission the "chief executive officer" with rather vaguely described powers to exercise executive and administrative authority. At the same time, however, the act prescribes that the chairman shall be governed by the policy of the commission and gives the commissioners as a whole approval authority over appointments to the major staff offices and formulation of the agency's budget. There was also some sentiment that the 1975 amendment was procured by the then-chairman behind the backs of the other commissioners, so that subsequent chairmen have been reluctant as a political matter to try to exercise whatever additional authority the law may confer on them.
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> Below the commission there is no general manager or chief executive officer with singular authority over the staff. The staff is divided into five major offices, three of which are independently chartered by the statute, and each of which is headed by an office director. Between the office directors and the commis-

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Photo by L. J. Carter

Mitchell Rogovin (left) with NRC chairman John F. Ahearne

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sion is an Executive Director for Operations (EDO). . . . [But] the EDO does not currently have the authority to manage the staff. Although the commission arguably could confer such de facto authority on the EDO, it has not done so . . . [and] the EDO has served primarily as a conduit between the five equally powerful commissioners above him and the five office directors, each with his own independent jurisdiction, below. The result has variously been described as "non-management," a "mess," and a situation where "nobody is running the store." As for the staff offices, they have been characterized as "feudal baronies" and "independent fiefdoms."

On top of everything, the structural problem at the NRC has been exacerbated by the "variety of viewpoints among the commissioners and their inability to work together," the report says. "The net effect of structure and personnel has often been paralysis."

If Congress were willing to consider abolishing the commission, some of the Administration officials who have been advising the President on the NRC reorganization would recommend such action. But others would not. "We want to protect nuclear safety from political changes," Frank Press, the President's science adviser, told *Science*. He observed that the fact that the NRC members are appointed for staggered terms gives the commission some shelter from political pressures, which from one administration to the next may shift from a concern for safety to a concern for greater energy production.

Nonetheless, the Rogovin report is receiving careful attention from Harrison Wellford, an associate director of the Office of Management and Budget and the official in charge of working out the details of the NRC reorganization plan which the President is expected to submit to Congress in mid-February. It could be influential in leading the White House to recommend giving the chairman more executive power than most of the NRC commissioners want him to have. The President already has said he wants the chairman vested with authority to run the NRC on a day-to-day basis, to make key personnel appointments, and to act in emergencies.

When the Rogovin report was presented, Ahearne, the interim chairman and the only commissioner to support the Kemeny recommendation to abolish the NRC, said it was a "sound document" and well worth the money spent on it. But some of the other commissioners seemed dubious.

Victor Gilinsky indicated, for example, that he found the report inconclusive with respect to whether there was deliberate wrong doing on the part of any of the parties involved in Three Mile Island. In the past, Gilinsky has expressed concern about "the adequacy of [Metropolitan Edison's] communications to government authorities" about conditions at the reactor on the first day of the accident. On this point, the report indicates that, on the evidence, the failure of timely communication was due largely to confusion and incompetence on the part of Met Ed and other parties involved, including the NRC itself.

About half of the first volume of the report is taken up with a narrative account, presented in journalistic style, of what happened during the accident. It says that engineering calculations done for the inquiry show that, if the relief valve in the coolant system had remained open for another 30 to 60 minutes, as much as half of all the fuel in the reactor core would have melted.

But the report adds that even with a core meltdown, "there is only a small probability that the consequences of TMI would have been catastrophic to public health and safety. The most likely probability is that the reactor building would have survived in this accident scenario, and the vast majority of the radioactive material released from the fuel would have been retained within the building, not released to the surrounding environment."

The Rogovin report seems generally consistent with the Kemeny report. Among other recommendations, it calls for:

- A "completely overhauled licensing system" that includes one-stage licensing (instead of licensing for both construction and operation), increased standardization of reactor design, establishment of an office of public counsel, and agency funding for interveners.
- Insistence on "more remote siting" for future reactors and on approved and workable evacuation plans as a condition for the licensing and continued operation of reactors. Exceptions to compliance with evacuation criteria would be allowed only if additional safety systems for accident mitigation were installed or the President determined that continued operation of the reactor is vital to the national interest.
- An "immediate and substantial shift" in the balance of effort at the NRC from reviewing reactor designs to monitoring reactor operations.
- The chartering of an operating consortium to operate the plants of those utilities that might lack the technical competence to ensure safe operation if they were to run them themselves.

This last proposal, for an operating consortium, is regarded by some committee staff people in Congress as especially interesting and noteworthy. But a spokesman for the Atomic Industrial Forum, Carl Goldstein, said that there is no need for such a consortium because the nuclear industry has already committed itself to making all utilities equally competent in reactor operations. It has done so, he said, by establishing the Institute for Nuclear Power Operations (INPO), which will establish "benchmarks of excellence" and audit all cooperating utilities to see that those standards are met.

All utilities are expected to subscribe to INPO, Goldstein added, because it is implicit that failure to do so would disqualify a utility from participating in a new industry program to insure utilities against the huge costs of buying replacement power in case of reactor shutdowns. Press, the President's science adviser, agreed that the industry effort at self-policing, coupled with on-going reforms at the NRC, should make an operating consortium unnecessary.

—LUTHER J. CARTER