

some groups in the Upper Peninsula (such as People Against Sanguine and Seafarer) were mobilizing to fight any move to bring the project into their region, approached the issue warily. His science adviser, William C. Taylor, chairman of the department of civil engineering at Michigan State University, was asked to head an ad hoc committee that would recommend what he should do.

After making a quick search of the literature on ELF radio transmission and hearing a slick and apparently persuasive Navy and Pentagon presentation, the Taylor committee reported that there were "no known harmful effects of exposure to radiation at the levels and frequencies to be produced by Seafarer." Further, the committee, with a few members dissenting, recommended that the Navy be invited in if certain conditions were met, such as having the environmental impact statement on Seafarer include the National Academy of Sciences' forthcoming report on the biologic effects of ELF radiation.

As it turned out, the Navy had left the governor as well as itself open to embarrassment by its failure to inform the Taylor committee of a 1973 paper by a Navy scientific panel. This paper revealed some inconclusive but disturbing evidence that exposure to ELF radiation may have caused some persons to experience increased levels of triglyceride in

their blood—a condition which can be associated with high blood pressure and heart attacks. After the existence of this report became known in late 1975, Senator Gaylord Nelson of Wisconsin accused the Navy of an attempt at suppression and deceit. Taylor himself believes the Navy acted in "bad faith" in this instance, however uncertain the suggested linkage between ELF radiation and triglyceride levels may have been (on the basis of current research and weaknesses in the earlier investigations, the recent National Academy of Sciences report exonerates such radiation on this count as well as others).

In any case, the governor took his committee's advice and invited the Navy in. But when it seemed to him that Seafarer might be put on the Upper Peninsula no matter how the environmental analysis came out, he demanded—and got—assurances that a Michigan site would not be chosen over his objection. In early 1976, Deputy Secretary of Defense William P. Clements, Jr., promised Milliken by letter that "I would not recommend a Michigan site to Congress if you object," and added that a "project of this magnitude would not be possible without the support of the people." Then, last October, as Jimmy Carter was eagerly seeking votes on President Ford's home turf, he made a similar promise. "If I am elected on November 2, Project Seafarer will not be built in the Upper Peninsula

against the wishes of its citizens," Carter said.

It is now evident that these promises to allow the state a right of veto over a major military project was questionable not only as a matter of principle but also as a matter of practical politics. Confering a veto power on the governor put him in a position where he might well *have* to veto Seafarer, because opposition to the project was growing by the day. In the advisory referendums held in five Upper Peninsula localities in the spring of 1976, Seafarer was rejected by large majorities, and, when several other communities put the issue to a vote last November, the "no" vote was still more overwhelming.

Yet, although giving the governor a veto was no doubt a mistake, the fundamental problem with Seafarer was that it involved so many uncertainties and so much that seemed arbitrary or unpredictable. As Milliken would later point out in protest to the Pentagon, Upper Peninsula residents and state officials were first given to understand that the antenna grid would cover 2500 square miles, only to see the figure later go to 3000, then 3500, and, finally, 4000. Also, whereas at first 90 percent of the antenna line was to follow existing roads or utility rights-of-way, the percentage was later to shrink to 65, and, contrary to what had originally been indicated, trees were not to be allowed to grow back on the numerous

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Odyssey of Agent Orange Ends in the Pacific

A scheme to "burn" Agent Orange sounds like material for a spy thriller, and, in fact, it does denote a Pentagon plan to liquidate a problem. And that is what the Air Force is doing in the Pacific right now. The nonfiction Agent Orange is the name for a half-and-half mixture of 2,4,5-T and 2,4-D herbicides which the military used for defoliation operations in Vietnam. The spray planes were grounded in 1970 after scientists raised the alarm about effects of the herbicide on the environment and, possibly, on humans who got in the way because of the presence in Agent Orange of the highly toxic contaminant dioxin.

When the defoliation operations were blocked, the Air Force was left with a couple of million gallons of Agent Orange on its hands. Some 1.4 million gallons

were withdrawn from Vietnam and shipped to isolated Johnston Island in the Pacific about a thousand miles west of Hawaii. Stateside, another 860,000 gallons were stored in steel drums at a Navy facility at Gulfport, Mississippi.

It took the military 7 years and several rejected strategies to find an environmentally acceptable method of disposing of Agent Orange. At one juncture, a pilot scheme to remove enough dioxin to make the herbicide meet commercial market standards was tried. The problem was that the dioxin extracted was stored in charcoal-filled steel canisters, and these presented an even more serious disposal problem because of a residue of concentrated dioxin. The canisters were bounced from pillar to post, being ejected from California and Oregon and finally being flown to Johnston Island where they reportedly still repose in a locked vault.

The Air Force last year abandoned attempts to reprocess the remaining Agent

Orange and retreated to a plan to burn the stocks aboard a German-built, Dutch-owned incinerator ship, the *Vulcanus*.

The Environmental Protection Agency approved a plan specifying that temperatures would not fall below 1250°C during the burn, thus insuring that 99.9 percent of the compound would be consumed. Sophisticated instrumentation is aboard the ship to keep track of incinerator temperatures, combustion rate, and efficiency, and to monitor the characteristics of the plume from the incinerators.

The Agent Orange stored at Gulfport was put aboard the *Vulcanus* and transported to Johnston Island. A test burn was successfully conducted 15 to 24 July and EPA gave the go-ahead to incinerate the main stocks. *Vulcanus* is now carrying out the incineration at a spot about 120 miles west of the island, and the burn is expected to be completed in early September. The empty steel canisters containing traces of the herbicide will be

new 10-foot-wide swaths that would be cut through the forests.

Especially galling to many Upper Peninsula people was that they might have to accept a project which a former Secretary of Defense had seen fit not to proceed with in his home state of Wisconsin—and this despite the fact that, according to accepted criteria, Wisconsin looked to be the best site of all.

Another arbitrary aspect of the site selection process was that, whereas the sites in Nevada and New Mexico were put forward by the Navy as worthy of detailed evaluation, the Navy clearly wanted no part of either of them. And, in fact, these sites—one confined to the Nellis Air Force Base/Nevada Test Site complex in Nevada, the other confined to the Army's White Sands Missile Range in the southern part of New Mexico—were unsuitable. For one thing, as the Navy's impact analysis and field hearings were later to confirm, Seafarer would conflict with the other activities going on there, making for opposition from the Army and Air Force and the towns near their installations.

To all appearances, the Navy's site evaluation exercise was a charade, and the only site it was really serious about was on the Upper Peninsula. So far as that site was concerned, the Navy was not doing any talking about trade-offs, of giving up some of the system's capabilities for the sake of environmental or lo-

cal political considerations. It wanted a full system, although it was planning to begin with only 130 miles of antenna (against the 2400 miles it would eventually require) to see that all went well before the entire grid was installed.

The upshot of all this was that, by the time the Navy issued the draft environmental impact statement for Seafarer this past February, the project seemed in worse shape politically than ever before. The statement itself was hardly convincing, especially inasmuch as the National Academy of Sciences' final report was not yet finished and could not be included in it. A 10-page preliminary report by the Academy panel favorable to Seafarer was presented, but of course it contained no supporting documentation.

(Moreover, the panel's objectivity had been challenged [*Science*, 18 June 1976] because its membership included three scientists who were already on record as believing that the electromagnetic fields associated with the transmission of electric power are harmless. The charge that the panel represented a "stacked deck," heard on the CBS "60 Minutes" program in February, was clearly unfair, for the panel seems to have gone about its task conscientiously. But this accusation could only have contributed further to the atmosphere of suspicion and distrust surrounding Seafarer.)

Upset at a newspaper report that an unnamed Navy spokesman had said that

his power of veto over the project had expired with the departure of the Ford Administration, Governor Milliken had written President Carter at the end of January to ask that this power be reaffirmed. What he got in reply was only a vague assurance from Secretary of Defense Harold Brown in March that "very great weight" would be given to the views of the people of Michigan. Annoyed still more by this, Milliken thereupon announced his opposition to Seafarer. Later, in June, he joined with Governor Patrick J. Lucey of Wisconsin (who has since become ambassador to Mexico) to reject Pentagon suggestions that Seafarer might somehow be divided between the two states. "Two small grids cannot be considered acceptable as an alternative to one unacceptable large one," the governors said.

This declaration might have marked the end of Seafarer except for the belief on the part of some influential members of Congress—Senator Thomas J. McIntyre (D-N.H.), chairman of the Armed Services Subcommittee on Research and Development, being a notable example—that the project is important to national security. Also, Milliken's rejection of Seafarer was less absolute than it appeared.

For, not long after his joint statement with Lucey, Milliken's science adviser was talking with Pentagon officials (albeit on their initiative) about the possi-

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crushed and ultimately melted down in steel mill furnaces at the required high temperature. And that, the Air Force hopes, will be the end of Agent Orange.

Blast-Off for Swigert, Reentry for Mosher

Recently retired Ohio Congressman Charles A. Mosher is returning to Capitol Hill to head the staff of the House Science and Technology Committee on which he served. He replaces John L. Swigert, a former astronaut, who resigned from the committee post to seek the Republican nomination for senator from Colorado.

It is highly unusual for a former member of Congress to serve on a committee staff, but the circumstances are unusual. Mosher was reportedly urged to take the

job by the committee's chairman, Representative Olin E. Teague (D-Texas). Teague recently had his lower leg amputated. He still tires easily and his mobility has been restricted. The committee faces a crucial period as it works out its relationship with the new Department of Energy, for which the committee is a major congressional overseer.

Mosher, 70, a former small-town newspaper editor, was elected to Congress in 1960. He chose not to seek reelection in 1976 (*Science*, 26 December 1975). As a member, he was regarded as knowledgeable and politically astute. His popularity among his former colleagues is indicated by their reported unanimous vote of accord with his appointment to the staff job.

Mosher's party affiliation posed no problem in the appointment to the staff job, according to committee sources. Teague has made a point of filling staff positions on the basis of professional qualifications rather than party affiliation.

This is in contrast to other House committees which adhere to an older Hill habit of heeding party identification when recruiting majority and minority staffs.

Swigert, command module pilot on the Apollo 13 mission, is also a registered Republican. His party affiliation apparently did cause some restiveness among Democratic members of the committee after it became known he was interested in running for political office, particularly that he was making the bid for the Senate.

After announcing his resignation, Swigert was interviewed by *Aviation Week*. Discussing the future of NASA, he noted that the utilization of research results is often thwarted by weakness in following through with applications. He was quoted as saying "All of this is compounded by a lack of technical capability in the policy-making branch of the government—Congress." Which might be interpreted as the words of a would-be, self-fulfilling prophet.

John Walsh