Icebergs for the Desert: Cool Calculations

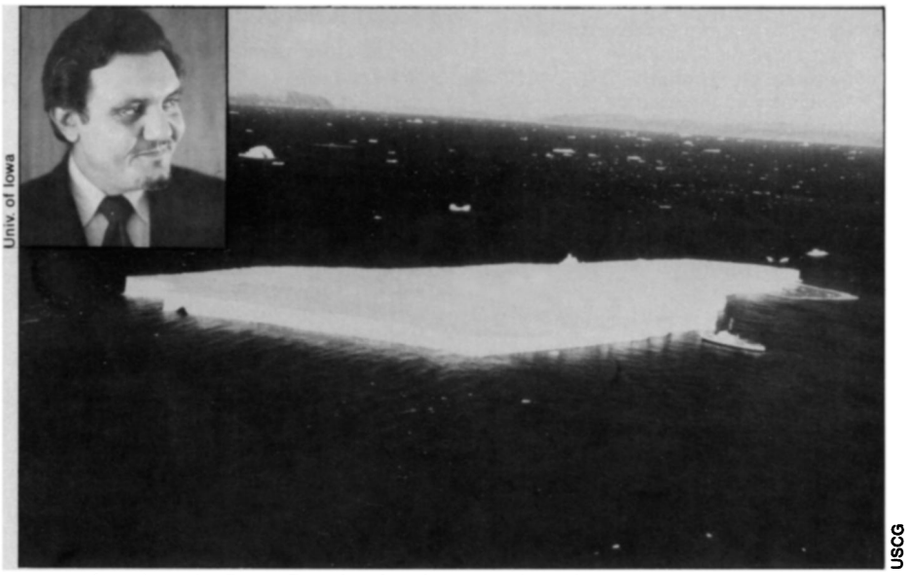
One hundred and ten scientists and engineers and one prince came to the land-locked state of Iowa last week to try to determine whether there's an iceberg in the future of the water-poor regions of the world. The subject of the First International Conference on Iceberg Utilization (ICIU) was a novel (some might say bizarre) one. Its proponents take it with a degree of seriousness that newcomers to the topic sometimes fail to appreciate.

The goal of the conference was to determine whether it will be technically and economically feasible to tow large, tabular icebergs broken off from the ice shelves of Antarctica to the coasts of desert countries of the world to serve human and agricultural needs for fresh water. After four days of deliberations, the assembled polar specialists and engineers came away with a strong determination to carry the idea further but with a realistic view that the proposal, simple enough in concept, faces technical problems that are, in a word, awesome.

"You engineers should be horrified," Henri Bader, former director of the U.S. Army's Cold Regions Research and Engineering Laboratories (CRREL), warned on the opening day. "The task," he said, "is several orders of magnitude of difficulty beyond your experience." One of the two great problems is how to transport an iceberg 1 kilometer long, 300 meters wide and 240 meters thick (five-sixths of it beneath the surface) that weighs 100 million tons—the minimum size considered economically feasible. The other is how to protect the iceberg from melting and ablation during its slow (1 knot) and long northward journey (8 to 12 months at 1 knot, for northern hemisphere lands).

By the conference's final day these two tasks seemed no less immense. "There was general agreement that the lack of knowledge and experience was overwhelming," said Ray Yagle, professor of marine engineering at the University of Michigan, summarizing the workshop on transport. That task group recommended carrying out one extensive experimental program of towing to gain experience before striking out on a major iceberg utilization project. As for the need to protect not only the sides but the bottom of the iceberg during transport, "the general consensus was that the problems are formidable," said the research glaciologist Wilford F. Weeks of CRREL.

Yet none of these difficulties are considered unsolvable by the proponents of the project. The most influential among them is Prince Mohammed al Faisal of Saudi Arabia, who contributed $50,000 to hold the conference (the National Science Foundation granted $25,000), and who was very much in evidence throughout the week. "We can do it—that should be emphasized," Faisal said at the conference's conclusion. "The only question is *when* is it feasible. I am an optimist. If we put the effort to it, we can have one [an iceberg in place at a target destination] in three to five years." Other proponents think 5 to 10 years is a more realistic time schedule.



Faisal (inset). U.S. Coast Guard icebreaker near three-fourth-mile-long tabular iceberg.

There is nothing new about the idea of towing an Antarctic iceberg to arid coasts for fresh water. Oceanographer John Isaacs proposed, but did not himself publish the idea in the 1950s. The two classic scientific papers outlining the concept in some detail were published in 1973, but enthusiasm was not high. What is new is the entrance into the field of Faisal, with his considerable financial support, his commitment to back necessary applied research and his dedication to accomplishing the goal of bringing iceberg water to Saudi Arabia and to other arid lands.

Saudi Arabia, with no lakes or streams and an average of only 4 inches of rainfall a year, has severe water shortages. Its only water sources are ground water and expensive and polluting desalination. For 15 years Faisal was head of the country's extensive desalination efforts, but he left that position two months ago and is now devoting full time to the iceberg idea, believing it to be far more economical in the long run. Faisal has formed a group called Iceberg Technology International. In June he sponsored a conference in Paris that concluded not only that the concept is feasible but that it could supply water at costs 30 to 50 percent lower than desalination. This could also make it feasible for areas outside the Middle East, such as Australia, Chile and California to use icebergs.

Last week's conference in Ames dealt not so much with economic as with scientific and engineering considerations. One of the surprising things that came out of it was how little scientists know about icebergs. They've been regarded as merely a nuisance, something to stay out of the way of. Many of the problems concern the numbers, size, behavior, lifetime, melt rates and physics of icebergs. And it's clear that a whole branch of research dealing especially with floating icebergs is ahead. A new journal dealing with iceberg utilization is planned, and another workshop on the subject a year from now was strongly recommended by the participants. (Faisal said he thinks it ought to be held "on the high seas" on an icebreaker.) The scientists and engineers recommended a program of experimentation and modeling to validate the engineering concepts. "We're not pessimistic," says Yagle. "Optimism is warranted if the task can be dealt with in evolutionary phases."

Nobody's enthusiasm seemed dampened by the litany of engineering problems that need solving. "There are fewer people dubious now than before," said veteran French polar explorer Paul-Emile Victor as the conference ended. Both he and Faisal, who has asked Victor to be his polar consultant, understand the natural caution of the scientists but see no insurmountable problems. "Five years after funding we could do it," says Victor. "If you do not start with an optimistic point of view, you do not get anything done in life." As for money, once feasibility is conclusively demonstrated the funding will come, Faisal maintains. "I believe in the idea," Faisal told SCIENCE NEWS. "I can get the money." □