

Beal believes that many White House crisis management problems can be corrected by the efficient application of modern computer technology. Since appointment to his post in late 1982, he has devoted much of his time to the development of a system for swiftly conveying information to the President in video, not printed form.

"The one technological innovation that we have hit upon that is very important is that we have married two worlds—digital and video," he says. "What that system represents is the following: we take a series of computers and they are very high speed, and their job is to organize information so that, when the President actually sees it, it largely is in composite video form. . . . It's supposed to look like [what] you would see on television if somebody had systematically gotten it ready." Although the screen itself primarily displays text, Beal says that his staff has prepared and stored "state-of-the-art graphics," including symbols depicting such activities as negotiation and fighting, as well as maps and bar graphs.

Beal explains that the primary value of the system is its speed and flexibility. Detailed analysis is impossible during a crisis, he says. "Nobody walks into the [Oval Office] struggling to hold his computer printout. . . . The worst thing that can happen is to pick up on something that is dead at the moment that you tell it. . . . And so you have to use your technology to accelerate the pace." The video system accomplishes this by presenting symbols as well as information about world events, "so that no one tiny bit of it gets lost in the mind."

This is merely the beginning and much more remains to be done before the impediments to successful crisis management are eliminated, Beal says. "It is unfortunate that no truly experienced crisis decision-maker has ever systematically evaluated the information management requirements and decision-making requirements from the top down." Ironically, "the American government will spend literally billions of dollars developing information systems for the bottom and nothing for the top. . . . By top, I mean the National Security Council, the President, and other people."

He is not sanguine about the future. "I have looked at the sequences of crises in the world. . . . The evidence is that the whole international system is heating up again."

"We are going to have more opportunities for crisis management," Beal concludes. "I don't think there's any question."—**R. JEFFREY SMITH**

Agent Orange: Guarded Reassurance

A major epidemiological study of Vietnam veterans has turned up some findings that are unlikely to still the debate about the health effects of exposure to the herbicide Agent Orange. The study,* carried out by the Centers for Disease Control (CDC) in Atlanta, found that Vietnam veterans in general do not seem to have an increased risk of fathering children with serious birth defects. However, the study did find a slight increase in the incidence of some birth defects, but an apparent decrease in others, among the offspring of those likely to have been most heavily exposed to the dioxin-contaminated herbicide.

According to J. David Erickson, the senior scientist on the CDC study, "We think we have strong data to show that the Vietnam veterans are not at an increased risk." That conclusion was reached after studying more than 7000 families in the Atlanta area with babies born with major birth defects in the period between 1968 and 1980.

To determine the mothers' exposures to potential causes of birth defects and also the fathers' experiences in Vietnam and their likely exposures to Agent Orange, the researchers conducted extensive interviews with the babies' parents. The indices for exposure used in the study were far from ideal, however. One was based on the father's recollections and the other based on military records of his movements in Vietnam cross-indexed with records of herbicide-spraying missions. Both indices are qualitative, and their degree of accuracy is unknown.

The CDC scientists found that the babies of the Vietnam veterans were more likely than other babies to have certain types of serious birth defects, including spina bifida, various kinds of tumors, and cleft palate. The incidence of those defects corresponds roughly with their fathers' exposure to Agent Orange in Vietnam. However, the study also found that there appears to be a lower incidence of certain other types of birth defects, including some affecting the cardiovascular system, among the children of these veterans.

The CDC scientists argue in their report that although these results are "statistically significant . . . they may not be biologically significant." The correlation with Agent Orange exposure, for example, is by no means proven, and it is difficult to explain the apparent decrease in the incidence of some other birth defects.

Ellen Silbergeld, a neuroscientist with the Environmental Defense Fund who has served as a witness on behalf of Vietnam veterans and others claiming harm from exposure to dioxin, disagrees with certain conclusions regarding dioxin's toxicity. She argues the CDC results are "positive"—indicative of dioxin's peculiar toxicologic specificity. Erickson says, "That's entirely possible. Our study can't rule it out. The findings may represent a real increase in risk or they may be a statistical fluke."

Silbergeld points out that for two categories, spina bifida and cleft palate, similar defects are seen in animal studies of dioxin. However, this apparent correlation of the CDC results with rodent studies is not so straightforward; the animal studies involved exposing pregnant females, not males, to dioxin. There are no animal experiments that directly address the issue of whether exposing males to dioxin will lead to birth defects in their offspring.

Thus, like most other epidemiologic studies of people exposed to dioxin, the CDC study presents a somewhat ambiguous verdict on the chemical's toxicity. Veterans' groups have, however, already reached a tentative settlement with seven former manufacturers of Agent Orange under which the companies will establish a \$180-million trust fund for treatment of the medical problems of veterans and their families (*Science*, 25 May, p. 849). Terms of the settlement currently are being aired in a series of public hearings. —**JEFFREY L. FOX**

*The report, "Vietnam Veterans' Risks for Fathering Babies With Birth Defects," was prepared by J. David Erickson, Joseph Mulinare, Philip W. McClain, Terry G. Fitch, Levy M. James, Anne B. McClearn, and Myron J. Adams, Jr. A brief account appears in the *Journal of the American Medical Association*, 17 August, p. 903 [volume 252]; a comprehensive version can be obtained from the authors at CDC in Atlanta.