The State of PBB Contamination

It has been called the most devastating contamination in agricultural history: In the summer of 1973, toxic fire retardant chemicals were accidentally added to livestock feed in Michigan. Five years after the accident, blood and fat tissue samples were collected from a cross-section of the Michigan population. The results of that study — recently reported by researchers from Mount Sinai School of Medicine in New York City — indicate that nearly all of that state's population had been contaminated with the fire retardant chemicals called polybrominated biphenyls (PBBs). Moreover, evidence from other studies suggests that the level of contamination has not significantly decreased since the 1978 survey. The health effects of "such continued body burdens" of PBB are not yet known, report Mount Sinai researchers Mary S. Wolff and colleagues in the April 16 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.

PBBs are chemicals that have been found to be liver-damaging, neurotoxic, immunotoxic and carcinogenic in animal studies. From 1970 to 1974 (when their manufacture ceased), these chemicals were used by more than 130 U.S. companies as efficient fire retardants for plastics. In 1973, between 1,000 and 2,000 pounds of the chemicals entered the food chain when Michigan Chemical Corp. inadvertently substituted the PBB flame retardant product "Firemaster" for the magnesium oxide additive "Nutrimaster" in animal feed. The feed then was sent to hundreds of dairy farms in west-central Michigan. It wasn't until seven months later — after farmers noticed significantly decreased milk production in their cattle, a marked increase in aborted calves and abnormal growth of animal hooves — that the error was detected. A state-supervised destruction of more than 30,000 cattle, 1,470 sheep, 5,900 swine and 1.5 million chickens followed. Unfortunately, by that time, meat and dairy products from the contaminated farms already had been sold and consumed throughout the state.

The recently published study by Wolff and associates is the first peer-reviewed journal article to report the precise extent of the state-wide PBB contamination. (Earlier studies were limited to certain subsets of the Michigan population — dairy farmers, nursing mothers or chemical workers, for example.) The study involved analyzing serum (a fraction of whole blood) from 1,681 persons and buttocks fat samples from 844 persons. Results reveal that 97.3 percent of the fat samples and 70 percent of the serum samples had detectable levels of PBBs. Levels of contamination — ranging up to 36,700 parts per billion in fat tissue and up to 120.5 parts per billion in serum samples — "were highest in that part of the state where meat and dairy products had been most contaminated and were lowest in the upper peninsula," Wolff reports.

Whether such levels of PBBs have caused or will cause serious health problems is unclear. Jeoffrey K. Stross of the University of Michigan and associates at the Michigan Department of Public Health in Lansing last year reported that various laboratory tests provided no objective findings to correlate with the subjective complaints of 23 farmers and 28 chemical workers with known exposure to PBB. For example, while one-third of the farmers in their study appeared to have enlarged livers during examinations, half of these were not confirmed by liver scans, Stross reported in the March 1981 TOXICOLOGY AND APPLIED PHARMACOLOGY. Also, although many farmers had skin problems, "these were common dermatologic problems ... which are not uncommon in the general population and in people working outdoors," the Michigan researchers reported. "Present evidence suggests that people exposed to PBB have few objective findings at this time," they concluded, "and reactive depression may be responsible for the high prevalence of constitutional symptoms."

In a telephone interview, Stross said he sticks by that conclusion and that the Mount Sinai study has "not changed my thinking" regarding potential PBB effects. He did concede that although "the widespread distribution" of PBB in Michigan was already known, the new study indicates it is even more widespread than previous estimates of 90 percent. But, he added, it is "difficult to say" to what extent, if any, the reported levels of contamination can affect a person's health "because people did not begin their studies until three to five years after exposure. There is no good evidence to link the population at large to adverse health effects produced by these [PBB] levels," he told SCIENCE NEWS.

J. George Bekesi, on the other hand, says he has found laboratory evidence for a PBB-induced health effect. In the March 17, 1978 SCIENCE, Bekesi and cohorts of Mount Sinai School of Medicine reported evidence of suppressed immune systems — decreased numbers of T cells, for example — in the PBB-exposed Michigan dairy farmers. Later results suggested a correlation between PBB concentration (dose) and the extent of immune system abnormality (response). Last year, Bekesi repeated his immunodiagnostic tests of the PBB-exposed Michigan dairy farmers. The results of that study — to be submitted to SCIENCE for publication — reveal that "nothing has changed," Bekesi says.

This observed chronic impairment of immunological function is just one effect potentially attributable to the continued storage of PBB in fat and other tissue, writes Dean W. Roberts of Hahnemann Medical College in Philadelphia in an April 16 JAMA editorial that accompanies the report by Wolff and associates. Of even greater concern, he says, is evidence of PBB-induced cancers in animals. "In view of the carcinogenesis lag time of up to two or three decades," Roberts says, "it will be important to monitor a sample of the exposed population over a prolonged period." —*L. Garmon*

JSC's Kraft to depart

Christopher C. Kraft Jr., director of the NASA Johnson Space Center in Houston, plans to leave the agency by the end of the year. His announcement came less than two weeks after a similar one by Jet Propulsion Laboratory head Bruce Murray (SN: 4/17/82, p. 260). Kraft, who has been with NASA since its inception (following 13 years with its predecessor, the National Advisory Council for Aeronautics), and who has directed JSC for the last decade, will be replaced by Gerald D. Griffin, who left NASA for the private sector last year after serving in several key space agency positions.

After the fifth space shuttle flight, due late this year, the shuttle will have established its operational status, says Kraft. "This will be a transitional period for activities at [JSC], and a reasonable time to depart." Still, his reasons are uncertain. Although he is in his third year of employment as a "retired annuitant," AVIATION WEEK & SPACE TECHNOLOGY magazine reports that "Kraft's departure was requested by NASA administrator James M. Beggs in order to install at Johnson new personnel and philosophies more in line with Beggs' viewpoints in transitioning space shuttle to an operational system." JSC has served as control center for all U.S. manned space flights, but a changing role may in fact be in the wind. Deputy NASA administrator Hans Mark last year wrote that "no matter how the matter of shuttle operations is finally decided, [JSC] should phase out of the operational mission during the next three years. It is very unlikely that it will be possible to control costs of operations if the developmental attitudes that prevail at [JSC] dominate after the space shuttle becomes operational." NASA has even discussed the possibility of turning routine mission operations over to a private contractor, which, for JSC, would mark a transition indeed. □