management discipline, and nuclear materials accounting. In May, Ruud specifically asked Rockwell officials to confirm in writing that they had improved the controls on plutonium within the plant. Otherwise, he said, they should close it down.

Several western politicians demanded last week that DOE take stronger action to resolve these management problems. Governor Gardner said on 8 October that he believed that "production is given a much higher priority than safety" at Hanford. "Maybe it's time for an independent review of all Rockwell operations, both to restore credibility and to assure safety," he said. Representatives Ron Wyden (D–OR) and Al Swift (D–WA) and Senator Daniel Evans (R–WA) have made similar proposals.

They are likely to have their wish fulfilled, according to U.S. congressional aides. The House energy subcommittee on oversight and investigations is one of several committees planning an inquiry. ■

ELIOT MARSHALL

Hoechst Tests Lead EPA To Ban Herbicide

A widely used herbicide, dinoseb, has been banned from use by the Environmental Protection Agency. The ban was instituted on 7 October in response to findings that the chemical could affect human reproduction and cause tumors.

EPA Administrator Lee M. Thomas issued the order on the basis of results of tests performed on animals by Hoechst AG, an international chemical and pharmaceutical manufacturer based in West Germany. Irreversible neurological and skeletal malformations occurred in the offspring of rabbits exposed to the chemical during pregnancy, the agency says.

Defects were found in 11 of 16 litters of Chinchilla rabbits that received doses of 1, 3, and 10 milligrams per kilogram of food ingested daily during days 6 to 18 of gestation. EPA concluded that dinoseb produced "biologically and statistically significant increases in malformations . . . at the highest dose tested when compared to the control group."

Other studies submitted to EPA show that the chemical affects fertility in male rats and mice. EPA says that limited studies also suggest that dinoseb has the potential to affect the human immune system and eyes. While dietary exposure to the chemical does not appear to present a significant risk, says Thomas, the chemical poses a threat to the unborn children of pregnant women and may produce sterility in men when it is inhaled or absorbed by the skin. The agency began examining the hazards of dinoseb in 1984.

Thomas exercised rarely used emergency powers to ban the pesticide because of the potential hazard to 25,000 farm workers in the next several months. Usually, a hearing is held before use of a herbicide or pesticide is suspended or banned. Dinoseb is primarily applied as a contact herbicide to control broadleaf weeds. An estimated 7 million to 11 million pounds of herbicides containing dinoseb are applied annually in the United States, chiefly through field sprayers, aircraft, and hand-held equipment. EPA estimates that 25% of this use occurs in the fall and early winter.

The herbicide is used primarily in connection with soybeans, cotton, potatoes, peanuts, and alfalfa. First-year losses from the suspension of dinoseb use will run as high as $90 million, the agency says. The three largest American producers are Uniroyal Chemical Company, Cedar Chemical Corporation, and Drexel Chemical Company, EPA says.

Hoechst does not market dinoseb in the United States. The company has registered the chemical with the EPA, chiefly as a certification procedure to meet requirements of other countries that permit the importation of products approved by the American agency. The company initiated toxological studies last year in anticipation of the U.S. Congress passing amendments to the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The legislation requires that pesticides that have been on the market for years be retested for compliance with current federal standards.

Hoechst first notified EPA of its findings in December 1985. Subsequent reports were provided to the agency in May of this year and on 16 September. On 10 September, in a letter to its subsidiary, American Hoechst Corporation, the company confirmed the findings of earlier tests. It further advised American Hoechst to drop EPA registration for the chemical. Trying to win EPA approval for continued use was judged too costly by the company.

On another front, EPA has placed restrictions on a second widely used herbicide, alachlor. Registered with the agency since 1969 and manufactured by Monsanto Chemical Company, it is the most widely used herbicide in the United States (*Science*, 12 September, p. 1143). The agency has initiated a review of the chemical in response to test results that show that alachlor produces tumors in mice and rats. A ban on the use of alachlor, the agency says, would mean farm losses up to $760 million. ■

MARK CRAWFORD

Panel Questions Shuttle Flight Rate

The space shuttle fleet will be unable to sustain the flight rate planned by the National Aeronautics and Space Administration (NASA), according to a panel convened by the National Research Council.

After an initial buildup period following the resumption of shuttle flights, says the panel report,* NASA will be able to launch 8 to 10 flights per year with the current three-orbiter fleet, and 11 to 13 flights per year with a four-orbiter fleet. This estimate is as much as 25% lower than NASA's recently announced schedule, which calls for 12 flights per year with three orbiters, and 16 flights per year when the replacement orbiter enters the fleet in 1991 (*Science*, 17 October, p. 279).

The 11-member panel, which was chaired by former White House science adviser Edward E. David, Jr., says that a "surge" rate equivalent to 15 flights per year should be possible with four orbiters—but only for short periods of time, and only for simple payloads and flight plans. Sustaining even the lower rates will require improvements in spare parts availability, crew training facilities, shuttle processing facilities, and many other aspects of the program.

The shuttle flight rate is a sensitive point with NASA. Not only has the agency been criticized for unrealistic launch schedules in previous years, but the pressure on mid-level officials to meet those schedules was cited by the Challenger commission as a major factor contributing to the disaster on 28 January. In announcing the post-Challenger shuttle manifest on 3 October, NASA administrator James C. Fletcher accordingly emphasized that the 16-flights-per-year rate was simply a target and would be modified if any safety problems arose.

Where NASA and the panel appear to differ most strongly is in their assumptions about orbiter availablity. The panel members concluded that one or another of the orbiters will always be out of service through a combination of routine maintenence, repairs, and upgrades. In effect, a three-orbiter fleet is really only a two-orbiter fleet, and so on.

The panel also points out that the shuttle fleet will have to serve at least until the year 2000. Since there is a significant probability of losing an orbiter to age or accident in that time, the panel suggests that NASA should always have one contingency orbiter in production. ■ M. MITCHELL WALDROP

* "Post-Challenger assessment of space shuttle flight rates and utilization," National Academy Press, Washington, DC, October 1986.