that the concentrations may be below the level of detection. Investigators even went so far as to test the unlikely possibility that this strain of *Salmonella* is resistant to heat. It was not.

Moreover, not all the milk processed on the 3 days has showed bacterial contamination. Some samples produced both positive and negative results and there has been a wide range of salmonella concentrations, says Jeremy Margolis, who is the Illinois inspector general and was acting state director of public health prior to Turnock's appointment.

Margolis also says that investigators have swabbed "every nook and cranny in the plant" in search of salmonella, but to no avail. All the tests to date have been negative. Of the thousands of cultures taken, "not a single salmonella has been found," he said in an interview. Sabotage has been considered, but minimized as a possibility because the processing system is closed, Margolis notes. "To my knowledge, nothing whatsoever suggests sabotage," he said. Even the paper cartons and plastic bottles to package the milk have been examined as a source, but, again, the tests are negative.

Scientists from the Food and Drug Administration, CDC, the state health department, Jewel, and other experts are now probing the vast plant, piece by piece. Margolis and Schultz say that the equipment has been subjected to dye testing to detect possible cracks and leaks, and pressure testing to trace the flow of milk. Each valve is being disassembled.

So far, the investigation has uncovered 13 minor violations. The dye tests have revealed a number of pinhole leaks among a few of the pasteurization plates and a small crack in one of the 25,000-gallon holding tanks. Investigators cut a 1-foot-square piece out of the tank, but failed to find any salmonella in the insulation where the red dye had leached.

Margolis says that the probe of the plant has become so complex that the state is now relying on a management technique used by the National Aeronautics and Space Administration to solve problems. "Every conceivable possibility is being considered," he says. Turnock says, "This may be an absolute quirk of circumstances or it may be that the conceptualization of the design of the plant failed to take into account a rare but possible event." Some officials, like Schultz, are increasingly skeptical that the problem will ever be found as the investigation continues. He says, "Every day, the mystery gets deeper."

—MARJORIE SUN

HHS Revises Rules on Animal Research

The Public Health Service (PHS) on 1 May released long-awaited revisions of its policy on laboratory animals, which are applicable to all institutions receiving PHS funds for research involving animals.

The changes, made partially in response to pressure from the animal welfare movement, shift responsibility more to the institutional level and require more detailed justifications for animal use in research proposals.

The principal requirements are as follows: every institution must have an "animal care and use committee." Formerly known as Animal Review Committees, these bodies, in which lay members are required, will have enhanced responsibilities for reviewing research plans and monitoring compliance. All animal facilities must be accredited by the American Association of Laboratory Animal Accreditation, or must conduct a self-assessment based on the updated NIH Guide for the Care and Use of Laboratory Animals. Institutions must designate clear lines of authority for those involved in animal care and use, and must furnish information to the federal government in great detail not only on the care and use of animals but on the facilities, staffing, and staff training.

The new policy, which goes into effect next November, "tells the world the standards are pretty high," says Charles McCarthy of the Office of Protection from Research Risks of the National Institutes of Health. He adds that the standards were already pretty high, but people are "not always getting credit."

The new PHS rules are not the only development on the animal front. In late April, the American Psychological Association came forth with a detailed set of guidelines for research psychologists. Designed by its Committee on Animal Research and Experimentation, they furnish a prototype of sorts, covering not only animal care but research procedures, surgery, fieldwork, and the use of animals in education. Review of proposed research by a local institutional committee is also required.

Meanwhile, the Office of Technology Assessment is completing a report on "Alternatives to Animal Use in Testing, Research and Education," requested in late 1983 by Senator Orrin Hatch (R–Utah), chairman of the Senate Committee on Labor and Human Resources.

In yet another project, the National Research Council's Board on Basic Biology is seeking money for a $1-million study on the "The Use of Laboratory Animals in Biomedical and Behavioral Research." This will include an update of the 1978 survey of animal use by NRC's Institute for Laboratory Animal Research (ILAR), which sent questionnaires to more than 2000 institutions. The study will also discuss future research requirements, regulations, and scientific policy issues.

Taken together, these initiatives are likely to further the downward trend in consumption of vertebrates. According to the ILAR's 1978 survey, the number of mammals used in research had declined from 33 million to 20 million in the prior decade.

—CONSTANCE HOLDEN

Congress Rearranges NRC's Priorities

The budget priorities of Nuclear Regulatory Commission (NRC) Chairman Nunzio J. Palladino have been largely rejected by House and Senate authorizing committees. The committees instead have mostly followed recommendations made by NRC Commissioner James K. Asselstine.

In testimony presented to Congress in April, Asselstine charged that the commission's recommendations for trimming back reactor regulation, inspection, and enforcement programs were unsound. The Administration had recommended that NRC's budget be cut from $449.6 million this year to $429 million in fiscal year 1986, and that the emphasis should be shifted toward "regulatory" research programs.

"We ought to reallocate that money and aim more at some of the real safety problems that exist in the plants," Asselstine advised the House Energy and Commerce subcommittee on energy conservation and power on 17 April. Although the energy committee has yet to issue its report, it is

expected to embrace budget levels set by the House interior committee on 1 May. The committee's actions, aides say, track Asselstine's objections to the NRC budget.

The interior committee has recommended funding reactor regulation programs at $96.7 million, compared to the $88.9 advocated by NRC. The House committee also wants inspection and enforcement efforts funded at $95.5 million, almost $3 million more than called for by NRC. The nuclear materials safety and safeguards budget would be boosted to $42.5 million, almost $2 million more than NRC sought.

The Senate environment committee's action parallels the House interior committee with two exceptions. It authorizes increasing reactor regulation funds to $91 million—slightly less than the current budget. And, it calls for funding regulatory research programs at $136.6 million—$600,000 more than the NRC requested but less than this year's $150-million budget.

The environment committee recommended a total of $437 million for NRC in 1986—$8 million more than requested by the agency. The House and Senate appropriation committees are expected to rely heavily on the authorizing committees' recommendations, staffers say. They are not expected to take up the NRC budget until later this month or early June.

—**Mark Crawford**

Ohio State, Arizona to Build Giant Telescope

Ohio State University and the University of Arizona have announced that they will jointly build an 8-meter infrared telescope atop Arizona's Mount Graham, some 100 kilometers northeast of Tucson.

When completed in the early 1990's, the Mount Graham instrument will be second in size only to the recently announced W. M. Keck telescope, a 10-meter instrument that will be built on the summit of Hawaii's Mauna Kea by the University of California and the California Institute of Technology (*Science*, 18 January, p. 275).

As in the California project, the Arizona/Ohio State group will use so-called "new technology" to transcend the size limits on conventional mirrors, represented by the 5-meter Hale telescope on Palomar Mountain and the 6-meter Soviet telescope at Zelenchukskaya in the Caucasus. However, the approaches are very different. The California mirror will be a mosaic of 36 hexagonal segments kept in a constant adjustment by computer, whereas the Arizona/Ohio State mirror will be cast as a single monolith.

The technique was developed by Arizona's Roger Angel, with major concerns being simplicity and cost-effectiveness. First, chunks of Pyrex glass are melted in a mold; then, as the glass cools, the mold is spun so that centrifugal force creates just the right parabolic surface on the finished mirror blank. This means that very little glass has to be removed during the final polishing. Angel and his colleagues have successfully demonstrated this technique on a 1.8-meter mirror, and are now building a facility for 8-meter mirrors under the university football stadium, Manhattan Project style.

In addition, the mirror for the new telescope will be given a relatively large curvature and a correspondingly short focal length, which means that the telescope structure and its protective dome can be that much smaller and cheaper. The upshot is that the estimated cost of the 8-meter instrument is only $25 million, far less than the $85 million being budgeted by the Californians. (Also under consideration is a plan to include a second, identical telescope, which would raise the cost to some $50 million.)

The money is not yet in hand, but the partners do have reason to be optimistic. Ohio State is in the midst of a $250-million fund-raising drive, and Arizona, which is currently celebrating its centennial, is raising $100 million. Eugene R. Capriotti, for one, believes that the astronomers can make a case for a small fraction of that money.

As chairman of Ohio State's astronomy department, he is the first to admit that "Arizona is the dog and we're the tail at this time. But the whole idea is to develop a program here of the first magnitude." Indeed, the observatory will have a remote control and viewing site on the Ohio State campus in Columbus. "We hope to sit here in Ohio and operate the telescope out in Arizona," he says. "We don't have to sit back any longer and let places like Texas and California dominate astronomy because of location."—**M. Mitchell Waldrop**

Senators Criticize Lopsided Chemical Weapons Panel

Last October, the House and Senate Armed Services committees asked the White House to establish a "bipartisan" commission on binary chemical weapons. The group's assignment was to assess the usefulness of existing chemical weapons, the adequacy of proposed defensive measures, and the implications of binary production for arms control. Supporters of the program hoped that the commission would generate a favorable consensus similar to that created by the Scowcroft panel on the MX missile.

In response, the White House appointed at least six people to the eight-member panel who had previously supported the production of binaries. Thomas Welch, a deputy assistant secretary of defense for chemical matters, was appointed as its executive secretary, and staff work was performed by members of the Army's chemical corps. In a report on 1 May that surprised no one, the panel concluded that binary weapons should indeed be produced.

At a hearing of the Senate Armed Services Committee, panel chairman Walter J. Stoessel, Jr., a former U.S. ambassador to Germany, Poland, and the Soviet Union, stressed that the members had all "come to this with an open mind." But he acknowledged under questioning from several senators that none of the members had previously opposed binary production.

The panel, which included several retired Army officers, as well as former national security adviser Zbigniew Brzezinski and former secretary of state Alexander Haig, concluded that only 25 percent of the existing chemical stockpile is "serviceable," and only a fraction of that is "militarily effective." All of these weapons "should be destroyed at an accelerated rate," Stoessel said, provided that binary weapons are created to take their place.