

## Grim prospects for flood-ravaged R&D

This week, as the level of the Red River continues to recede throughout North Dakota, researchers in Grand Forks have begun taking stock of what survived last month's flood. Unlike their counterparts 75 miles away in Fargo, many will not be able to return to their labs for weeks—in some cases, months.

The U.S. Department of Agriculture's Human Nutrition Research Center in Grand Forks was among the hardest hit. On April 20, water began seeping into this facility, renowned for its pivotal studies, many probing the dietary effects of essential and trace metals, including copper (SN: 6/8/85, p. 357) and magnesium (SN: 5/3/97, p. 279). Though a comprehensive assessment is currently under way, Forrest Nielsen, director of the center, estimated that the facility suffered about \$6.5 million in flood losses. Its annual budget is \$7 million.

Volunteers housed in the center since January as part of a long-term dietary study were moved to a nearby hospital for a few days, then sent home when that

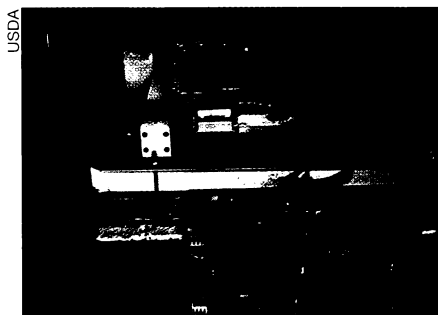
\$1 million research project was abandoned 8 weeks early. Similarly, several outpatient studies were discontinued when researchers and subjects had to be evacuated from the town. Moreover, nearly 1,000 laboratory animals had to be destroyed when access to clean water and their special experimental food was lost.

"Overall," Nielsen estimates, "we lost experiments worth about \$2 million." One of his own experiments was terminated just a week before data collection was scheduled to end.

While he hopes to see all the studies restarted eventually, it won't happen soon. "Everything is totally shut down," Nielsen laments from an office he's set up in his home.

The center won't regain electric power in even half of the one dry floor for perhaps a month. Inpatient studies are unlikely to begin until August, he says, and animal work can't resume until the basement is cleaned and repaired—probably in late fall. More than 1 million gallons of dirty river water were pumped out of it just last week.

Though the University of North Dakota in Grand Forks sustained an estimated \$40 million in flood-related losses, only a



First-floor room at the Human Nutrition Research Center, where water levels rose to the bottom of the fan on this generator.

few of its research centers took big hits.

The university's 17 biology researchers all suffered some losses, notes department chair Albert J. Fivizzani Jr. Most must throw out enzymes and reagents that were not refrigerated reliably during the flood—supplies valued at perhaps \$50,000, he says. Several also lost biological samples, some of which may be irreplaceable.

A 6-foot-deep sewage backup in the basement-level biomedical laboratories caused much of the estimated \$10 million worth of flood-related research losses at the medical school. Among the equipment destroyed were three electron microscopes. "In terms of research at the medical school, this is probably the leading tragedy," observes biochemist Robert C. Nordlie.

Flood damage to a network computer interrupted the medical school's E-mail and Internet access, which could remain down for another 3 to 4 weeks, notes biochemist Barry Milavetz.

The university's Energy and Environment Research Center also got clobbered. This \$25.7-million-a-year nonprofit institute lost sophisticated analytical equipment valued at about \$4.5 million, including an X-ray diffractometer, X-ray fluorescence spectrometer, three scanning electron microscopes, and a molecular-scale milling machine.

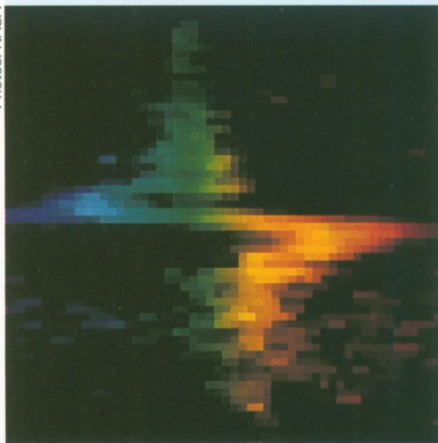
Since this hardware was essential to about one-fifth of the 200 research projects that the lab performs under contract to clients worldwide, it must be replaced, says Gerald H. Groenewold, director of this former Department of Energy facility. He says he hasn't a clue where the money will come from.

While his staff of 250 scientists, engineers, and technicians are called state employees, they get no money from the state. Nor does the facility receive any money from the university. For all practical purposes, he says, the center is a small business that derives all of its funds from its clients—many of them corporations or governments.

"As a hydrogeologist, I used to love water," muses the stunned Groenewold. After the last 3 weeks, "I'm not so sure I can say that anymore." — J. Raloff

## Checking out Hubble's new eyes

Photos: NASA



It took just 20 minutes for the Hubble Space Telescope's new imaging spectrograph to confirm the existence of a black hole at the center of M84, a galaxy 50 million light-years from Earth. The zigzag pattern (left) depicts the speeds of orbiting gas and stars, measured on opposite sides of the galactic center at distances ranging from 1,500 light-years (top and bottom of the image) to 26 light-years (center line). Green and blue indicate material moving toward Earth; yellow and red indicate material moving away.

Close to the galaxy's center, the speeds of orbiting matter skyrocket to 400 kilometers per second, pushing the emissions to the far red and far blue. The sharp

increase in speed can only be explained by the presence of a central black hole at least as massive as 300 million suns tugging on the gas and stars, reported Bruce E. Woodgate of NASA's Goddard Space Flight Center in Greenbelt, Md., at a press briefing this week.

Unlike its two predecessors, which laboriously measured speeds one point at a time, the new spectrograph records a series of velocities simultaneously, enabling astronomers to conduct a rapid census of nearby galaxies and to hunt for smaller black holes than could previously be detected.

Despite problems that could cut its 4.5-year intended lifetime by more than half (SN: 5/3/97, p. 272), a second instrument installed on Hubble last February is also proving its mettle. The near-infrared camera and multi-object spectrograph penetrated the dust cloaking OMC-1, part of a stellar nursery in the Orion nebula (right). The bright central object is the massive star BN; molecular hydrogen (blue blobs at lower left) may indicate material thrust from nascent stars yet to emerge from their dusty cocoons.

— R. Cowen

