met, the knowledge gained will completely change our lives."

"The truth is," Representative Newt Gingrich of Georgia, the Republican whip, had declared during a boisterous debate in the House last June, "I don't think there is a single person in this body who has the scientific background to know for sure whether this is the greatest investment ever or the worst investment." A similarly disarming remark came from Senator Phil Gramm, the Texas Republican who is among the SSC's strongest defenders. "I doubt if there is a member of the Senate who really understands to any degree what the SSC is about." Having said that, he trudged into more familiar territory. As a former economics professor at Texas A&M University, he claimed that between 20% and 30% of the US gross national product comes from high-energy physics. "Everything from the computer to television has come as a result of high-energy physics undertaken in this country," Gramm said.

On 14 August friends of the SSC gained confidence in the project when the long-awaited "string test" of a complete half cell of the main ring met the criteria set nearly three years before by the project's design group. The half cell, often called "the basic building block of the collider," consists of five full-length dipole beam-bending magnets and one quadrupole, each jacketed in a cryostat, along with associated components. The 15-meter dipoles were built at Fermilab by engineers and technicians of General Dynamics. The quadrupole was built at the Lawrence Berkeley Lab and tested at 4.35 kelvin at Brookhaven.

While SSC officials had hoped to start the string test in June, it was delayed for more than a month to complete the test building and to run diagnostic procedures on the magnets. Schwitters had planned more than a year ago to complete the test by September, before the start of fiscal 1993, when the schedule calls for the magnets to begin to be manufactured in quantity.

A celebratory event

By early July, all was ready. The cooling to 4.35 kelvin took a week, during which time the cryogenic system was carefully checked for leaks. Then began weeks of low-power testing, including deliberately induced quenches and checks for thermal quench propagation through each magnet at currents of 2000 amps and above. The critical test took place on 14 August. Some 50 scientists and Energy Department officials jammed into the control trailer outside the test building to watch the event. As the current in the bending magnets ramped up, tensions increased apace in parallel in the trailer. Cheers went up when the current reached full power at 6520 amps, corresponding to the SSC's intended operating field intensity of 6.6 tesla, and was held at that level for a few minutes shortly before noon CDT before it was lowered to zero. A bottle of California champagne was popped to celebrate the occasion.

"The results showed that the magnets and other subsystems can work together," said an enthusiastic Theodore Kozman, an associate director of the lab and head of the accelerator systems division there. Most important, there had been no quenches during the test.

Early next year the lab will conduct another string test—this time of a full cell, consisting of ten dipoles and two quads. When the machine is completed, each of the two main rings will have 43 cells in each sector; each ring is designed for ten sectors. The 8600 dipoles will be built by either General Dynamics in Hammond, Louisiana, or by Westinghouse Electric in Round Rock, Texas, the two firms that are competing for the magnet contract. Because the test magnets were among the early prototypes of the final design, each one cost slightly more than $250 000. Once the magnets are industrially fabricated in quantity, the economy of scale should bring the sticker price down to about $150 000 each. While Schwitters points to the magnet test as a sign to doubters that the machine will work as advertised, he also expects that Congress will continue to keep a careful watch on its progress and its costs.

—IRWIN GOODWIN
with additional reporting by Bertram Schwarzschild

EXODUS OF FIVE OMB SCIENCE STAFFERS LEAVES GAPS IN KEY SCIENCE POLICIES

Five departures from the science research branches of the White House Office of Management and Budget have depleted the agency's ranks of technically trained staffers even as the fiscal 1993 budgets for the science agencies are critically debated in Congress. The absence of these people leaves gaping holes in the White House science policy apparatus when it comes to knowing the background and understanding the costs, risks and benefits of many programs supported by the budgets of NASA, the Department of Energy and the National Science Foundation. The flight of this flock has stimulated a flurry of rumors about their reasons for resigning. Speculations range from increased frustration with the dismal outlook for science funding to a serious rift with the agency's leaders over the way science budgets are parceled out as well as to anxieties about the political discord among the White House, Congress and sections of the scientific community over such prize projects as Space Station Freedom and the Superconducting Super Collider. OMB's "gang of five" deny any internal conspiracy or impending crisis. Still, their departures are bound to have some serious ramifications for science agencies, for national labs and for academic scientists.

Joseph S. Hezir, deputy associate director for energy and science, was a 17-year veteran of the agency. He has joined the EOP Group in Washington as managing partner. EOP is a small consulting organization that advises clients on environmental, natural resources, energy and technology issues and on business opportunities created by government actions. The firm boasts of having four other former OMB officials: two who left the agency before Hezir did and two who departed with Hezir. This group includes David Gibbons, who had spent 20 years there, the last few as deputy associate director for natural resources. At OMB Gibbons oversaw programs of several agencies with environmental missions, including the Environmental Protection Agency, the Department of Agriculture and the Department of the Interior. White House officials are dismayed about EOP because those associated with it appear to be cashing in on their inside knowledge and connections. Though Hezir insists that the letters in the firm's name have no real meaning, OMB staffers gossip that the initials stand for Executive Office Partners, a title suggesting a direct line to the White House.

With a bachelor's degree in chemi-

cal engineering from Carnegie-Mellon in 1973, Hezir spent a year in industry before he came to OMB as a budget examiner for EPA. He later switched to overseeing non-nuclear energy technology programs, which include fossil fuels and renewable power sources. Hezir spent 1982 on a White House executive exchange assignment in the corporate planning department of Exxon Research and Engineering Co, where he developed technology forecasts. He returned to OMB to become chief of the non-nuclear energy branch, which covers energy R&D, and conservation, the DOE labs and energy regulatory programs. As deputy associate director since 1986, Hezir was in charge of the budgetary, regulatory, legislative and policy development actions of DOE, NASA, the National Science Foundation, Tennessee Valley Authority, Nuclear Regulatory Commission and Smithsonian Institution.

Thomas M. Palmieri was chief of the nuclear energy branch, which oversees the Nuclear Regulatory Commission and DOE programs for science research, nuclear energy, defense operations and waste removal and reclamation. After 14 years at OMB he will join Sandia National Laboratories in Albuquerque this month as manager of the strategic program development office. That office looks for ways to provide "exceptional service in the national interest," the phrase President Truman used in establishing the lab to develop nuclear weapons and other defense technology under AT&T's management after World War II. Palmieri, who got his PhD in physics at the University of Wisconsin in 1969, spent the next six years as a member of the high-altitude physics group at Lawrence Livermore. While still with Livermore, he went off to the Center for Nuclear Studies at Saclay, France, for a year. From 1975 to 1977, he was with TRW Energy Systems. During the following year he was a legislative aide to Robert Dole, the Kansas Republican who later became Senate minority leader. After that, Palmieri joined OMB.

At the time Palmieri came to the Old Executive Office Building, OMB included Fred Schult, who had been there when the Atomic Energy Commission was created in 1947 and, though retired, still had an office and a title of consultant, and Hugh Loweth, chief of the energy and science division. Each in his own way, Schult and Loweth taught the rest of the budget crunchers that DOE labs should be celebrated as jewels in the crown of the US research enterprise. They reasoned that the labs were run by competent scientists and engineers who knew what they were doing and therefore neither the agency nor the budget office ought to micromanage the labs. Although Palmieri already knew the lab culture from his days at Livermore, others OMBers, like Hezir, were indoctrinated by Schult and Loweth. Thus, sheltered from the budget storms, the labs flourished. But, OMBers recall sourly, for all the preferred treatment the labs received, their leaders sometimes bit the hands that fed them when they trudged up Capitol Hill to gripe about their budget allocations or to demand a costly new project.

Erosion of trust

In recent years, as the relationship of trust between the agencies and the labs has eroded, under the rubric of accountability, control and cost-containment, OMB has lost its flexibility in dealing with budgets. This, along with zero-sum constraints imposed on the agencies by the 1990 Budget Enforcement Act, have frustrated many OMB staffers. With budget decisions curtailed by spending caps, the agencies had few if any new starts. In such circumstances, the need for OMB to weigh the scope and substance of new programs was greatly reduced. In fact, objective analysis was usually shunned, according to budgeteers. Not surprisingly. some OMB staffers virtually turned into bean counters. Those who had inherited the ideals of Schult (who died soon after leaving OMB) and Loweth (who retired and now is a consultant to Southeastern Universities Research Association) often thought of themselves simply as ciphers. The result, say sources at OMB, was inevitable: an exodus.

Among the others who have left is **Norine E. Noonan**, chief of the OMB branch that oversees NSF and NASA budgets. She came to the agency with a PhD in cell biology in 1976 from Princeton University, having taught biology at the University of Florida and Georgetown University (in Washington, D.C.). In 1982 the American Chemical Society selected her its Congressional Fellow, and she chose to work on the staff of the Senate Commerce Committee. When her year was up in Congress, she admits she had lost her "naivete" about science budgets and was ready to join OMB. In mid-September she becomes vice president for research and professor of biology at the Florida Institute of Technology in Melbourne. "One of the lessons I've learned at OMB is the necessity of choices," she said in a recent interview. "If there is anything I can bring to my university from OMB, it's an understanding of the realities of funding. Federal budgets are not fungible. When scientists oppose a research project, they may get their wish, but that doesn't mean their own pet project will get all or some of the money that would have gone to the project they loved to hate. The money is almost certain to go to a project with the least resistance--and that's not usually in science."

For nearly three years **Nancy Milton** was a budget examiner for DOE's nuclear research programs, with responsibility for non-defense functions at all the labs. Before coming to OMB she was a chief scientist at the US Geological Survey. As a geobotanist, Milton was a member of the USGS geophysics branch and used an array of instrumentation, including satellite sensors, x-ray diffraction and spectroscopy, in her studies of heavily vegetated areas of the Earth. Milton started working for USGS while she was a graduate student at The Johns Hopkins University, which awarded her a PhD in plant ecology in 1981. She left OMB last April to return to USGS as assistant chief geologist for the Eastern region, overseeing the health and welfare of research centers east of the Mississippi.

Katherine Yuracko, a budget examiner who was also, like Milton, in Palmieri's nuclear energy branch, joined Hezir at the EOP Group in September. She got an AB in physics in 1984 from Harvard, an SM in health radiation physics in 1987 from MIT, a master of public policy degree in 1989 from the John F. Kennedy School of Government at Harvard and a PhD in nuclear engineering in 1990 from MIT. In 1990 Yuracko won an executive branch fellowship from the American Association for the Advancement of Science and chose to work on science policy issues at the White House Office of Science and Technology Policy. At OSTP, under the wing of J. Thomas Ratchford, associate director for international programs and science policy, she helped develop interagency discussions on international cooperation for big science projects. Before her year was over at OSTP she moved to OMB to oversee DOE's environmental restoration and waste management program, mainly required to clean up the nuclear weapons complex at a cost of more than $5 billion per year.

With these departures, OMB claims it is casting out lines to snare competent physical scientists and science policy experts to fill the vacant slots.

—IRWIN GOODWIN