National Aeronautics and Space Administration is set to climb from $10.9 billion to $13.3 billion. A dominant factor in the increase is the $1.1-billion addition to the budget for the space station.

Congress last year decreed that some of the fiscal 1989 funds for the space station could not be spent before 15 May 1989, to give the new Administration a chance to review the program. Presidential candidate George Bush voiced early support for a manned space station, however, and he is expected to proceed with the program. But a recent call by a committee of the National Academies of Sciences and Engineering to take another look at the rationale for and scope of NASA's design (see page 164), could make the project more vulnerable on Capitol Hill.

Elsewhere in NASA's budget, funds are included for a start on the Cassini mission to Saturn and its moon Titan, a project that will be conducted jointly with the European Space Agency.

■ **Department of Energy.** The item in DOE's R&D budget that is likely to draw most political attention is the $250-million request for the SSC. The funds would be used to support continuing research, particularly on superconducting magnets, and to begin construction of the facility at a site recently selected in Texas—Congress willing.

Although the SSC would account for a substantial fraction of the increase in DOE's basic research budget, funding for other high energy physics programs would grow by 10% and nuclear physics programs would get a 15% increase. DOE's budget would also permit construction to begin on a 7- to 9-billion-electron-volt synchrotron at Argonne National Laboratory and the Compact Ignition Tokamak, a next-generation fusion machine at Princeton.

Less favored are a variety of R&D programs on fossil fuels, energy conservation, and renewable energy technologies, which are again slated for radical surgery.

■ **Global environment.** A priority in this budget is a coordinated set of research programs aimed at gaining a better understanding of human impacts on global processes such as climate change, ozone depletion, and desertification. A committee under the chairmanship of Dallas Peck, head of the U.S. Geological Survey has drafted a preliminary program spanning seven federal agencies, and the budget would boost spending for these activities from $134 million this year to $191 million in fiscal 1990.

■ COLIN NORMAN

With reports from William Booth, Mark Crawford, Marjorie Sun, and M. Mitchell Waldrop.

U.S.–Soviets Sign Collaboration

Paris

After months of negotiation, a 5-year agreement to promote increased collaboration between the United States and the Soviet Union in eight fields of basic scientific research was signed in Paris last Sunday by U.S. Secretary of State George Schultz and the Soviet Foreign Minister, Eduard Shevardnadze.

The agreement is a major step in rebuilding formal ties between the U.S. and U.S.S.R. scientific communities—ties the United States ended when the Soviet Union invaded Afghanistan in 1979. Schultz and Shevardnadze welcomed the agreement as a sign of improved relations between the two countries.

Under the terms of the new agreement, a joint commission will be established to oversee and encourage joint activities in the fields of geosciences, engineering sciences, scientific problems of the Arctic, life sciences, science policy, chemistry, mathematics, and theoretical physics.

Specific projects will be defined in separate memorandums of understanding negotiated between individual agencies or scientific organizations in the two countries. According to Soviet officials, two of these are currently under discussion—one between the National Science Foundation and the Soviet Academy of Sciences, the other between the U.S. Geological Survey and the U.S.S.R. Ministry of Geology. The others are expected to follow shortly.

The text of the agreement makes it clear that activities such as exchange visits, conferences and joint projects in "basic scientific research," rather than research "designed for the transformation of new discoveries into applied technologies," are the focus.

U.S. concerns over possible Soviet access to U.S. technological know-how are addressed in a detailed, seven-page appendix setting out the rules that will govern the intellectual property rights covering all scientific activities carried out within the framework of the agreement.

The 5-year agreement can be renewed for a further 5 years through mutual agreement, but it can also be terminated at 6 months' notice by either side. ■ DAVID DICKSON

Europe Bans Boeuf à l'Estradiol

Europe is imposing bogus safety standards on beef, according to U.S. officials who are caught up in a 7-year-old wrangle with the Common Market over the practice of doping cattle with sex hormones.

The European Community (EC) banned the sale of meat from hormone-treated cattle on 1 January as a health risk, blocking imports from the United States valued at $100 million a year. Most U.S. cattle are given hormone implants because they accelerate growth without greatly increasing the demand for feed.

The EC claims that its ban is designed to protect citizens from overdosing on sex hormones, but American officials think it is designed to protect European farmers from competition. Last week, a trade war loomed on the horizon as U.S. and EC officials threatened one another with retaliatory tariffs.

The EC's agricultural counselor in Washington, Derwent Renshaw, says that "our consumers have expressed a strong preference to eat hormone-free meat," and the ban on treated beef imports is simply a manifestation of this health concern. He maintains that Europe has not raised a trade barrier, and that the U.S. retaliation is "illegal." While there may be no evidence that hormone-treated beef is risky, Renshaw says, neither is there any evidence that it is safe.

Lester Crawford, director of the U.S. Department of Agriculture's Food Safety and Inspection Service, blasts the EC policy as disingenuous. First, he says, it cannot be enforced. Methods of hormone use are so sophisticated now that it is often impossible to tell whether or not meat in the supermarket comes from a treated animal. Three of the five hormones used in the United States are identical to those the animal produces itself, and residues are within the natural range. For the two synthetic hormones, residues are so low as to be barely detectable—in the range of 1 to 20 parts per billion. No excess residues have been found in U.S. beef in the past 6 years of government monitoring.

The EC insists, however, that it will accept only beef that the exporting government certifies has come from animals that were never given hormones. Crawford's response: "We cannot certify a lie." He says that analytical tools permit one to identify traces of synthetic hormones in some cases, but they cannot support the categorical statement that an animal has never received

hormones. Impossibility has not prevented Argentina, Brazil, and half a dozen others from promising to comply with the EC requirement.

Second, Crawford says, none of the scientific reviews of the past 7 years has found that hormone treatment as practiced in the United States poses a health risk. The most recent study was conducted by an advisory committee to the World Health Organization in Geneva. This 1988 report concludes that no residue standards are needed for the three natural hormones (estradiol 17b, progesterone, and testosterone) because they are "unlikely to pose a hazard to human health" if "good animal husbandry" is practiced. For the two synthetic hormones (trenbolone acetate and zeranol), the World Health group recommends limits of 1.4 and 2 micrograms per kilogram in beef muscle, respectively, as a temporary standard while laboratory studies continue. These limits, according to Crawford, are stricter than those set by the U.S. Food and Drug Administration but not difficult to meet.

A study commissioned by the EC was even more supportive of U.S. cattle rearing. A group chaired by G. E. Lamming of the University of Nottingham issued its findings in two stages. The first part, released in 1982, found that the three natural hormones "would not present any harmful effects to the health of the consumer when used under the appropriate conditions as growth promoters in farm animals." It withheld its opinion of the two synthetic hormones until 1987, when the chairman released the rest of the report, apparently after failing to win official attention. (The EC voted to impose the ban on hormone-treated beef before receiving the report.) The report concludes that the levels of trenbolone and zeranol found in treated cattle "do not present a harmful effect to health."

Third, Crawford argues, by outlawing modern techniques, Europe will give impetus to old or illegal practices, such as the use of diethylstilbestrol, banned in the United States since 1979. Furthermore, Europe has allowed a loophole—or "derogation," in the official language—that permits the therapeutic use of hormones that it forbids as growth promoters. Because the drugs actually do work, farmers will be tempted to peform many "therapeutic" injections, creating high, localized hormone residues. There is evidence already that this is done. For example, in the first week of January, there were reports of excessive hormone residues in one-fourth of the Belgian hamburger meat sampled by a consumer magazine in Brussels and in a shipment of West German beef tested by the U.S. Army.

■ ELIOT MARSHALL

"Wise Men" on Superconductors

Universities, private industry, and government laboratories should work together in consortia to develop uses for high-temperature superconductors, according to a report issued 3 January by the Committee to Advise the President on High Temperature Superconductivity. The panel, which President Reagan had dubbed the "wise men," says such consortia are the country's best chance to compete with the Japanese for what is expected to be an extremely valuable high-technology market in 10 to 20 years.

The recently discovered high-temperature superconductors offer an unusual challenge. Even though few commercial applications are visible in the short run, scientists believe the materials' special properties will eventually make them valuable.

"We can't see yet what to do with them, but we feel very strongly that we can do something with them," said Ralph Gomory, chairman of the President's commission and senior vice president for science and technology at IBM. Since industry is unlikely to make much money on high-temperature superconductors in the next few years, few companies are likely to continue their research and development efforts unless something is done, he added. The panel's report puts it more bluntly: "While there is a high level of activity in U.S. industry today, much of it is scattered . . . and unlikely to survive in what we believe will be a long-distance race."

The purpose of the consortia, Gomory said, is to keep research and development efforts going for the ten or more years it will take for them to pay off.

Superconductors offer potentially valuable applications because they lose resistance to an electric current when cooled below a certain critical temperature. Without electrical resistance, they make perfect wires for transmitting electricity and making magnets and electric motors; their use in computers can increase power and speed dramatically; and they offer a number of other uses, particularly in electronics, that are impossible with other materials.

Although superconductors have been known for more than 75 years, until recently they had to be cooled with liquid helium, which is expensive and difficult to work with. The new materials, the first of which was discovered 2 years ago, can be used with cheaper and more convenient liquid nitrogen.

The initial discovery of the high-temperature superconductors created a great deal of excitement, accompanied by predictions of a technological revolution comparable to the one caused by the invention of the transistor. After 2 years of working with the materials, however, it has become obvious that widespread applications are still a decade or more away.

To keep the American research effort going for this period of time, the panel recommends four to six superconducting consortia. Each would have three primary members—a research university, a government laboratory working on superconductivity, and one or more companies actively doing superconductivity research—that would decide on the consortium's direction and provide the resources to do the work. Secondary membership would be open to other interested parties. Each center would have 20 or more researchers with perhaps twice as many students.

A consortium's funding would come from its members, with the federal government picking up most of the tab for the universities. The panel estimates the annual cost of the program would be $25 million to $30 million over what is now being spent on superconductivity research.

The commission also recommends the National Science Foundation spend an extra few million dollars a year on principal investigator grants to superconductivity researchers, who it says are not being fully funded. In order to avoid competition, the funding for the consortia should come from other agencies, such as the Department of Energy, the report says. Federal funding for all high-temperature superconductivity research was about $96 million in 1988.

The plan is a uniquely American one that does not copy the Japanese but rather will use the strengths of the American system, Gomory said. "Our strong points are the universities, not enlightened government intervention." The function of the consortia, the report says, will be to "link government labs with industry on the university terrain that is familiar to both. The main increment of strength comes from linking groups from university, industry, and government laboratories that have been historically separate in a single technical plan."

■ ROBERT POOL