

## 2 – Agency R&D Budgets

(Full agency analyses of R&D in FY 2006 appropriations, including historical charts and supplemental material, are available on the AAAS R&D web site.)

### Department of Defense (DOD)

**Congress allocated a record-breaking \$73.0 billion for DOD R&D in FY 2006**, a substantial increase of \$1.5 billion or 2.1 percent over the previous record of \$71.6 billion last year (see Table 4). While the Pentagon requested a cut in DOD R&D, Congress reshuffled DOD priorities to provide increases to a broad range of R&D programs, offset by cuts in other DOD accounts as well as funding shifts from the regular DOD budget to emergency funding. The DOD request would have been the first real cut in DOD’s R&D since 1996 after four years of record-setting gains, but Congress extends the gains for another year.

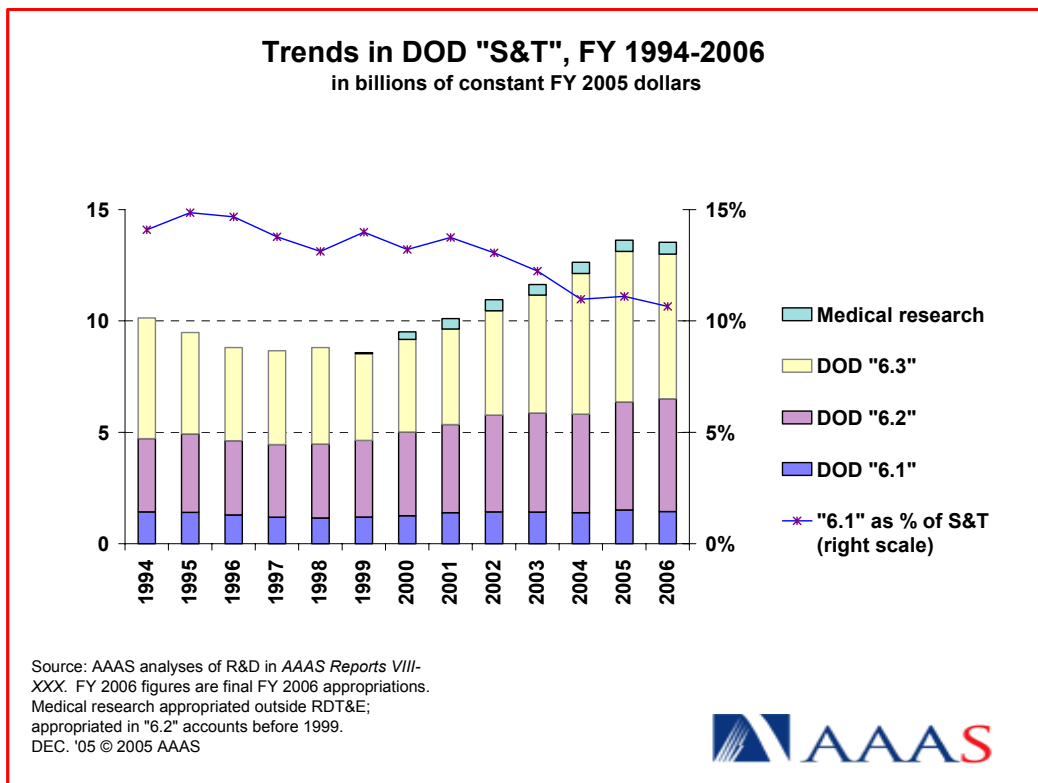


Figure 10.

**Although 82 percent of the R&D increase goes to development programs, DOD support of basic and applied research does far better in the final appropriation than in the request.** DOD’s “6.1” (basic research) and “6.2” (applied research) activities combined gain 4.2 percent to \$6.6 billion, a \$1.2 billion improvement over a 14 percent requested cut (see Table 4). In real terms, the proposed cut would have reversed six years of increases and left DOD research support at 2000 funding levels, but the final increase enables DOD support to stay ahead of expected inflation.

**But basic research funding (the “6.1” category) falls 2.9 percent to \$1.5 billion**, reversing an 11 percent increase last year, even though Congress adds funds to many “6.1” accounts to improve on a 13 percent requested cut. Table 6 shows that basic research in the Army, Navy, and Air Force all decline,

though by less than the request. Basic research funding in the Defense Agencies, however, increases by 5.7 percent to \$260 million, mostly because of a near-doubling of the basic research portfolio of the Chemical and Biological Defense Program (CBDP) to \$94 million. Funding for the University Research Initiatives program falls 7.5 percent down to \$272 million despite additions to the request in the form of earmarks. URI competitively awards basic research grants to university performers and is funded by the three services. The Defense Research Sciences program, which primarily funds in-house research but also awards external grants, receives a combined \$919 million in FY 2006, a cut of 5 percent. One area due for increased funding is the new National Defense Education Program (NDEP), started this year in the Office of the Secretary of Defense (OSD) with \$3 million and increasing to \$10 million in 2006.

Applied research funding (the “6.2” category) gains 6.5 percent in the congressional plan to \$5.2 billion in FY 2006 instead of a 15 percent requested cut. Appropriators moderate steep requested cuts to applied research programs in the three services, mostly through the addition of earmarks, and add to a requested increase for the Defense Agencies.

Congress provides \$537 million for congressionally designated medical research programs in FY 2006 (see Table 4) in the Defense Health Program. Included in the total is \$214 million combined for breast, ovarian, and prostate cancer research through peer-reviewed, competitively awarded grants (down slightly from the current year total). Over the years, the DOD program has become a major force in cancer research; NIH spending on these cancers, for example, is estimated at \$1.2 billion annually. Most of the remaining appropriation goes to earmarked research projects on medical topics, although there is a separate pool of \$50 million for peer reviewed grants for miscellaneous medical topics. In addition, there is nearly \$500 million in the Army for earmarked medical R&D projects in “6.2” and “6.3” accounts.

**DOD funding of “S&T”** (the “6.1” through “6.3” categories plus medical research) **totals \$13.8 billion in FY 2006, a slight increase of 1.2 percent from last year** (see Table 6 and Figure 10). For the past several years, Congress has been far more supportive of S&T funding than the Pentagon, and the pattern continues to hold true in 2006. The final appropriation is \$3.1 billion more than the \$10.7 billion DOD request, which would have amounted to a 22 percent cut. Advocates of DOD S&T in the science and engineering community argue that DOD S&T funding is essential for building the knowledge and technology base for future DOD needs, and have successfully argued that post-Cold War cutbacks over the past decade eroded this base. In the past few years, there has been growing support inside and outside the Pentagon for setting 3 percent of the DOD budget as a goal for the proper level of S&T investment. The last four budgets, including this year’s, have met that goal after taking out Iraq and Afghanistan war spending. The final Defense bill boosts the ratio to 3.3 percent of the non-emergency DOD budget.

**The final FY 2006 appropriation keeps DOD S&T near its record-high 2005 funding level.** DOD S&T has increased in recent years after hitting post-Cold War lows in the late 1990s, though it took nearly two decades for S&T funding to return to mid-1980s levels (see Figure 10). While this is a relief for DOD S&T advocates, the composition of the DOD S&T portfolio has been changing. DOD support of basic research has increased relatively little, and is a shrinking proportion of the DOD S&T portfolio. While “6.2” funding has increased a little more, recent growth in DOD S&T has come predominantly from growth in “6.3” funding of advanced technology development rather than from research, a trend that has many DOD S&T advocates worried. Recently, advocates have called for at least 20 percent of S&T funding to be devoted to basic research. As Figure 10 shows, basic research makes up only 11 percent of S&T funding in 2006, a ratio has been declining steadily over the past decade with no reversal in sight.

After several years of large increases, R&D in the Defense Agencies falls \$1.2 billion or 5.7 percent to \$19.6 billion, primarily because of a \$1.2 billion or 13.1 percent cut to \$7.7 billion for development in the Missile Defense Agency (MDA; see Table 5). Although missile defense systems have begun to be deployed in Alaska, the development effort slows in FY 2006. The MDA (formerly the Ballistic Missile

Defense Organization) no longer funds research; nearly all missile defense funds go to advanced development, testing, manufacturing development, and evaluation of missile defense systems.

The Defense Advanced Research Projects Agency (DARPA) sees its R&D funding remain flat at \$3.0 billion in FY 2006, just \$2 million more than last year (see Table 5). DARPA is research-oriented (51 percent of its budget is for research, with the remainder devoted to “6.3” technology development), and its broad research portfolio is aimed at expanding the frontiers of knowledge and military technology to provide future solutions to DOD’s technology needs. DARPA’s efforts in areas such as tactical technology, materials, network-centric warfare, information and communications technology, and cognitive computing receive increases, while there are cuts in support of electronics technology, biological warfare defense, sensors, and guidance technology, and steep cuts in basic research.

### National Institutes of Health (NIH)

**In 2006, the NIH budget falls for the first time in 36 years.** Although Congress appropriated the modest increase that NIH requested, a separate 1 percent across-the-board cut for discretionary programs leaves NIH with \$28.6 billion in 2006, \$35 million or 0.1 percent less than 2005 (see Table 9). **All but two institutes face cuts in 2006, with most institutes facing budget cuts of between 0.4 and 0.7 percent.**

NIH classifies 97 percent of its budget as R&D, including R&D facilities (the remainder is for overhead costs and research training). NIH R&D totals \$27.7 billion in 2006, also a 0.1 percent cut from 2005 funding levels. NIH support of basic and applied research grows slightly compared to total R&D with a 0.5 percent increase because of a drop in R&D facilities funding, but the growth in NIH research support is still the smallest increase since 1970 (see Table 2).

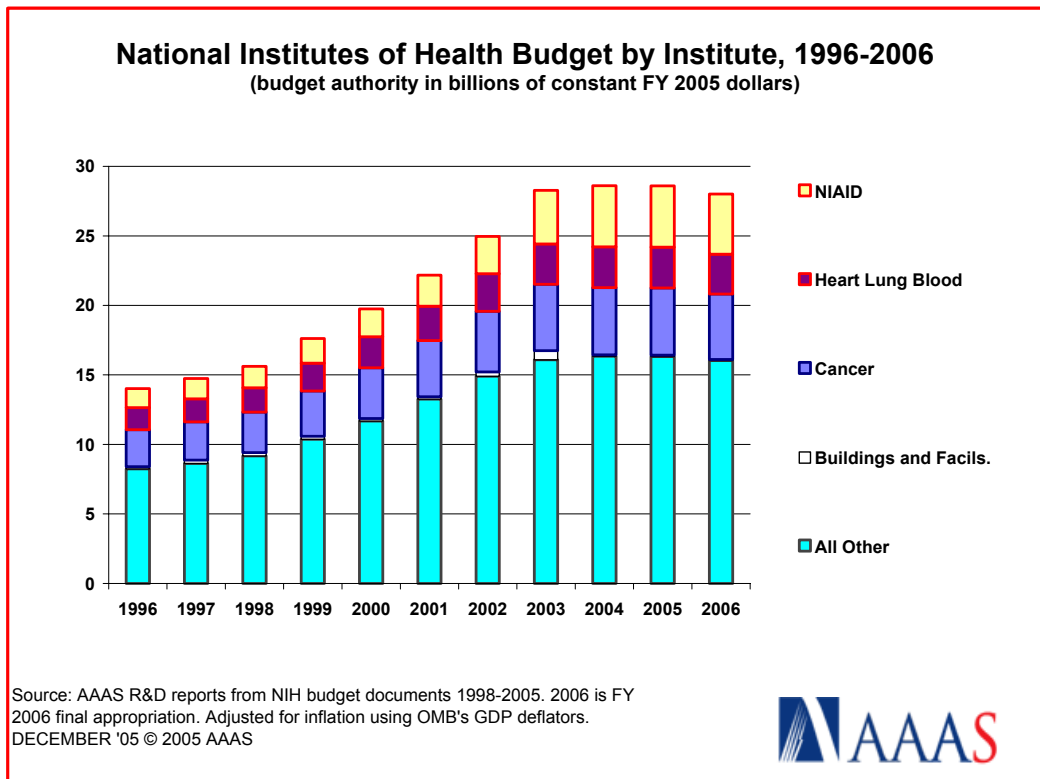


Figure 11.

After a completed five-year doubling campaign involving 15 percent increases for each of the five years between 1998 and 2003, biomedical researchers hoped for a gradual easing into slower growth rates. But growth in the NIH budget slowed sharply to 3.2 percent in 2004, slowed even further to 2.0 percent in 2005, and now reverses in 2006 with a declining budget for the first time since 1970. After adjusting for inflation, FY 2006 is the first time in 24 years that the NIH R&D portfolio falls behind inflation in the economy as a whole, after just barely staying ahead of inflation in 2004 and just matching it in 2005 (see Figure 11). The 2006 budget cut is steep enough to bring NIH R&D below the 2003 funding level in real terms, erasing the increases of the last two years.

**Most NIH institutes see budget cuts in a narrow range between 0.4 and 0.7 percent, even before factoring in a roughly 2 percent inflation rate.** The National Institute of Allergy and Infectious Diseases (NIAID), home to NIH's biodefense effort, is one of only two institutes with more money than last year with a small 0.3 percent increase to \$4.4 billion. The steepest cut among the institutes goes to the National Center for Research Resources (NCRR) budget with a 1.4 percent drop to \$1.1 billion because of the elimination of a \$30 million program for extramural facilities construction. This program had funded competitively awarded construction grants and was the only federal funding source for non-biodefense biomedical research facilities. Buildings and Facilities funding, for NIH intramural facilities, falls 26.5 percent to \$81 million as the renovation and construction of biodefense facilities ramps down.

The only significant increase goes to the Office of the Director (OD) with a 33.5 percent boost to \$478 million, but primarily because Congress transfers \$97 million from the Office of the HHS Secretary to NIH. The Office of the Secretary requested \$97 million (see Table 10) for transfer to NIH to spend on developing medical countermeasures against nuclear, radiological, and chemical terrorist attacks, nearly double last year's funding level because of the introduction of chemical countermeasures to the 2006 program. Congress bypasses the Office of the Secretary and gives the requested funds directly to NIH (see Table 9). But after excluding the transfer, the remaining increase for OD is still a substantial 8 percent to boost OD funding for clinical research, high-risk basic research, and collaborative research in the NIH Roadmap for Biomedical Research. The Roadmap could receive up to \$333 million in FY 2006 (up 41 percent), with \$83 million from OD and \$250 million coming from other institutes' budgets, with their contributions going from 0.63 percent of institute budgets to 0.89 percent in 2006.

Biodefense R&D continues to be a high priority in the NIH portfolio. NIH identifies \$1.7 billion for biodefense R&D in FY 2006, essentially unchanged from last year. But a decline in biodefense laboratory construction funding allows for a 7 percent increase in biodefense R&D grants and contracts to a total of \$1.7 billion, plus another \$97 million in mostly biodefense funding transferred from the Office of the Secretary. After providing \$148 million in 2005 to fund extramural construction for biosafety level (BSL) 3 and 4 laboratories around the nation, NIAID construction funding ramps down to \$30 million in 2006.

The majority of NIH's budget is distributed to external performers through Research Project Grants (RPGs), which are investigator initiated, peer reviewed, and competitively awarded. Earlier this year, NIH had projected a decline in the number of Research Project Grants (RPGs) for the second year in a row based on the NIH request, but the 1 percent across-the-board cut could further reduce RPGs. RPG funding would have increased by 0.4 percent in FY 2006 to reach \$14.9 billion, but the final appropriation will most likely lead to a 0.6 percent or so cut in RPG funding. The final appropriation will result in even fewer than the projected 36,666 RPGs, compared to roughly 37,000 last year and 2004. Because RPGs are multi-year grants, the number of new grants initiated in FY 2006 was already projected to be smaller, and could shrink even further to well below the 10,020 awarded in 2004.

NIH also projects a decline in the success rate for new grant applications for the fifth year in a row to 21 percent in 2006, down steeply from a high of 32 percent in FY 2001 because recent surges in the number of applications have outpaced the number of grants awarded. The success rate could dip below 20 percent in 2006 after institutes factor in the 1 percent across-the-board cut. Although the number of RPGs has

increased from 25,000 in the early '90s to more than 35,000, the number of grant applications has increased so fast that the success rate is now well below the success rates of the NIH doubling period 1998-2003 when they exceeded 30 percent.

**The final 2006 budget leaves NIH with less money in real terms than in 2003, signaling a retreat from the funding levels reached in the NIH doubling campaign.** Although other R&D funding agencies have struggled to maintain their budgets over the past decade, NIH until recently enjoyed extraordinary success on Capitol Hill, and its budget growth during the NIH doubling campaign (in non-inflation adjusted terms) in the five years to FY 2003, but then abruptly halted. Much of the recent growth in NIH has been in biodefense research, funded primarily by the National Institute of Allergy and Infectious Diseases (NIAID). As a result, the NIAID budget has grown far faster than other institutes' budgets to become the second-largest institute (see Figure 11). But the recent slowdown in NIH budget growth combined with continuing growth at NIAID means that, in real terms, all the other NIH institutes collectively have seen their budgets decline every year since 2003.

Total R&D in the Department of Health and Human Services (HHS) is \$29.0 billion in FY 2006, a slight cut of 0.2 percent (see Table 10). NIH dominates the HHS R&D portfolio, but the rest of HHS (excluding NIH) funds a still-substantial \$1.3 billion in R&D in FY 2006, a cut of 2.0 percent. The entire apparent cut is due to the transfer of medical countermeasures R&D from the Office of the Secretary to NIH; overall, HHS R&D outside NIH wins an increase because of the last-minute infusion of emergency funding to combat a possible U.S. outbreak of avian flu. Although nearly all of the \$3.8 billion avian flu spending package attached to the final Defense bill is for non-R&D activities such as countermeasures procurement, health infrastructure upgrades, and health monitoring, the Centers for Disease Control and Prevention (CDC) receives \$50 million to upgrade its R&D facilities, the Food and Drug Administration (FDA) receives \$18 million for R&D and facilities related to flu, and the Office of the Secretary receives an estimated \$80 million within a larger \$3.3 billion flu appropriation for avian flu-related research.

### **National Science Foundation (NSF)**

**NSF has a total budget of \$5.6 billion in FY 2006, an increase of 2.0 percent or \$108 million** (see Table 11). Although the final NSF budget that was signed into law in November contained a 3 percent increase, a 1 percent across-the-board cut for all discretionary programs was attached to the final Defense bill in December. The total falls far short of an NSF authorization bill calling for a doubling of the NSF budget between FY 2002 and FY 2007 (see Figure 12), and the increase is less than a budget cut in 2005, leaving NSF with a smaller budget than in 2004. In real terms, the \$5.6 billion is a loss of 5 percent from the \$5.6 billion 2004 total and is also less than the 2003 budget, even though the 2006 total includes \$48 million in polar icebreaking costs previously funded by the Coast Guard.

NSF's R&D funding, which excludes NSF's education and training activities and overhead costs (such as the polar icebreaking costs), totals \$4.1 billion, an increase of \$66 million or 1.6 percent that brings the R&D total back to the 2004 funding level after a dip in 2005 (see Table 11 and Figure 12). But in real terms the 2006 NSF R&D portfolio is smaller than in any of the last three years.

NSF's main Research and Related Activities (R&RA) account does relatively well in a tough budget year, receiving \$4.3 billion in 2006, an increase of \$111 million or 2.6 percent. Congress originally boosted the request of \$4.3 billion by 1 percent in November, but the December across-the-board cut brings it back down to almost exactly what NSF requested in February. Within R&RA, the largest increase is a 12.3 percent boost to Polar Programs to \$387 million, but the entire increase and more goes to fund a transfer of \$48 million in non-R&D Coast Guard costs for icebreakers to the NSF budget. Icebreaker ships necessary for research access to the Arctic and Antarctic have traditionally been funded and operated by the Coast Guard, but NSF now takes over funding for these ships. Many in the polar research community are concerned about the financial implications of this transfer, partly for the extra costs now but mostly

because of the far larger costs looming in the future to renovate or replace these aging icebreakers within a tight NSF budget. Although NSF will pay the Coast Guard to keep operating these icebreakers in 2006, Congress gives NSF the task of making other arrangements if the Coast Guard is unable or unwilling to do so in future years.

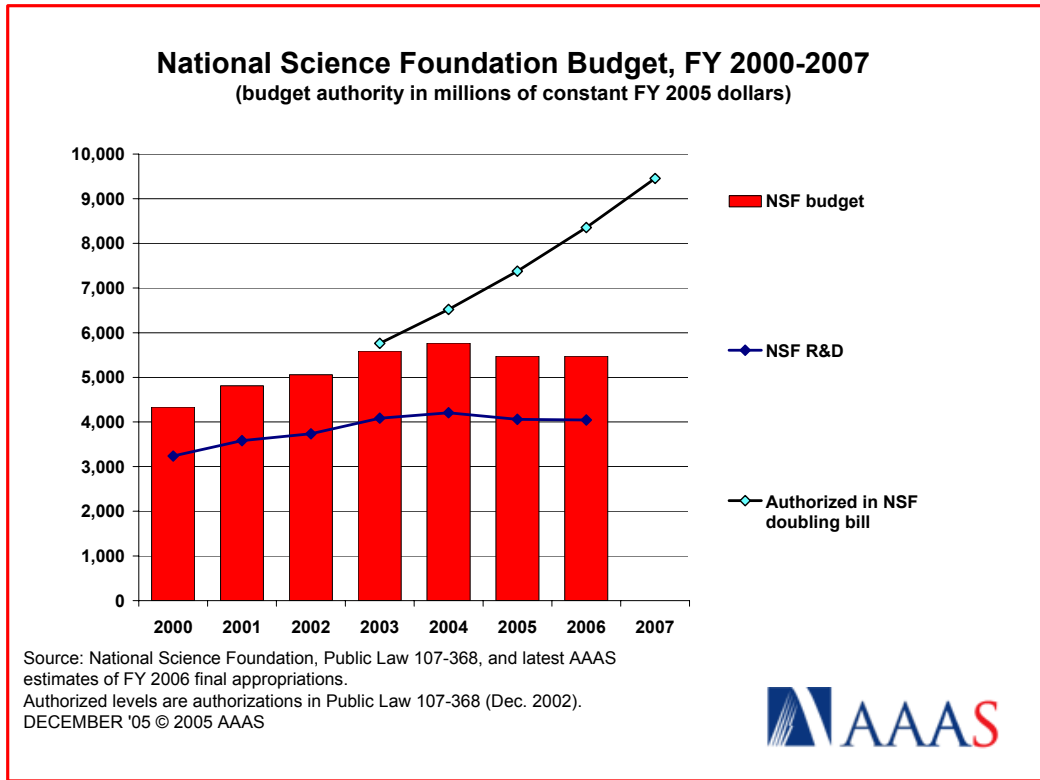


Figure 12.

Most of NSF’s research directorates receive increases between 1 and 3 percent after similar cuts in 2005, but in real terms the directorates’ 2006 budgets are below or just even with their 2003 or 2004 budgets.

Congress trims the request for the Major Research Equipment and Facilities Construction (MREFC) account, but still provides a \$17 million boost to \$191 million. Congress agrees with the NSF proposal to have no new starts in FY 2006, and funds four out of the five existing projects. While the Scientific Ocean Drilling Vessel, the Atacama Large Millimeter Array, EarthScope, and the IceCube Neutrino Observatory projects receive close to the requested amounts, the Rare Symmetry Violating Processes (RSVP) project is left out of the money in protest over escalating cost estimates.

Most NSF education and training programs suffer cuts for the second year in a row. NSF proposed an Education and Human Resources (EHR) budget of just \$737 million, down a dramatic \$104 million after an identical cut in the 2005 budget. Congress adds back \$60 million for a budget of \$797 million, still 5.3 percent below FY 2005. Although Congress protests the Bush Administration’s efforts to transition the Math and Science Partnerships (MSP) program from a joint Department of Education-NSF program to an Education-only one, there is only \$63 million for NSF’s MSP program, less than half the \$139 million NSF received in 2004.

## **National Aeronautics and Space Administration (NASA)**

NASA does relatively well in the FY 2006 budget, but the agency faces a tight squeeze from trying to get the Space Shuttle back to safe flight, finish construction of the International Space Station, embark on an ambitious plan to return humans to the moon and send them onward to Mars, and also support R&D across a broad range of fields, all within a flat budget. The FY 2006 \$16.6 billion NASA budget is 2.5 percent or \$400 million more than last year (see Table 7), but \$350 million of the increase is emergency funding to repair NASA facilities damaged by Hurricane Katrina. Excluding emergency funding, NASA receives only a 0.3 percent increase even as it struggles to juggle its many mission deadlines, for a key year in which a dramatic ramp-up of R&D efforts on human space vehicles coincides with a much-delayed resumption of regular shuttle flights and resumed construction of the Space Station.

In order to keep up with changing shuttle launch schedules and shifting timelines for ending the Space Station and returning to the moon, NASA's budget has been in flux for the past few years with major changes happening even in mid-year. **NASA's R&D (two-thirds of the agency's budget) totals \$11.4 billion in 2006, a 6.2 percent increase that is the second-largest percentage increase among the major R&D funding agencies (see Table 7).** R&D funding grows far faster than the total NASA budget because the agency anticipates a reduction in the non-R&D Space Shuttle program from a record \$5.0 billion funding level last year down to \$4.5 billion this year, and also because NASA made mid-year cuts in the 2005 R&D portfolio (see Figure 3). But if safety upgrades in preparation for the May 2006 shuttle launch cost more than expected, money could be siphoned off from R&D programs to the shuttle midway through 2006 as soon as February, as was the case in preparation for the July 2005 return to flight. Another wrinkle is the \$350 million in emergency funds for reconstruction of hurricane-damaged NASA facilities in Mississippi and Louisiana; NASA estimates place the full cost of reconstruction at closer to \$700 million, meaning these costs may also have to be siphoned off from R&D program funds midway through 2006. Thus, the \$11.4 billion R&D total for 2006 is likely to be far less by the time the fiscal year is over.

For the moment, the latest FY 2006 budget plan agrees with NASA's plan to increase funding for the International Space Station. The Station is now essentially in maintenance mode until the Space Shuttle resumes its role of carrying Station components into orbit. After shrinking to \$1.4 billion in 2004, Space Station construction is scheduled to resume after the next shuttle launch with a \$1.8 billion budget, up \$75 million from 2005. The Space Station and the Space Shuttle make up the Exploration Capabilities (EC) account, which totals \$6.9 billion, a decline of 2.6 percent because of the expected fall-off in Shuttle costs (see Table 7). If the shuttle launch is delayed again, Space Station funding will be diverted again.

With these two big-ticket current programs provided for in the EC account, the Science, Aeronautics, and Exploration (SAE) account, which funds most of NASA's research, climbs \$586 million or 6.5 percent to reach \$9.6 billion. The entire increase and more goes to the new Constellation Systems program to develop replacements for the Space Shuttle which will eventually return humans to the moon and then onward to Mars. From \$422 million last year, funding nearly triples to \$1.1 billion in 2006 for applied research on the Crew Exploration Vehicle (CEV) and Crew Launch Vehicle (CLV) concepts. But NASA could wind up spending even more: Congress finalized its appropriation before an internal memo surfaced showing the agency's plan to devote up to \$1.6 billion to Constellation Systems to accelerate development of the CEV and CLV for a 2012 launch instead of the previously announced 2014.

The large increase for next-generation space vehicles comes at the cost of sharply reduced funding for biological and physical sciences research, and new propulsion technologies. Congress winds up endorsing NASA's proposal to dramatically restructure and downsize its biological and physical sciences research portfolio into a Human Systems Research and Technology program more narrowly focused on research topics relevant to human space flight. Human Systems R&T within Exploration Systems receives \$791 million, down 14.4 percent from \$925 million last year. But NASA plans to reduce the portfolio even further in order to boost Constellation Systems; the latest NASA plan allocates just \$564 million, down 40

percent from 2004 funding levels. The Prometheus Nuclear Systems and Technology program to develop new power and propulsion technologies based on nuclear power for future NASA missions receives \$123 million, down from last year's \$270 million, since NASA now sees no need for these technologies until 2018 at the earliest.

NASA R&D programs in aeronautics and the earth sciences suffer cuts in the FY 2006 appropriation and could suffer further cuts as the year goes on. Funding for the Earth-Sun System program, restructured from the former Earth Science program, declines 8.3 percent to \$2.1 billion. This NASA program is a key part of the interagency Climate Change Science Program and is responsible for space-based observations of the earth environment. NASA's support of aeronautics research falls less than requested, but at \$930 million is still 3.4 percent below last year's funding level. NASA's aeronautics support has been in steady decline over the last decade and FY 2006 appropriation leaves it at little more than half the size of a decade ago.

Despite tough budget times, one part of the NASA budget that continues to increase is congressional earmarks. Congress allocates a record-breaking \$317 million for performer-specific projects in the FY 2006 NASA appropriation, far above the \$217 million in similar earmarks in FY 2005. The earmarks are distributed throughout the SAE account, but many of them are in Education Programs, resulting in a dramatic boost of 53 percent in its budget to \$273 million. Although many of the earmarked projects fund R&D or R&D facilities related to NASA missions in earth, space, and physical sciences, the earmarks also fund science education programs, science museums, and high school science labs.

The large increase to NASA's R&D portfolio in FY 2006 continues a modest upward trend for the last few years, except for the drop in the 2005 budget. NASA's R&D funding has just kept pace with inflation going back to FY 1991, and recent increases have been just barely ahead of inflation (see Figure 3). NASA has committed to carrying out its ambitious plans with a budget that would just keep pace with expected inflation over the next decade. Although inflationary increases are more than most R&D funding agencies are likely to get in the next few years, NASA's big plans will still require NASA to reshuffle its resources and to meet ambitious targets for deployment, construction, and then phase-out of the Space Shuttle and Space Station programs to make room for moon and Mars programs.

## **Department of Energy (DOE)**

After a year-end across-the-board cut, the Department of Energy (DOE) has \$8.6 billion in its final 2006 budget for R&D activities, a slight cut of 0.1 percent (see Table 8). Congress adds \$136 million to the request for DOE's Office of Science (OS), turning a 4.5 percent requested cut into a 0.4 percent cut to \$3.3 billion, but nearly all of the congressional additions go to congressional earmarks. In today's dollars, the Science program has been stuck at roughly \$3.3 billion since FY 2001, and the 2006 appropriation falls even before adjusting for inflation (see Figure 13).

**The FY 2006 appropriation confirms DOE plans to reduce operating times at OS user facilities, and the 1 percent across-the-board could further reduce times.** The Office of Science operates unique, large-scale research facilities at DOE's national laboratories around the country, which external researchers can use for their own experiments through a competitive proposal process. In recent years, tight budgets (see Figure 13) have squeezed operating time at these facilities, and the FY 2006 request would have squeezed even tighter, with operating times reduced by as much as 61 percent at some OS facilities. Earlier House and Senate versions of the Energy-Water bill would have allocated additional funds specifically to sustain operating times at current rates, especially programs funded in the Basic Energy Sciences (BES) and Nuclear Physics (NP) programs, but the final bill provides just the request for most OS accounts and thus confirms the requested reductions in operating times. But the 1 percent across-the-board cut could force DOE to reduce operating times even further.

Domestic fusion research facilities, however, should be able to operate at 2005 levels thanks to a funding shift. Total Fusion funding jumps 5.0 percent to \$288 million, just slightly off the request, but Congress rearranges fusion priorities to favor domestic fusion over an international collaborative project. In its budget request, DOE proposed \$56 million for the International Thermonuclear Experimental Reactor (ITER) project, up from just \$5 million last year, at the cost of reducing operating times at domestic fusion facilities. The \$5 billion international project had been delayed because the international partners were unable to agree on a site, but in 2005 a site in France was chosen, a director was selected, and construction got underway. The energy policy bill signed into law in August 2005 authorized U.S. participation in the project and authorized DOE to negotiate with the other partners. But Congress shifts \$30 million from the ITER request to domestic fusion research in order to sustain operating times at fusion facilities in New Jersey, California, and Massachusetts. The \$26 million for ITER is still far above the \$5 million in 2005.

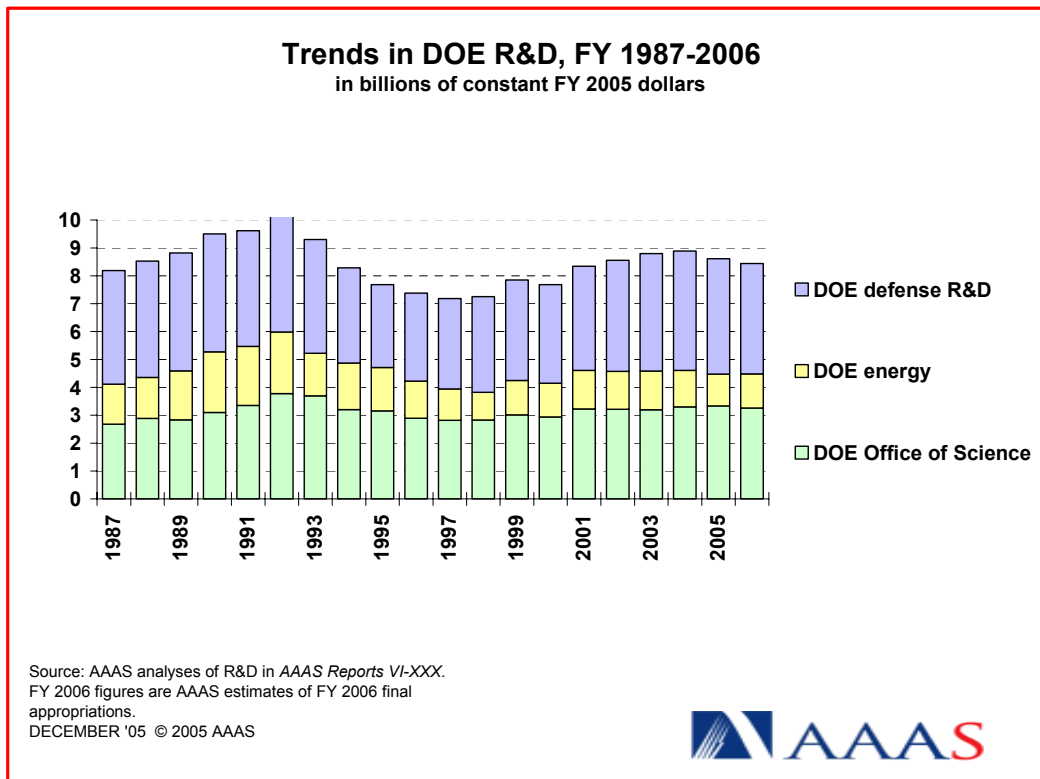


Figure 13.

The final DOE budget contains a boost for advanced scientific computing research (ASCR). Congress adds \$28 million to a requested cut in ASCR for a total of \$235 million, a 1.0 percent increase over 2005. The additional funds go to accelerate R&D efforts on a world-class supercomputer to provide advanced scientific computing capabilities to U.S. researchers. Congress leaves in place the request for Basic Energy Sciences, the largest OS program, for a 2.7 percent increase to \$1.1 billion after the 1 percent cut. The largest project in BES is the Spallation Neutron Source (SNS) in Tennessee, which receives \$147 million as the facility transitions from construction to operations in 2006.

Congress adds \$130 million to the Biological and Environmental Research (BER) account in 2006, entirely for 164 earmarked projects. The \$580 million BER total is down just \$2 million from 2005, but because 2005 earmarks totaled only \$78 million, funding for core BER programs is down significantly in 2006 compared to last year. Although the majority of the 164 earmarks are for biological and environmental

projects, many of them are in unrelated areas such as water resources, energy technologies, and science education.

**Congress cuts back on funding for energy R&D programs, funding Administration priorities in coal and nuclear energy but scaling back requested boosts for hydrogen and fuel cell R&D, and trimming funding as requested for other energy R&D. But at the same time, Congress sets new records in R&D earmarks, earmarking more than 1 out of every 5 energy R&D dollars.** The overall DOE energy R&D portfolio climbs 9.6 percent or \$109 million to \$1.3 billion, but the increase is due to a \$160 million rescission in 2005 for Clean Coal Technology that reduces the funding base. Without the 2005 rescission, energy R&D falls in 2006.

In fossil energy, coal remains the top priority. Fossil Energy R&D funding increases 5.9 percent to \$474 million, in sharp contrast to steep cuts in the House and the request. Funding for FutureGen remains at \$18 million for this program to develop a near-emission-free, coal-fired electricity and hydrogen production plant, while overall coal R&D climbs from \$351 million to \$377 million with the largest increase going to carbon sequestration R&D (up from \$45 million to \$66 million). Oil and gas R&D decline, though not as much as the request to eliminate these programs. Energy conservation R&D appears to fall 17 percent or \$61 million to \$306 million, but nearly all of the decline is due to the transfer of the \$60 million distributed energy and energy transmission R&D program from this account to the Electricity Transmission and Distribution program in Energy Supply. Funding for the remaining Energy Conservation programs is flat, with cuts in industrial conservation technologies offset by increases in building and vehicle technologies. Fuel cells R&D, a key part of the Bush Administration hydrogen initiative to move toward a hydrogen economy, receives a cool reception in Congress with a \$136 million appropriation spread across the two accounts, down from \$149 million in 2005.

In Energy Supply, nuclear energy is the top priority. Nuclear energy R&D surges dramatically by 31 percent to \$111 million. Most of the new funding supports a dramatically expanded effort to develop new technologies for future nuclear power plants in an effort led by the Idaho National Laboratory. There are also dramatic boosts in nuclear hydrogen R&D to explore ways to use nuclear power to produce hydrogen, and in advanced fuel cycle R&D to develop better technologies for reprocessing spent nuclear fuel. In Solar and Renewables, a requested boost for hydrogen R&D turns into an appropriated cut down to \$80 million, but the bill also goes along with requested cuts in R&D on other renewables such as geothermal technology, wind energy, and solar energy.

**R&D earmarks eat up whatever increases there are for most energy programs, and cut deeply into core R&D programs.** Energy R&D earmarks total \$266 million in 2006, more than double the previous record from last year, and make up 1 out of every 5 R&D dollars in energy. These earmarks are concentrated in some areas, including biomass R&D where they make up more than 50 percent of total program funds, hydrogen (27 percent), and wind energy (33 percent). Overall, R&D earmarks total a new record of \$524 million in the FY 2006 DOE budget, nearly double the previous record.

Congress leaves DOE's defense R&D funding slightly below 2005, in a continuing downward trend over the last few years (see Figure 13). R&D in DOE's core Weapons Activities account totals \$2.9 billion, 5.8 percent below FY 2005. Advanced Simulation and Computing (ASC) funding falls 14 percent to \$600 million. The ASC program funds R&D in high-end computing for leading-edge supercomputers and software necessary to simulate nuclear explosions without nuclear testing, and is the defense counterpart to the OS Advanced Scientific Computing Research (ASCR) program. The largest increase in defense R&D goes to Nonproliferation and Verification R&D (up 42 percent to \$319 million), with large boosts for R&D on proliferation detection, nuclear explosion monitoring, and treaty monitoring.

Congress agrees with the Administration's recent decision to terminate research on the controversial Robust Nuclear Earth Penetrator (RNEP) program in 2006. Last year, DOE requested funds but Congress

provided no money. DOE tried again in FY 2006 with a request of \$4 million, but in November 2005 the Administration signaled that it would drop its support for the program. This Administration proposal to initiate research on a new generation of nuclear weapons, including the RNEP and other tactical or ‘low-yield’ nuclear weapons (also called ‘bunker buster’ bombs), has been opposed by Congress so far because building these weapons would require the repeal of a U.S. ban on developing new nuclear weapons. Instead, Congress provides \$25 million instead of a \$9 million request for R&D on the Reliable Replacement Warhead, a 5-year, \$98 million project initiated by Congress in the FY 2005 budget that would explore the possibility of new warhead designs to use with existing rather than new nuclear weapons. But the RNEP project actually remains alive at the Department of Defense (DOD), which receives \$7.5 million for R&D on a ‘non-nuclear’ Earth Penetrator prototype which could be identical to the RNEP except for the warhead.

### Department of Homeland Security (DHS)

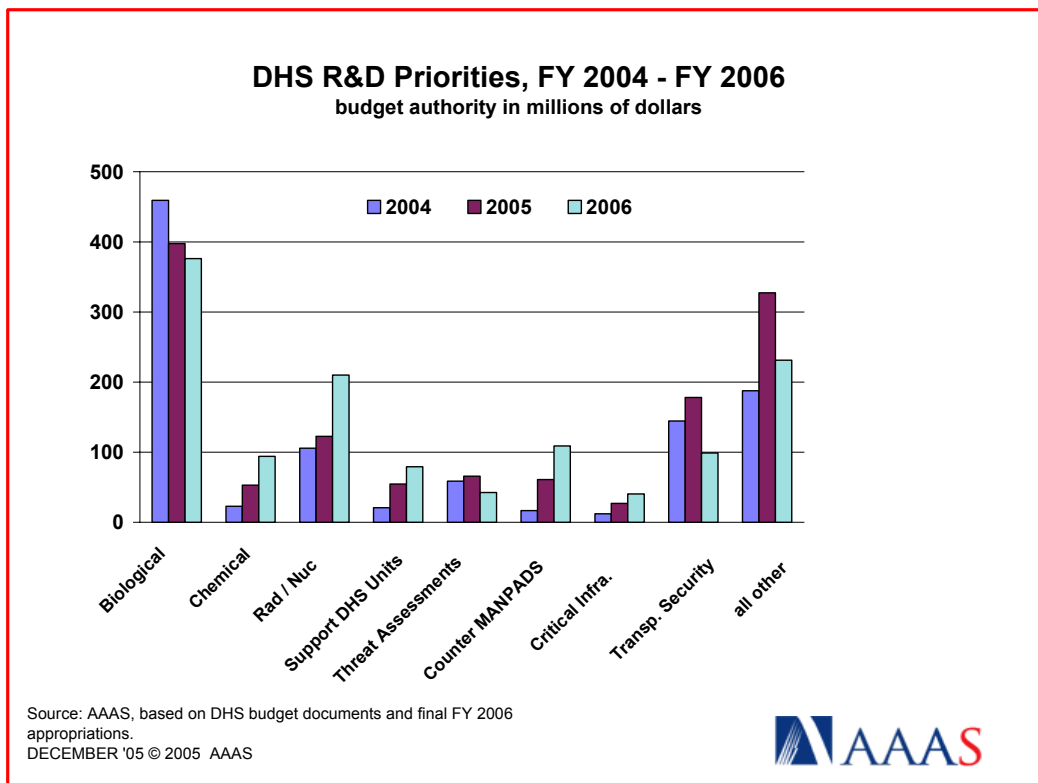


Figure 14.

**The final Department of Homeland Security (DHS) budget for FY 2006 provides \$1.3 billion for R&D, a 3.1 percent increase** that slows recent growth in the DHS R&D portfolio (see Table 17).

There are dramatic shifts in DHS R&D priorities in 2006 (see Figure 14). The top priorities in the DHS R&D portfolio are clearly radiological and nuclear countermeasures (increasing 71 percent to \$210 million in FY 2006), including the establishment of a Domestic Nuclear Detection Office (DNDO); chemical countermeasures (climbing 78 percent to \$94 million); explosives countermeasures (up 121 percent to \$44 million) and R&D to counter portable anti-aircraft missiles (up 79 percent to \$109 million).

Within radiological and nuclear countermeasures, nearly all the funds go for \$191 million in start-up money for R&D in the new Domestic Nuclear Detection Office (DNDO), down from the \$227 million request. The DNDO will develop, acquire, and support a domestic system to detect and report terrorist attempts to transport or use radiological or nuclear materials. DNDO will be staffed with a multi-agency team and will coordinate its efforts with the intelligence community, and hopes to fund R&D, develop new technologies, and transition these technologies to field use. An additional \$125 million in non-R&D procurement funds for radiation portal monitors at the nation's ports of entry brings the total DNDO budget to \$315 million. The large DNDO appropriation comes as something of a surprise, since both the House and the Senate had expressed doubt as to whether the new office could realistically spend such large sums in its first year. But these doubts appear to have been resolved in appropriators' minds.

The Counter MANPADS portfolio nearly doubles to \$109 million (up 78.5 percent). Man Portable Air Defense Systems (MANPADS) are shoulder-mounted portable air missiles that have been used (unsuccessfully so far) against passenger aircraft. Fears of a successful MANPADS attack against commercial aircraft have jump-started DHS' Counter MANPADS effort. DOD also has a Counter MANPADS R&D effort, though smaller at \$19 million in 2006.

**Large increases for the priorities above are offset by cuts in other areas of the DHS R&D portfolio,** including threat and vulnerability assessments (down 35 percent to \$43 million), standards development (down 13 percent to \$35 million), rapid prototyping (down 54 percent to \$35 million), cybersecurity, and aviation security (see Figure 14). TSA R&D programs in aviation security, funded at \$178 million in FY 2005, move to the S&T Directorate at \$99 million in FY 2006, a dramatic reduction, although some TSA R&D areas migrate to the explosive countermeasures portfolio.

**The largest part of the DHS R&D portfolio continues to be biological countermeasures,** with an investment of \$376 million in FY 2006, nearly even with 2005 (see Figure 14). Although there is no new money, construction of the National Biodefense Analysis and Countermeasures Center (NBACC) at Fort Detrick, Maryland continues in FY 2006 with previously appropriated funds toward a target completion date of 2008. The FY 2006 appropriation contains \$23 million in new funds to start construction of a new National Bio and Agrodefense Facility (NBAF), a \$450 million total project with a scheduled completion of 2010 to enhance DHS capabilities to respond to food or animal-borne terrorist threats and to replace DHS' existing facility on Plum Island, New York. The new facility signals a higher DHS priority on agroterrorism in cooperation with similar efforts underway at the U.S. Department of Agriculture (USDA).

Congress agrees with the request to make modest cuts to \$62 million for University Programs and Fellowship Programs, down from \$70 million in FY 2005 but still well above \$22 million in 2004. This program funds several university-based centers of excellence and is a funding source dedicated exclusively to funding university-based research. DHS has already designated five university-based centers for homeland security; the fifth center, awarded in December 2005 to Johns Hopkins University and its partners, will focus on preparations and responses to terrorist attacks, and will be followed by three other centers to be awarded by the end of FY 2006. The program also funds cooperative centers awarded in collaboration with other federal agencies for research areas of mutual interest: the first was a joint DHS-EPA award to Michigan State University and partners for a center on microbial risk assessment, followed by two more cooperative centers by the end of FY 2006. This program also funds fellowships and scholarships that fund graduate education and research opportunities for scientists and engineers.

## **U.S. Department of Agriculture (USDA)**

**USDA R&D improves dramatically from a proposed 15 percent cut in the USDA budget request to a cut of only 0.4 percent for a total of \$2.4 billion (see Table 13).**

**Instead of USDA's proposed shift to competitively awarded funds, Congress keeps USDA's external portfolio split between formula funds, earmarked funds, and competitively awarded funds.** USDA's extramural research grants, nearly entirely to colleges and universities, are administered by the Cooperative State Research, Education and Extension Service (CSREES). Total CSREES R&D declines 1.0 percent to \$643 million in FY 2006, a big improvement from a proposed 20 percent cut. The difference is that USDA proposed to eliminate \$180 million in 2005 congressional earmarks and slash formula funds, but Congress restores \$165 million in earmarked projects and keeps formula funding stable. Most of these earmarks are in the nearly entirely earmarked Special Research Grants program, which USDA proposed to cut from \$120 million last year down to just \$3 million in 2006, but the final Agriculture bill provides \$127 million for 202 projects, all but 3 of which are for congressionally designated performers. Congress also rejected USDA's proposal to dramatically restructure formula funds for agricultural R&D at land-grant institutions. Hatch Act formula funding for agricultural R&D at land-grant colleges remains at \$177 million (down 1.0 percent because of the across-the-board cut) instead of the USDA proposal to cut it in half to \$89 million in the first year of a two-year phaseout. Congress also rejects similar proposed cuts to other formula research grants (in "All Other CSREES R&D" in Table 13).

The National Research Initiative (NRI) of competitively awarded, extramural research grants receives \$181 million, a modest increase compared to the \$250 million request. But there would be a transfer of some competitive grants currently funded in Integrated Grants to NRI, leaving actual program funding slightly below last year's level. USDA also proposed to make competitive grants more attractive to potential applicants by repealing a longstanding limit on indirect cost reimbursements for USDA grants, currently capped at 20 percent, but the final Agriculture bill keeps the 20 percent limit in place.

Most of USDA's intramural research is performed in the Agricultural Research Service (ARS). ARS R&D falls 1.4 percent or \$19 million to \$1.3 billion, an improvement over steep requested cuts because of millions of dollars in added earmarks and \$16 million in emergency appropriations to combat avian flu. The appropriation includes the \$59 million request for the National Centers for Animal Health in Ames, Iowa. Congress provided \$122 million for the Ames facility in the FY 2005 budget, and the FY 2006 appropriation should be sufficient to finish the major renovation project. The renovated National Centers for Animal Health will serve as the nation's premier animal research and diagnostic laboratory and will enhance the nation's ability to respond to attacks on the food supply as a biosafety level 3 (BSL-3) facility. The drop in total construction funding allows for a 3.4 percent boost to the intramural ARS research budget to \$1.1 billion, with much of the \$144 million boost over the request in the form of earmarked research projects at ARS laboratories as well as a last-minute infusion of funds for avian flu preparedness.

The slightly declining FY 2006 USDA R&D portfolio keeps the department's R&D funding near record highs in inflation-adjusted dollars (see Figure 3). USDA R&D has been at historical highs this decade. Since hitting a recent low in 1996, the funding trend has been generally upward, first because the federal budget surplus made more discretionary funds available to congressional appropriators, then in FY 2000 and FY 2001 from the release of mandatory competitive research funds, and since FY 2002 because heightened concern about agricultural terrorism and the security of USDA laboratories resulted in millions for security upgrades and other homeland security-related investments. But with homeland security-related construction needs waning at locations such as Ames, USDA R&D now declines from record levels.

## **Department of Commerce**

Congress gives the Department of Commerce an R&D portfolio of \$1.1 billion in FY 2006, down 1.5 percent (see Table 12). Both of Commerce's two major R&D agencies—the National Oceanic and Atmospheric Administration (NOAA) and the National Institute of Standards and Technology (NIST)—steer a course between steep House cuts and large Senate increases in the final appropriation. **NOAA R&D**

**increases \$11 million or 1.7 percent to \$661 million, while NIST R&D declines 5.0 percent to \$438 million** (see Table 12). Both agencies would have seen steep cuts in the Administration budget request.

**The Advanced Technology Program (ATP) in NIST survives another year after yet another round of House and Bush Administration proposals to eliminate it.** The FY 2006 appropriation of \$72 million, including a rescission, is 49 percent below last year's budget and is enough just to cover 2006 costs of previously awarded grants. The Senate tried to set aside \$60 million for new grants, but the conference removed these funds so ATP will most likely make no new awards in 2006. The main NIST R&D activity—Scientific and Technical Research and Services (STRS), which funds intramural research at the NIST laboratories—gains \$14 million in R&D funding to \$331 million, a 4.3 percent increase.

The largest R&D gain in the NIST portfolio goes to Construction of Research Facilities (CRF), with a \$19 million or 63 percent boost in its R&D funding to \$48 million for major renovations to NIST facilities in Maryland and Colorado. But the CRF appropriation also contains \$125 million in non-R&D congressionally designated projects, mainly in South Carolina, Mississippi, and Alabama, far away from NIST facilities.

NOAA R&D climbs \$11 million or 1.7 percent to \$661 million, but the appropriation contains \$51 million in earmarked new funds for fisheries and marine mammals R&D in Alaska, leaving all other NOAA R&D programs collectively with less than last year. The National Marine Fisheries Service (NMFS) R&D portfolio grows \$40 million to \$103 million because of the new program, but other NMFS R&D programs wind up with cuts. NOAA's largest R&D unit, Oceanic and Atmospheric Research (OAR), receives an R&D portfolio of \$322 million, 4.8 percent less than last year. Within OAR, Congress provides \$55 million for the National Sea Grant College Program, down from \$62 million this year. Begun in 1966, Sea Grant provides research grants to more than 200 universities to gain better understanding of marine life and marine resources through education, outreach, and technology transfer. OAR Climate Research falls nearly \$21 million down to \$157 million, while weather and air quality research climbs from \$51 million to \$66 million.

## **Other Agencies**

Congress reversed proposed cuts to R&D in the **U.S. Geological Survey (USGS)** and instead agreed on an increase of \$11 million or 2.1 percent to \$553 million (see Table 15). R&D funding for the Department of the Interior totals \$629 million in FY 2006, an increase of \$14 million or 2.2 percent above FY 2005 that stands in sharp contrast to a cut of 6 percent contained in the President's request.

The **Environmental Protection Agency's (EPA)** R&D budget barely increases by just 0.2 percent or \$1 million to \$573 million in FY 2006 (see Table 16). Because of a reduction in congressional earmarks, most EPA R&D programs are set to receive slight increases.

**Department of Transportation (DOT)** R&D funding climbs dramatically in 2006 to an all-time high of \$841 million, a 13.0 percent or \$97 million increase (see Table 14), thanks to an August 2005 transportation reauthorization bill that guarantees large increases in highway funding as well as numerous congressional earmarks. R&D in the Federal Aviation Administration (FAA) increases 5.0 percent to \$276 million in contrast to a requested cut.

**Department of Veterans Affairs (VA)** federal R&D totals \$805 million in FY 2006 (see Table 18), up 2.7 percent from last year and a similar boost over the request. VA is the only federal agency exempt from across-the-board cuts in 2006.