



Science + Technology

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Energy Debates Spur Tug-of-War Over "Sound Science"

Scientific research has played a critical but not always clear role in recent debates over energy policy, with advocates on all sides of the issues marshaling "sound science" to defend their position against the "junk science" of their opponents. The Arctic National Wildlife Refuge and the Yucca Mountain nuclear waste repository have been the focus of particularly heated arguments, in which studies in wildlife biology, geology, and nuclear waste disposal have been praised or criticized depending on their impact on policy decisions.

Arctic National Wildlife Refuge

The issue of whether or not to allow drilling in the Arctic National Wildlife Refuge (ANWR), located on Alaska's North Slope, was one of the most contentious issues in the debate over this year's Senate energy bill. The bill, passed on April 25, comes almost 10 months after passage of the House bill, which was motivated by the release of the President's National Energy Plan in May 2001. While the House bill would authorize drilling on a 2,000-acre footprint within the refuge's coastal area, the Senate bill would maintain the status quo, a ban on drilling anywhere in the 19 million-acre refuge. Resolving the differences between the two in conference will be, at best, a painful process.

The U.S. Geological Survey (USGS) esti-

mates that anywhere from 4 to 12 billion economically-recoverable barrels of oil are buried in the refuge, most of them in the northwest corner of the coastal area near the Prudhoe Bay oil fields. Critics of the proposed drilling have suggested that local populations of caribou, polar bears and other arctic wildlife, some of which are important economic resources for native groups, will be harmed by drilling. Proponents counter that new, low-impact drilling techniques will cause minimal damage

to the refuge, significantly boost the U.S. energy supply, and raise the standard of living of native groups who own rights to some of the oil-rich land. All of the groups, regardless of their position, have attempted to use scientific research to bolster their positions, and each has given the research its own particular spin.

USGS estimates of the location and amount of oil in ANWR have been mostly immune to such debates, but estimates of

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Cloning Comes Down to the Wire

The one thing that's certain about an upcoming Senate vote on a bill to ban human cloning is that it will be close. Other than that, however, the cloning ban's fate is very much up in the air.

The need for a ban on the cloning of human babies (reproductive cloning) is not disputed on Capitol Hill, but the shape that such a ban takes is a hotly contested issue. On one side are supporters of a bill (S. 1899) introduced by Sens. Sam Brownback (R-KS) and Mary Landrieu (D-LA), which is identical to a bill that passed the House last summer and would criminalize all forms of human cloning. Anyone who produces a cloned human embryo would be subject up to a ten-year jail sentence.

On the other side are supporters of a bill (S. 2439) authored by Sens. Arlen Specter (R-PA) and Dianne Feinstein (D-CA) that would ban reproductive cloning, but allow scientists

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FOR MORE INFORMATION:

www.aaas.org/spp/cstc/issues/cloning.htm

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"...asking scientists to answer what are essentially political questions can only distort the science and muddle the policy debate."

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Research, Innovation, and Patents

Enactment of the Bayh-Dole Act in 1980 was intended to provide a fertile environment for academic researchers to be able to convert their research results into innovative products and encourage collaborations with industry. A quirk in U.S. patent law, however, was revealed in a 1997 court ruling that could threaten these partnerships. The ruling focused not on biotechnology or another breaking scientific field, but on a toy football.

On March 14, the House Courts, the Internet, and Intellectual Property Subcom-

"The question before us ... is how ... to provide an environment in which researchers have the freedom and opportunity to develop inventions and new ideas."

mittee held a hearing to discuss whether to amend a portion of the Patent and Trademark Act of 1980 [35 U.S.C § 103(c)] to eliminate this quirk. The debate centered on the conditions under which an organization or individual may apply for a patent. According to Section 103(c), an invention is ineligible for patent consideration if it is shown to be "prior art," which is measured by two thresholds for determining the discovery's "obviousness." For an invention to achieve the status of "non-obvious"—and therefore not be defined as prior art—there must be no common ownership of it, and information shared among collaborators must not have been publicly known.

In the *OddzON Products, Inc. vs. Just Toys, Inc.* case, the court restricted the interpretation of Section 103(c) to allow for communication between collaborators only if they were working within the same organization. Hence, once information was shared between organizations it would be considered publicly known and ruled as prior art.

The university community has decried the *OddzON* decision, noting that merely discussing research results that may have potential commercial applications with a prospective industry partner will open the institution to the "publicly known" thresh-

old and exempt them from legal protection.

According to Carl E. Gulbrandsen, managing director for the Wisconsin Alumni Research Foundation, "the *OddzON* decision has been viewed as creating a significant threat for the loss of intellectual property rights for inventors who engage in joint research and development projects with scientists not employed by the same entity, be it a university or corporation."

Other patent lawyers testifying at the hearing noted that universities could circumvent this problem by creating a joint venture, or by assigning intellectual property rights to a single entity. University representatives countered that some state and federal government organizations cannot assign rights to an outside partner. This is especially true in the case of public research institutions, due to state sovereignty laws.

The enactment of patent and trademark laws, such as the Bayh-Dole Act, has led to increased collaboration among universities, non-profit institutions, and industry. University researchers can patent discoveries (including those made under federal research grants) and then issue licenses for a fee in order to generate income to be reinvested into additional research. The more "innovative" a university, the more likely they are able to forge partnerships with in-

dustry, creating a new cycle of investment, discovery, and economic return.

The benefits of Bayh-Dole are evident in the number of patents issued and royalty income generated over the last twenty years. A survey conducted by the Association of University Technology Managers revealed that universities filed 6,375 new patents in fiscal year 2000. In that same year, adjusted gross income received from licenses and options amounted to \$1.26 billion. That includes both one-time payments and royalty income from active licenses. Before 1980 fewer than 250 patents had been issued to U.S. universities.

Rep. Howard L. Berman (D-CA), ranking member of the subcommittee summed up the situation in his opening remarks at the hearing. "There is no question that research collaborations are a key element to the success of the U.S. economy. The question before us today is how we can continue to provide an environment in which researchers have the freedom and opportunity to develop inventions and new ideas. ... In 1984, the research paradigm was one in which collaborations across institutions was a rarity. Thus, we apparently just neglected to include this possibility in the language of Section 103(c). It may be time to correct this oversight." ●●●

Tracking Foreign Science Students

The U.S. government has taken some steps to close up loopholes in the immigration process that apparently allowed some of the September 11th terrorists to enter the country, with additional scrutiny being placed on foreign students studying in science fields.

On May 14th President Bush signed the border security and immigration bill that will, among other things, require that all foreign visitors utilize tamper-proof visas and passports, as well as impose biometric methods for detecting potential terrorists. Just four days prior to the President's Rose Garden ceremony, Attorney General John Ashcroft held a press conference announcing a new regulation to implement the Student Exchange and Visitor Information System (SEVIS); replacing the dated, paper-system for tracking foreign students with an electronic system.

The new SEVIS database will be launched on a voluntary basis beginning in July, but the Immigration and Naturalization Service (INS) will require that all academic institutions comply by January 30, 2003. Information to be collected on foreign students includes data such as port of entry, arrival on campus and residential address, and field of study. Though universities and colleges are more or less satisfied with the new electronic system, some representatives have expressed concern over whether they have sufficient time to comply.

In addition to utilizing SEVIS for tracking the comings and goings of foreign students, the White House Office of Science and Technology Policy (OSTP) recently revealed plans to institute an additional level of scrutiny over students that plan to study science and engi-

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Boehlert Supports NSF Doubling

House Science Committee Chairman Sherwood L. Boehlert (R-NY) and Research Subcommittee Chairman Nick Smith (R-MI) have proposed a National Science Foundation (NSF) reauthorization bill that would set the agency on a track to double its budget over the next five years.

Calling NSF research critically important to the economy, national security, health, and education, Rep. Boehlert presented the bill (HR 4664) at a May 7 press conference alongside a bipartisan group of co-sponsors, including the ranking member of the Research Subcommittee, Rep. Eddie Bernice Johnson (D-TX). The legislation would pro-

"NSF has the broadest research mission of any federal science agency.... It needs the funding that goes with that ... mandate."

vide annual 15 percent increases for NSF over the next three years, boosting its budget from \$4.8 billion in fiscal year (FY) 2002 to \$7.3 billion in FY 2005. If the budget continued on this trajectory, it would reach \$9.6 billion in FY 2007, twice the total for FY 2002.

"Congress has quite properly committed to doubling the budget of the National Institutes of Health," said Rep. Boehlert. "... But NIH does not and cannot fund the full range of research activities the nation needs to remain prosperous – and healthy. NSF has the broadest research mission of any federal science agency and the clearest educational mission. It needs the funding that goes with that expansive – and expensive – mandate."

The funds provided by the bill would be spread fairly evenly across the agency, with mathematics and nanotechnology research singled out for particularly large increases. The legislation would also address two policy issues that have attracted recent attention by taking steps to encourage greater transparency in procedures for selecting major research projects and better cooperation with NASA in funding astronomy research.

The scientific community has responded

enthusiastically to the proposal. Earlier this year, the Coalition for National Science Funding, representing over 70 scientific and engineering societies and universities, recommended an identical 15 percent increase for NSF in FY 2003.

While the Research Subcommittee approved the bill by voice vote on May 9, and the full Science Committee is expected to follow suit, the bill's aims cannot be achieved without the support of the Appropriations Committee, and key House appropriators have not embraced the goal of doubling funding for NSF.

In the Senate, however, the idea has widespread support. Sens. Barbara Mikulski (D-MD) and Kit Bond (R-MO), the chairwoman and ranking member of the VA-HUD Subcommittee, which allocates funds for NSF, have lobbied hard in recent years for more NSF funding. They circulated a letter in 2000 signed by over 40 senators advocating doubling of the agency's budget.

The Bond-Mikulski push coincided with

Senate passage in 2000 of an authorization bill to double federal funding for all civilian R&D, and a January 2001 recommendation in the Hart-Rudman report on national security for a doubling of the entire federal R&D budget by 2010. In addition, Senate Majority Leader Thomas A. Daschle (D-SD) recently called for doubling of civilian R&D funding.

Asked whether the Office of Management and Budget supports his bill, Rep. Boehlert indicated that he is involved in ongoing discussions with the White House and expects "no major difficulty moving forward on the course that we're charting."

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FOR MORE INFORMATION:

National Science Foundation: www.nsf.gov

House Science Committee:
www.house.gov/science

Hart-Rudman Report: www.nssg.gov

Cloning Comes Down to the Wire

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to carry out research on stem cells extracted from cloned embryos (sometimes referred to as therapeutic or research cloning). Anyone who implants a cloned embryo in a woman's womb would be subject to a ten-year jail sentence.

Both sides have won significant lobbying victories in recent weeks, and it appears that the Senate is evenly split, with about a dozen legislators undecided. Most recently, Sen. Orrin G. Hatch (R-UT), a prominent pro-life conservative, announced his support for the Specter-Feinstein measure at an April 30 press conference.

"I come to this issue with a strong pro-life, pro-family record," Sen. Hatch said. "But I also strongly believe that a critical part of being pro-life is to support measures that help the living. ... At the core of my support for regenerative medicine research is my belief that human life requires and begins in a mother's nurturing womb."

On April 10, President Bush made a statement strongly supporting the Brownback-Landrieu legislation. "[A]nything other than a total ban on human cloning would be unethical," he said. "Research cloning would contradict the most fundamental principle of medical ethics, that no human life should be exploited or extinguished for the benefit of another."

Joining the president as he made this statement was Sen. Bill Frist (R-TN), a heart surgeon who is often looked to by colleagues and the White House as a resource on health issues, and who is a supporter of stem cell research. "[O]ne must understand the fundamental fact that ... embryonic stem cell research and human embryo cloning research are not the same thing," he said on the Senate floor. "... [T]he promise of stem cell research ... can and will progress with a ban on human cloning embryo experimentation. ... I would indeed argue that any potential benefit of cloning ... should be demonstrated in animal models before going to the human model."

Although Senate Majority Leader Thomas A. Daschle (D-SD) has a long-standing commitment to Sen. Brownback to bring up the issue, reports indicate a vote will be postponed until after the Memorial Day recess. •••

Three Speeches, Three Visions

Three key policymakers have given major speeches in recent weeks outlining their visions of S&T policy. Excerpts follow.

Dr. John H. Marburger, III

President's Science Advisor

AAAS Colloquium on S&T Policy, April 11
ostp.gov/html/02_4_15.html

"As I learned more about the challenges of terrorism, I realized that the means for reducing the risk and consequences of terrorist incidents were for the most part already inherent in the scientific knowledge and technical capabilities available today. Only in a few areas would additional basic research be necessary, particularly in connection with bio-terrorism. By far the greater challenge would be to define the specific tasks we wanted technology to perform, and to deploy technology effectively throughout the diffuse and pervasive systems it is designed to protect. The deep and serious problem of homeland security is not one of science, it is one of implementation. ...

"I do not mean to imply that the science role in the war against terrorism is unimportant. Nor that substantial funds will not be forthcoming to solve technical problems critical to the war effort. But science is moving forward with its own powerful dynamic, and it is producing the means for addressing many of society's difficult problems, terrorism among them. Federal support of science must be directed first of all to sustain this dynamic, and secondly to seize the greatest opportunities it is creating for discovery, and for the improvement of the human condition. This is what I have called a "science based" science policy. It differs from what might be called an "issues based" policy in recognizing that discovery and the creation of entirely new technologies are unlikely to emerge from mandates in service to a particular social issue. ...

"The social sciences in general have much more to offer on the difficult problems of our time than we are currently acknowledging in our federally funded programs. The September meeting on terrorism sponsored by the National Academies included a number of social scientists whose input provided structure and dimension to the discussion. We are not yet systematically including the social sciences in the mobilization for the war against terrorism, and this needs to be done."

Sean O'Keefe

NASA Administrator

Syracuse University, April 12
www.nasa.gov/bios/vision.html

"Today I am introducing a new strategic framework and vision for NASA. It is a blueprint for the future of exploration. It is a roadmap for achievement that we hope will improve the lives of everyone in this country and everyone on this planet. ... Our mandate is: to improve life here, to extend life to there, to find life beyond.

"To improve life here is self-explanatory. From medical devices to better tires, many of the products we use and experience every day have their origins in NASA technology. The American taxpayers' investment in NASA pays off every day in spin-off technology. ...

"The second point in the vision is to extend life to there. Where is there? Everybody has a favorite candidate—and that's a good thing—but wherever we want to go, we currently have a limited means to get there, and we must overcome these limitations.

"We will go where the science dictates that we go, not because it's close or popular. We are going where the fundamental questions that we seek to answer take us. That's the big change. NASA's mission ... must be driven by the science, not by destination. And while policy and politics and economics are inevitable factors, science must be the preeminent factor.

"And that leads me to the final point in the vision—to find life beyond. That is the fundamental, most compelling question known to humankind. Are we alone in the universe? ... NASA, with telescopes, spaceborne observatories, robotic and human explorers, we will find out. ...

"A theme I've sought to weave through the talk today has been the contributions and dedication of our people. This is why we have made not only inspiration, but also education, a core mission component. ...

"It is time for NASA ... to send an educator into space to inspire and teach our young people. To achieve that goal, ... I am pleased to announce Barbara Morgan has been selected to begin her mission as the first Educator Mission Specialist. Mrs. Morgan's mission will be the first of a series of flights in the new Educator Mission Specialist Program."

Rep. Sherwood L. Boehlert (R-NY)

Chairman, House Science Committee

EPA Science Forum 2002, May 1
www.house.gov/science/press/speeches.htm

"I want to throw out some important cautions that can be forgotten.... We need to remember that as important as science is, it is not and cannot be the sole basis of environmental policy. Science is a necessary, but not sufficient basis for policy. It must inform all of our policy decisions, but it cannot be the determinant of any of them. ...

"I'm thinking of two classic pitfalls to avoid when drawing on science in the policy arena. The first, and more obvious one is that science can rarely provide definitive answers to complex questions, at least on a timely basis. Policymakers desperately turn to scientists time and again for simple yes-no answers, and time and again we are sorely disappointed.

"It's essential that scientists not distort the inherent uncertainty of their conclusions in response to our special pleading. ... Instead, policymakers need to get better at evaluating scientific uncertainty and at making decisions as research proceeds. Unfortunately, this is hard to accomplish on Capitol Hill, where science too often is used as a weapon rather than a tool. ...

"The second pitfall is a bit more subtle, but just as important to avoid. We need to understand that not all environmental policy controversies involve questions of science. And asking scientists to answer what are essentially political questions can only distort the science and muddle the policy debate. ...

"Everyone wants to frame environmental debates in terms of science—politicians because science provides a cloak of objectivity (whatever the post-modernists may think); scientists because it increases the prestige of science. But we will never have an honest, direct and fruitful debate about environmental policy until we clearly delineate where science's role comes to an end. Policy questions need to be addressed as policy questions, not as matters of science. Informed by science—yes, but not answerable by science."

CONGRESSIONAL RESEARCH SERVICE

Copies of CRS reports for congressional use are available by calling 202/707-7132.

- **Possible Impacts of Major Counter Terrorism Security Actions on Research, Development, and Higher Education (RL31354)**
Since the September 11 attacks, scientists, technologists and the legislative and executive branches of the federal government have considered or adopted new measures to counteract terrorism. These measures include increased monitoring of foreign students, tighter restrictions on biological agents with potential terrorist uses, improvements in security and surveillance at laboratories, and restrictions on scientific communication of sensitive information. Public discussion of such measures is needed, and policymakers need to be aware of possible unintended consequences of heightened security measures.
- **Children's Environmental Health: What Role for the Federal Government? (RL31322)**
On May 22, 2000, CRS convened a seminar to examine the scientific evidence regarding the threat of environmental pollutants to children and the public policy choices available to respond to those threats. CRS concluded that the extent and significance of environmental risks to children could not be determined from the available evidence. While increased funding for further research is recommended, Congress will have to balance risk assessment, personal and societal values, and political philosophies in coming to a decision about further legislative action.
- **Science and Technology Policy; Issues For the 107th Congress, Second Session (RL31352)**
Legislative and budgetary decisions about science and technology (S&T) have implications for a wide range of national issues. This report provides an overview of key S&T issues pending before the 107th Congress, including the fiscal year 2003 research and development budget, homeland security, technology development, telecommunications and information technology, biotechnology, global climate change, aeronautics and space. A list of related CRS reports is appended.

GENERAL ACCOUNTING OFFICE

Copies of GAO Publications are available online at www.gao.gov or by calling 202/512-6000.

- **Nuclear Waste: Uncertainties about the Yucca Mountain Repository Project (GAO-02-539T)**
On February 15, 2002, the president recommended that the Department of Energy (DOE) proceed with the controversial Yucca Mountain repository for high level nuclear waste, triggering a legally-mandated deadline for the department to submit a licensing application to the Nuclear Regulatory

Commission. This report argues that DOE will not be able to resolve outstanding technical and management issues before the time limit expires. As a result, DOE's expectation of opening the repository by 2010 is unrealistic.

- **Technology Transfer: Several Factors Have Led to a Decline in Partnerships at DOE's Laboratories (GAO-02-465)**
To encourage partnerships between DOE laboratories and the private sector, Congress began providing the laboratories with dedicated funds for cooperative research and development agreements (CRADAs) in 1991. In 1996, however, Congress began to phase out those dedicated funds. This report examines the relationship between the decline in funding and the significant reduction in recent years in the number of CRADAs at 12 DOE laboratories.
- **Environmental Health Risks: Information on EPA's Draft Reassessment of Dioxins (GAO-02-515)**
The Environmental Protection Agency (EPA), which first reported on the human health risk of dioxins in 1985, will publish the results of a second round of assessment later this year. In this report, GAO compares the methods and conclusions of the EPA study to those of a similar study by the World Health Organization. It concludes that the two studies, while differing in methodology, arrive at similar conclusions: dioxins can cause cancer and other health problems at lower levels than previously expected, and some adverse health effects may occur at levels to which the general population is currently exposed.

THE NATIONAL ACADEMIES

Government offices may obtain single complimentary copies by calling the Office of Congressional and Government Affairs at 202/334-1513. Others may order copies from the National Academy Press (800/624-6242, www.nap.edu).

- **Safe on Mars: Precursor Measurements Necessary to Support Human Operations on the Martian Surface (ISBN: 0-309-08426-1)**
Before astronauts can take the first steps on Mars, much research needs to be done to guide mission planners and hardware designers, this report finds. The report outlines the environmental, chemical and biological hazards that NASA should assess.
- **Geoscience Collections and Data: National Resources in Peril (ISBN: 0-309-08341-9)**
Many geological collections and data crucial for coping with natural disasters and managing the nation's natural resources will be in peril without immediate U.S. action to improve preservation efforts, this report says. Museums, universities and federal and state agencies that currently house these resources are running out of space.

scientific definitions

1. The act of making clear and distinct.
2. the act of stating a precise meaning or significance.

NUCLEAR POWER TERMS

HALF-LIFE The amount of time required for half the atoms in a radioactive substance to decay into other elements or isotopes.

ISOTOPE One of a number of different forms that each element can take, where the forms differ in the number of neutrons they contain. Uranium, for instance, has two main isotopes: U^{235} , which has 92 protons and 143 neutrons, and U^{238} , which has 92 protons and 146 neutrons. U^{235} makes up only about 0.7 percent of the uranium naturally available, but the percentage can be increased to make "enriched" uranium that is the primary fuel for nuclear power plants. U^{238} , unlike U^{235} , does not fission easily, but it is a "fertile" material that can be transformed into fissionable plutonium (Pu^{239}) by bombarding it with neutrons.

RADIATION The emission of particles or energy from a radioactive substance, as in the spontaneous decay of uranium or plutonium. **Alpha radiation** consists of helium nuclei, which are made up of two protons and a neutron. Because alpha particles are positively charged and relatively massive, they tend to travel only short distances, and as a result they are a health risk only if ingested or inhaled. **Beta radiation** consists of high-energy electrons. As with alpha radiation, the major health concern for beta radiation is from ingestion or inhalation. **Gamma radiation** consists of high-energy electromagnetic waves; because gamma rays can destroy cells, they are commonly used for cancer treatment. **Neutrons** are emitted by nuclear fission reactions.

RADIOISOTOPE An isotope that emits radiation, sometimes called a radionuclide.

REPROCESSING One of two ways of disposing of spent nuclear fuel. It involves the mechanical and chemical process of separating out usable products like uranium and plutonium from spent nuclear fuel. It has been rejected as a strategy for nuclear waste management in the U.S. because of economic and non-proliferation concerns, although several plants in Europe use the technique. The alternative, **long-term storage**, is being explored by a number of countries, but the U.S., while still a long way from opening a long-term repository, is further along than any other country.

MORE NUCLEAR FACTS:

The U.S. has 103 operating nuclear reactors, more than any other country in the world and almost twice as many as the second- and third-place countries, France and Japan. Approximately two-thirds of U.S. reactors are **pressurized water reactors**, in which the heat generated by the nuclear reaction is conveyed by pressurized water to a steam generator; one-third are **boiling water reactors**, in which the reaction heat is used to generate steam directly. Altogether, they generate approximately 750 billion kilowatt-hours of electricity per year, or 20 percent of the nation's electric power (coal accounts for around 50 percent, and natural gas, hydropower, and other sources for the rest).

SOURCES: Nuclear Regulatory Commission (www.nrc.gov), Nuclear Energy Institute (www.nei.org), Yucca Mountain Project (www.ymp.gov)

Foreign Science Students

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neering in the United States. OSTP announced the creation of an Interagency Panel on Advanced Science Security (IPASS) that will provide another specialized review of F (student), J (post-doctoral), and M (vocational) visas for students pursuing scientific study.

In a special briefing to scientific and education organizations, a representative of OSTP stated that the goal is "to ensure that international students or visiting scholars do not acquire 'uniquely available' and 'sensitive' education and training at U.S. institutions and facilities that can be used against us in a terrorist attack."

The IPASS group will consist of representatives from defense, civilian, immigration, and intelligence agencies to review visa applications. Criteria for determining whether a student should be given IPASS inspection will be done first by INS using the Technology Alert List and country of origin. IPASS will then analyze students according to a series of variables to determine patterns. The variables include the student's educational background, training, and work experience; country of origin; whether the field of study is uniquely available in the United States and sensitive; and whether research conducted elsewhere at the chosen school—beyond the student's major—could pose national security implications.

IPASS is still in the conceptual phase and nothing is written on paper as of yet, though OSTP stated that it plans to implement this by either new regulation or legislation. Issues that need to be resolved include defining "uniquely available" and "sensitive"; how to best implement the IPASS review in an efficient manner; and mechanisms for determining intent to do harm. ●●●

FOR MORE INFORMATION:

Department of Justice: www.justice.gov

SEVIS: www.ins.usdoj.gov:80/graphics/services/tempbenefits/sevpqa.htm

Energy Debates

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the potential impact of drilling on ANWR wildlife, which are less certain and more emotionally charged, have become focal points for controversy. In early April, for example, USGS released a report suggesting that ANWR's caribou, geese, polar bears and other wildlife would be adversely affected by drilling under a number of different development scenarios. The report appeared to contradict earlier testimony by Interior Secretary Gale Norton, who responded to its release by requesting a supplementary report. The supplementary

Not only are many of the nation's nuclear power plants, which are scattered across the majority of U.S. states, running out of on-site storage space, but some of them are suing DOE to recover the cost of storage since 1998.

report, completed in less than a week, analyzed the effect on caribou populations of drilling limited to the 2,000-acre footprint specified in the House energy bill, a scenario not included in the original study.

When the supplementary report, which concluded that limited development would have no adverse impact on caribou, was released, proponents of drilling saw it as further evidence that limited development could be environmentally harmless. Opponents, however, saw it as evidence that the administration was manipulating the scientific process to support its political and economic goals.

Yucca Mountain

A similar tug-of-war over science has taken place in the debate over Yucca Mountain, the proposed permanent storage site for the nation's high-level radioactive waste. The Nevada site has been under evaluation since 1982, when the Nuclear Waste Act gave the federal government responsibility for long-term storage of the nuclear power industry's waste. According to Energy Secretary Spencer Abraham, who has stressed the importance of "sound science" in deciding Yucca Mountain's future, the suitability of the site is supported by more than \$4 billion dollars and 20 years of scientific research.

However, opponents of the site, including environmentalists, some scientists, and Nevada's governor and congressional delegation, have questioned whether the time and money spent are valid indicators of the quality of the science. In a recent article in *Science* (which is published by AAAS), for instance, Rodney Ewing of the University of Michigan and Allison Macfarlane of MIT argued that "political pressure to resolve the issue ... now drives the decision-making process at the expense of the science required to support this important public policy decision," and concluded that "mov[ing] ahead without first addressing the outstanding scientific issues will only continue to marginalize the role of science." In contrast, the Department of Energy (DOE), Nuclear Regulatory Commission (NRC), International Atomic Energy Agency, and other groups have stated that, while some technical issues remain, the science is sound enough to support moving to the next stage of the development process.

Regardless of the quality of the science, the political pressure to move forward on Yucca Mountain is enormous. Not only are many of the nation's nuclear power plants,

which are scattered across the majority of U.S. states, running out of on-site storage space, but some of them are suing DOE to recover the cost of storage since 1998, when the agency had originally contracted to begin removing the waste.

According to current projections, the Yucca Mountain repository will open in 2010 at the earliest. As a result, both the administration and Congress, with the exception of the Nevada delegation, have strong political and economic motivations to select the site regardless of the remaining scientific questions.

The House recently voted to override the Nevada governor's veto, 306-117, and the Senate is likely to follow suit in July after a series of hearings scheduled to take place in the coming month. If it does, DOE will be able to proceed with submitting a licensing application to the NRC, at which point further evaluations and public comment, and further debates over the soundness of the science, will take place. ●●●

FOR MORE INFORMATION:

Department of Energy: www.energy.gov

Energy Information Administration (ANWR):

tonto.eia.doe.gov/oog/info/state/ak.asp

U.S. Fish & Wildlife Service (ANWR):

www.r7.fws.gov/nwr/arctic/arctic.html

Sierra Club (ANWR):

www.sierraclub.org/wildlands/arctic

Sierra Club (nuclear waste):

www.sierraclub.org/nuclearwaste

Yucca Mountain Project: www.ymp.gov

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- David G. Cooper, *Project Coordinator, CSTC*
- Etienne Benson, *Intern, CSTC*



Heard off the Hill

Paint-On Solar Panels • Researchers at the University of California, Berkeley, have created a new, ultrathin solar panel that is flexible enough to be painted onto

any surface. The panel could eventually produce low-cost power for portable devices without the expensive materials and manufacturing processes required for today's best photovoltaic cells. It consists of a mixture of nanotubes and plastic sandwiched between two electrode layers, one of which is transparent. Currently, the material can extract about 2 percent of the energy from sunlight, a far cry from the industry standard of 10 percent. But the researchers are optimistic that they'll be able to up the percentage.

---> *Science, March 28, 2002*

Skip Lunch, Prevent Cancer • Eating less could reduce your risk of developing intestinal cancer, according to a new study. Researchers at the National Cancer Institute found that mice limited to 60 percent of their normal food intake developed 60 percent fewer precancerous growths than mice allowed to eat their fill. Recognizing that not everyone is willing to give up the equivalent of a meal a day, the researchers also tested the effect of a "healthy" diet in which the mice were allowed to eat as much as they wanted. They found that mice who ate a diet high in olive oil, fruits and vegetables had fewer growths than mice on a standard diet, though the effect was not quite as strong as in the low-calorie group.

---> *Experimental Biology Meeting, New Orleans, LA, April 2002*

New Genes for Blue Jeans • Researchers have genetically engineered the bacterium *Escherichia coli* to produce indigo, the dye that gives blue jeans their color. "Bioindigo," as it is known, could be more environmentally friendly than the petroleum-based synthetic indigo that is currently used. Until now, attempts to farm *E. coli* for indigo have been limited by the slow rate at which the bacteria synthesize the dye, and by contamination from a red pigment that is a byproduct of the synthesis process. Now, however, researchers have boosted *E. coli*'s indigo production by 60 percent and tweaked the genome to eliminate the red pigment. The study is a significant step towards the day when indigo may be produced in fermentation vats, not petrochemical labs.

---> *Journal of Industrial Microbiology and Biotech., March 2002*

Neanderthals Banged Heads • A new study of a 36,000-year-old Neanderthal skull has produced evidence that the extinct hominids were not above hitting each other on the head with sharp implements. Researchers have long believed that Neanderthals, like other social primates, fought amongst themselves, but until now evidence for weapon use has been scarce. Using CAT scans and a computer reconstruction of the skull, the researchers eliminated the possibility that a fracture near the top of the head was caused by a fall or a medical condition. Instead, the fracture was probably caused by an attack with a sharp weapon by another hominid—either another Neanderthal or an early modern human.

---> *Proceedings of the National Academy of Sciences, April 23, 2002*