



Argonne National Laboratory

Two of the new breeders are planned for the Kalpakkam site.

INDIA TO BUILD FOUR FAST BREEDER REACTORS

India’s Department of Atomic Energy official Dr. Baldev Raj announced Jan. 31 that India will simultaneously build four 500-megawatt fast breeder reactors, as a next step in its thorium program. A breeder reactor generates electricity and at the same time makes more new fuel than it uses up, the only truly renewable energy system. Raj is the director of the Indira Gandhi Center for Atomic Research in Kalpakkam, where a 20-MW Fast Breeder Test Reactor has been in operation for 20 years. Two of the new reactors will be based in Kalpakkam, where a prototype 500-MW Fast Breeder Reactor will go critical in 2010. Tamil Nadu, the state where Kalpakkam is located, is bidding for the second two reactors also, to meet the need for desalination and electricity production.

The new breeders would first use uranium-plutonium oxide as fuel, and later switch to metallic fuel. The neutrons produced by the fission of the uranium and plutonium will convert thorium oxide, positioned in a blanket around the reactor wall, into fissile U-233. The conversion (“breeding”) of thorium into U-233 is the first step in the thorium cycle, which would make India energy-independent, as it possesses the world’s second largest reserves of thorium in the black sand beaches in Kerala state. The U-233 bred from the thorium would then become the fuel for nuclear generating plants to be built on the model of a prototype reactor now running at the Bhabha Research Center.

NASA HEAD QUESTIONS HUMAN ROLE IN GLOBAL WARMING

“We have yet to find out whether the present climate change is man-made, or whether it is just a short-term vacillation,” NASA Administrator Mike Griffin told the German daily *Frankfurter Allgemeine Zeitung* Jan. 26. This, despite an annual investment of \$5.5 billion in research on planet Earth. “What I also want to know from our scientists,” he said, “is why the Vikings settled in Greenland and cultivated wheat, and why one day it became too cold to do that.”

Griffin gave the interview to the Frankfurt paper while he was attending the World Economic Forum at Davos, Switzerland.

POLYHEDRAL FUSION PROVEN IN INERTIAL ELECTROSTATIC CONFINEMENT

A novel method of achieving nuclear fusion by inertial electrostatic confinement was given wide publicity by the posting on Google Tech of a 90-minute lecture Nov. 9 by veteran fusion researcher Dr. Robert W. Bussard. Bussard explains how a program funded by the Defense Advanced Research Projects Agency (DARPA) achieved 100,000 times the neutron flux produced in earlier devices of this kind.

Bussard began work on inertial electrostatic confinement fusion (IECF) in the 1980s, after losing faith in the bureaucracy administering the magnetic confinement (tokamak) program, of which he was a pioneer. In IEC fusion, deuterium or other positive ions are drawn to the center of a spherical vacuum chamber by the high negative voltage potential on the inner of two concentric metal grids. Part of the problem of achieving fusion involves steering the electrons stripped from the ions. Bussard realized a means of guiding the electrons using magnetic fields. It turned out that the ideal configuration required placing magnets around a polyhedron in which four faces come together at a vertex. The cuboctahedron was chosen. In the seventh prototype, built at a Manassas, Va. lab funded by the Navy and DARPA, six toroidal-wound magnetic coils were placed at the cubic faces of a cuboctahedral configuration, achieving a 100,000-fold increase over the best results achieved by electrostatic-only devices. The results were achieved in the last run of the prototype device, just before the program was shut down because of funding cuts stemming from the Iraq war.

Bussard is seeking \$200 million in funding for further work. He will also try a configuration based on the icosidodecahedron.



Google Tech

Fusion scientist Robert Bussard presenting IECF fusion to Google staff members. The video can be viewed at <http://video.google.com/videoplay?docid=1996321846673788606>.

IT'S CHEAPER TO REPROCESS SPENT NUCLEAR FUEL THAN TO BURY IT

The French nuclear conglomerate Areva announced a new study that refutes the long-held claim of the anti-nukes and the nuclear industry that recycling is prohibitively expensive. The study, released July 25, was carried out by the Boston Consulting Group. It involves only "market" and "competitive" assumptions, and does not include the valuable isotopes that could be "mined" from the small amount of nuclear fuel—the so-called high level waste—that cannot be recycled into new uranium fuel or mixed oxide fuel. If the technologies were developed to extract these isotopes for medical and industrial purposes, the economy would have no waste burial costs.

At present, the United States has a once-through cycle for nuclear fuel. Reprocessing was stopped in the 1970s, in a policy pushed by neo-con Albert Wohlstetter and carried out by President Carter, which equated nuclear plants with bombs, and reprocessing with proliferation.

NEW TB TEST IS QUICK AND EFFECTIVE

A group of scientists working in a clinical setting in Peru have developed a new test for TB that is fast and effective, as reported in the *New England Journal of Medicine*, Oct. 12, 2006. The new test, called the microscopic-observation drug-susceptibility (MODS) assay, uses microscopically visible growth morphology to spot TB quickly in culture. Differential growth media were used to determine drug susceptibility. The scientists claimed that their MODS assay produced results in 7 days, compared with the two methods presently used: automated mycobacterial culture, which takes 13 days, and culture on Lowenstein-Jensen medium, which takes 26 days. The new test is also more accurate.

In addition, the MODS assay can test for drug resistance at the same time, producing drug resistance profiles in 7 days, versus 22 days and 68 days, respectively, for the other two methods. The advantage of such quick results is that patients will be identified sooner, and will not be treated for weeks with therapies which may not be effective.

The test itself is inexpensive, but it will still require safe handling of the cultures for preparation and observation in a well-organized tuberculosis lab with biosafety Level 3 standards.

CHERNOBYL BIOLOGY STUDY: NO MARKED GENETIC EFFECTS ON WILDLIFE

Writing in the *American Scientist*, Nov.-Dec. 2006, biologists Ronald K. Chesser and Robert J. Baker review their 12-year study of wildlife at the site of the Chernobyl accident, where they were astounded to discover an abundant and thriving ecosystem, just eight years after the accident. They report that they are still challenged by what they found there—higher than normal radiation levels with no marked genetic effects on the wildlife, and very complex ecological variables. Their unusual article admits that they were "terribly naive about radioecology" and the "politics of science" at the start, and says that they wrote the article to share some "brief lessons" of what they learned, including, "Beautiful theories are often destroyed by ugly facts," and "Be prepared to be unpopular and uncomfortable." Scientists must have a single agenda: the truth," they conclude.

WIND ENERGY FIZZLES WHILE CALIFORNIA SIZZLES

California's vaunted windmills produced only 4 to 10 percent of its capacity in Summer 2006, when it was most needed. A Department of Energy nuclear engineer reported in the *Energy Pulse* web newsletter Sept. 8, on the output of windpower during California's 2006 heat wave: "On the day of peak demand, August 24, 2006, wind power produced at 254.6 MW at the time of peak demand. 254.6 MW represents only 10.2% of wind's rated capacity of 2,500 MW. . . . Over the preceding seven days, August 17 to 23, wind produced at 89.4 to 113.0 MW, averaging only 99.1 MW at the time of peak demand or just 4% of rated capacity."



Savannah River Site

Spent fuel handling at the Department of Energy's Savannah River Site, which also used to reprocess nuclear fuel, until U.S. reprocessing was shut down.



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No wind, no power.