

The report concedes that highly experienced nuclear weapons states—the US, Russia, the UK, France, and the People's Republic of China—might be able to use sophisticated masking techniques to hide a blast of 1 or 2 kilotons. But such constrained nuclear testing would not add significantly to the nuclear weapons capabilities those states already possess, the report says. Other nuclear weapons states—notably India and Pakistan—and those aspiring to develop nuclear weapons capabilities, such as Iraq, would not be able to reliably test below the detection threshold without the help of one of the more experienced states, the report says. The results of such tests alone would not be enough to enable such states to develop advanced nuclear weapons, the report adds. But, cautions the report, some types of simple and relatively heavy and inefficient fission weapons could be developed without any nuclear testing at all.

The report concludes that “the worst-case scenario under a no-CTBT regime poses far bigger threats to US security interests—sophisticated nuclear weapons systems in the hands of many more adversaries—than the worst-case scenario of clandestine testing in a CTBT regime, within the constraints posed by the monitoring system.”

The NAS panel was not asked to reach a conclusion as to whether the US should ratify the treaty. “Answering that question requires taking into account a wider array of issues—not just the technical ones we addressed but also military and political issues that were outside our mandate,” says Holdren. “But understanding of the technical issues is certainly an essential ingredient of the informed public and policymaker discussion that must precede a ratification decision, and we hope our report will help provide this.”

PAUL GUINNESSY

Radiation Assessment at Risk

For nearly half a century, the United Nations Scientific Committee on the Effects of Atomic Radiation has been an influential resource on radiation sources and their effects on human health and the environment. But if its budget is not resuscitated, UNSCEAR's data compilation and evaluation activities will grind to a halt.

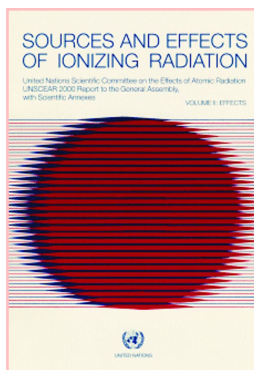
UNSCEAR's budget, \$674 000 for the two-year period 2002–03, is roughly half of what it was a decade

ago. Because of the crunch, UNSCEAR cancelled its annual meeting this spring and will instead meet just once, in January, during the current two-year budget period. But hardest hit is the portion of UNSCEAR's budget that covers travel and honoraria for outside consultants: 10 years ago, it was \$180 000; by 2000–01, it had shrunk to \$52 000; and for 2002–03, it was further chopped in half. “We can't run on that,” says Norman Gentner, scientific secretary for UNSCEAR, which is based in Vienna, Austria, and has 21 member countries. “[The consultants] are world-level people. They get a pittance. It's become impossible to function.”

UNSCEAR assembles experts who comb through and analyze the literature on such topics as the health effects of the Chernobyl accident, non-cancer mortality from ionizing radiation, and the risks associated with radiation-based medical procedures. Their work forms the core of the tomes the committee puts out every few years. The International Atomic Energy Agency, the International Commission on Radiological Protection, and other international and national bodies use data from UNSCEAR in setting safety standards and making policies, says the committee's chair, Joyce Lipsztein, a radiation protection scientist at Brazil's National Atomic Energy Commission. “UNSCEAR is not biased. It's just scientific, not political. That's why it's so valuable.”

The squeeze on UNSCEAR's budget is part of a broader belt-tightening at the UN, Gentner says. UNSCEAR was especially vulnerable because during the last negotiating phase, which took place before Gentner came on board, it was without a leader. The committee comes under the umbrella of the UN Environment Programme, and UNSCEAR members and others describe the UNEP–UNSCEAR relationship in terms ranging from “neutral” to “benign neglect” to “a divorce would help.” Last year, the UN complimented UNSCEAR's work and directed UNEP “to continue providing support for the effective conduct of the work of the Scientific Committee and for the dissemination of its findings to the General Assembly, the scientific community and the public.” But, says Lipsztein, “that hasn't happened.”

More than neglect is at work, says Poland's representative to UNSCEAR,



UNSCEAR's reports on the sources and effects of ionizing radiation come out every few years.

Zbigniew Jaworowski of the Central Laboratory for Radiological Protection in Warsaw. “UNSCEAR dared in 2000 to state that practically no adverse radiation effects were observed among the post-Soviet population ex-

posed to Chernobyl radiation, and that no genetic effects have been observed in the children of Hiroshima and Nagasaki survivors. As a result, UNSCEAR's activities have been all but stopped, and there are real prospects that UNSCEAR could disappear,” he says.

While politicians may not always like UNSCEAR's conclusions, says Lipsztein, “among scientists, they are not controversial.” At a General Assembly this month, Brazil's mission to the UN will try to bring attention to UNSCEAR's plight. “Without the appropriate funding, UNSCEAR cannot continue,” says Lipsztein. For countries around the world, she adds, “that would be like not buying insurance.”

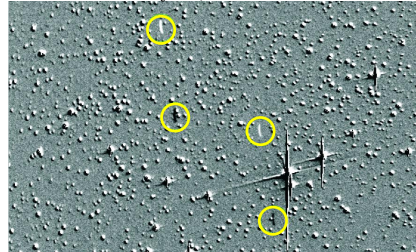
TONI FEDER

Contour Is Lost in Space

The \$159 million Comet Nucleus Tour (Contour) spacecraft, which NASA launched in June to rendezvous with three comets, apparently broke into pieces in August. “There was a big problem with firing the solid rocket booster,” says Robert Farquhar, mission director at the Johns Hopkins University Applied Physics Laboratory (APL).

Contour spent two months in a highly elliptical orbit before attempting to leave Earth's gravitational well, but after it fired its main booster to break orbit, NASA lost radio con-

SPACEWATCH PROJECT, UNIVERSITY OF ARIZONA



TRACKS (highlighted in yellow) might indicate possible Contour debris.

tact with the spacecraft. APL scientists hope to regain communication with Contour in December, when, if the spacecraft is still intact, its main antenna should point directly toward Earth. "We're not very optimistic about the chances of ever recovering Contour again, but we haven't given up totally," says Farquhar, who puts the odds at 10 000 to 1.

The science team is keen to recover the spacecraft because "Contour is the only kind of mission that allows you to study the diversity of comets with the same instrumentation looking at different comets," says Contour's principal investigator, Joseph Veverka of Cornell University. "Equally important," he adds, "it's the only type of mission that gives you the opportunity to intercept a new comet if one of those happens to come in from the Oort Cloud at the right time." Contour was scheduled to rendezvous with comets Encke in 2003, Schwassmann-Wachmann 3 in 2006, and d'Arrest in 2008. Four different instruments would have taken pictures at infrared and visible wavelengths and analyzed dust samples from the comets' nuclei during the flybys.

Further evidence that Contour had experienced a major problem came from Jeff Larsen, an astronomer who used Spacewatch's 1.8-meter telescope on Kitt Peak in Arizona. On 16 August, Larsen spotted two bright parallel moving objects near the predicted position of the spacecraft. "It was within

97% of the predicted trajectory," reports Farquhar. Because of the reflective characteristics of the spacecraft's components, the Contour team suspects that the objects are the main part of Contour and perhaps the rocket nozzle or a piece of thermal blanket. Astronomers in California and Hawaii have confirmed the trails and found a third mysterious fragment. In any case, says Farquhar, if Contour is still intact and APL is able to reestablish contact, then "we have enough fuel on board to reach our targets."

Contour's malfunction may have occurred for two reasons, says Edward Reynolds, Contour's system engineer. Either the rocket booster failed and caused an explosion, or the spacecraft couldn't cope with the acceleration or heat from the booster and suffered a "systemic failure."

If the spacecraft isn't recovered in December, says Veverka, "then we're going to proceed aggressively with a Contour 2." A duplicate spacecraft would cost approximately \$20 million less than the original because all the R&D work for the instruments—which were not involved in the first spacecraft's failure—has already been done. The major change, says Reynolds, is that "we would redesign the rocket motor from a solid propellant to a liquid-based rocket." With an April 2006 launch date, the earliest a replacement could be built, Contour 2 could still intercept the same targets.

PAUL GUINNESSY ■

WEB WATCH

<http://www.ccnmtl.columbia.edu/projects/helfand>

In the past, astronomy was confined to one spectral band, the visual. Now, however, astronomers exploit the entire electromagnetic spectrum. To demonstrate the power of full-spectrum observing, Columbia University's David Helfand makes an aural analogy. His Web site, *Seeing the Whole Symphony*, offers audio files that sample the last movement of Beethoven's Ninth Symphony one octave at a time.



<http://www.rutherford.org.nz>

John Campbell of New Zealand's University of Canterbury has put together the Web site *Rutherford* to celebrate his distinguished compatriot, Ernest Rutherford. The site includes a biography of Rutherford and a compilation of the many and varied ways in which Rutherford's contributions to science have been honored around the world.



<http://www.northcentral.tec.wi.us/programs/laser/laserglossary.htm>



Northcentral Technical College in Wausau, Wisconsin, offers a course in industrial laser technology. Among the course materials is a comprehensive and useful *Glossary of Laser Terms*.

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