

The environment is very important in the aspects of peace because when we destroy our resources and our resources become scarce, we fight over that. I am working to make sure we don't only protect the environment, we also improve governance.

Wangari Maathai, 2004 Nobel Peace Prize winner

WARFARE

NRDC Knocks Nukes

More than a decade after the end of the Cold War, the United States is spending 12 times as much on nuclear weapons and production as it does on programs to find and dispose of nuclear weapons, according to a recent report by the Natural Resources Defense Council (NRDC), a Washington, D.C.-based environmental organization. The report warns that the continued push for a new generation of nuclear weapons could lead to a second arms race. And with another arms race, analysts fear, could come renewed nuclear weapons testing and potential serious fallout for the environment.

"There is no good reason why the U.S. should be spending on average more than it did during the Cold War," says Chris Paine, an analyst with the NRDC's Nuclear Program and the report's author. "The U.S. government needs to rethink the role that nuclear weapons should play in the post-Cold War era."

Titled *Weaponers of Waste*, the report analyzes six nuclear weapons projects, primarily located at the Los Alamos, Sandia, and Lawrence Livermore laboratories. According to the report, the government spent \$6.5 billion in fiscal year 2004, compared to the average \$4.2 billion dollars (in 2004 dollars) it spent yearly during the Cold War. In fiscal year 2005, the U.S. Department of Energy (DOE), the federal agency overseeing the nuclear weapons complex, is asking Congress for \$6.8 billion to support its nuclear weapons projects.

The report describes several of the projects it reviewed as "boondoggles." They include the huge National Ignition Facility at Lawrence Livermore National Laboratory, a high-energy fusion laser that in 1997 the DOE said would be ready in 2005 at a cost of \$1.2 billion, but now, after factoring in additional expenses and recalculating construction management costs, will cost as much as \$5-8 billion. The government expects to complete the facility sometime between 2010 and 2014.

"The government seems determined to put a lot of money into very expensive nuclear weapons projects at the expense of nonproliferation programs, which are hurting for funding," says Victoria Samson, a research analyst with the Washington, D.C.-based Center for Defense Information, a think tank that monitors the U.S. defense industry. "At a time that we are in a war on terrorism, it doesn't seem like a good idea to spend money on [nuclear weapons] programs."

Others believe the report is the real boondoggle. "The NDRC budget assessment is wrong, and they are misleading people," says Bryan Wilkes, director of public affairs for the National Nuclear Security Administration in Washington, D.C. "Our weapons program budget also includes money for such things as security, adminis-

trative costs, infrastructure repair, secure transportation [to move weapons secretly around the country], and emergency response teams—not just nuclear weapons."

trative costs, infrastructure repair, secure transportation [to move weapons secretly around the country], and emergency response teams—not just nuclear weapons." Yet according to Martin Butcher, director of security programs for the Washington, D.C.-based Physicians for Social Responsibility, there is deep skepticism in some quarters about such assurances, and concern that the Bush administration's research program on nuclear weapons and refusal to ratify the Comprehensive Nuclear Test Ban Treaty may lead to the development of new or modified weapons that require proof testing.

"The history of nuclear weapons in this country has been an environmental catastrophe," Butcher says. "We don't want to repeat the mistakes of the past." He adds that the Bush administration has given no signs of planning to resume atmospheric testing, but

underground testing in the Nevada test site would still lead to the venting of irradiated gases. In the 1989 report *The Contamination of Underground Nuclear Explosions*, the congressional Office of Technology reported that since 1970, a total of 126 underground tests have resulted in 54,000 curies of radiation being vented into the atmosphere. Just one accident during nuclear testing could release 150 million curies into the atmosphere—about equivalent to what resulted when the atomic bomb was dropped on Hiroshima during World War II.

In the report, the NDRC urges Congress to implement several recommendations. They include consolidating

the nuclear weapons complex to reduce costs, eliminate redundancies, and lessen its environmental footprint. The group also urges putting more focus on international efforts to reduce stockpiles and funding for the preparation of nuclear testing.

"Congress needs to take a closer look at the role and mission of our nuclear weapons programs," says Daryl Kimball, executive director of the Arms Control Association, an independent organization that supports effective arms control and disarmament policies. "It's a bad idea to assign new [projects and programs] to our country's nuclear weapons program." —Ron Chepesiuk



Taking aim at nukes. A new report by the Natural Resources Defense Council challenges the government's spending on and handling of nuclear weapons.

trative costs, infrastructure repair, secure transportation [to move weapons secretly around the country], and emergency response teams—not just nuclear weapons."

Wilkes says charges that the government is spending too much money on nuclear weapons are irresponsible. He points to the science-based Stockpile Stewardship Program, which conducts tests to ensure the current stockpile remains safe, secure, and reliable without underground testing.

Wilkes further says the government has increased spending on nonproliferation programs by more than 60%. "If that figure doesn't reflect our priorities," he says, "I

TRADE/COMMERCE

NAFTA Worries in Juárez

In June 2004, Mexico's government enacted a law requiring industrial facilities to measure, record, and report emissions of 104 chemicals that formerly were subject only to voluntary reporting. Mexico now joins the United States and Canada in mandating public access to such information through databases and other means. Although earlier Mexican laws had established some voluntary reporting, implementation was weak. The new law marks a watershed step in Mexico's environmental legislation.

Critics say the list of 104 chemicals is paltry compared to the 650 and 268 tracked by the United States and Canada, respectively. But Paul J. Miller, air quality program coordinator at the Montréal-based Commission for Environmental Cooperation (CEC), says what's most important at this point is to establish a workable rule, then add more substances to the list. The CEC is an environmental research organization created by a side agreement to the North American Free Trade Agreement (NAFTA).

The question is, will those additions come in time? Miller says that health problems related to pollution from heavily traveled border crossings are acute in Mexico because most crossings are located in thickly populated areas. With NAFTA's 1993 opening of cross-border trading, motorized traffic across the U.S.–Mexico border increased. Heightened security following the terrorist attacks of 11 September 2001 means it takes even longer to get through border checkpoints, resulting in long lines of idling trucks and other vehicles.

Research by Mexico's National Institute of Public Health concluded that air pollution from high-traffic border crossings between the United States and Mexico poses serious health risks to the children who live near those thoroughfares. In the study, written up in a November 2003 CEC working paper, the researchers examined the effects of air pollutants and ozone on the respiratory health of children in the Mexican city of Ciudad Juárez, which lies just across the border from El Paso, Texas. They found that the traffic pollution–related risks to children were “significant,” and recommended the



Ciudad Juárez. Trading on the environment?

implementation of cost-effective interventions to reduce the problem.

The researchers studied children's respiratory health between 1997 and 2001 by matching hospital admission data to each child's place of residence. They found a connection between poor air quality along the Ciudad Juárez thoroughfare and emergency room visits by children suffering from respiratory illness. Among the poorest citizens, exposure to particulate matter (PM) was related to an increase in infant mortality. Among infants aged 1–12 months, an increase of 20 micrograms PM per cubic meter air on the previous day was associated with a 62% increase in respiratory mortality. If elevated PM was observed on the two previous days, the risk of death was increased by 82%.

Carlos A. Rincón, a scientist with the nonprofit Environmental Defense in El Paso, says the population of Ciudad Juárez has been growing at 4.3% annually for years, mostly due to workers moving there to take jobs created largely by NAFTA. “The border areas should benefit from some of the wealth created by the NAFTA trade,” he says, adding, “Common problems require common solutions.”

Miller points out that NAFTA has no obligations to reduce air pollution, whether it be in Mexico, the United States, or Canada. So the CEC can only issue a call for action, as it did in the Ciudad Juárez working paper.

Fernando Holguin, formerly of the Mexican National Institute of Public Health now working for the Centers for Disease Control and Prevention and Emory University, hopes to enlist the help of municipal authorities in Ciudad Juárez in finding solutions. “The goal would be to either divert traffic flows from some areas where we've shown that schools are sensitive to traffic-related emissions or change the time in which certain kinds of vehicles are allowed to travel in certain parts of the city,” he says.

On a broader level, Miller suggests Mexico should reduce the sulfur content in diesel fuel sold there, as the United States and Canada have, and require particle traps on diesel exhausts. Long-term measures would include more expensive responses, such as moving congested border crossings to locations outside of heavily populated areas. In the meantime, Mexican officials plan to start the first phase of mandatory industry reporting by the end of 2004. —Richard Dahl

Dodging the Bullet

Studies in the late 1990s showed that lead bullets were contaminating soil and groundwater near shooting ranges. Alternative “green” bullets made of tungsten were developed and first distributed to select Army facilities in 1999. Now researchers at the Stevens Institute of Technology have found that tungsten and its alloys dissolve in water and soil at rates that exceed lead. And tungsten, once thought to be a benign substance, is being investigated by the CDC as possibly contributing to a cluster of leukemia cases in Fallon, Nevada, where the mineral occurs naturally. Military bases are examining possible ways to capture the not-so-green bullets or prevent their leaching. Meanwhile, tungsten has been nominated for toxicity study by the National Toxicology Program.



The Worm Turns in Cambodia

Cambodia has successfully treated 75% of its nearly 3 million school-aged children against intestinal worms six years ahead of a World Health Organization goal for global parasite control. Cambodia is the first country to reach this international goal. The inexpensive treatment (2¢ per pill) can be administered by teachers in classrooms, as is being done in Cambodia.

Worldwide, intestinal worms affect at least 2 billion people. Children affected with intestinal worms weigh less than healthy children and are more prone to anemia. Left untreated, infection with intestinal worms can cause irreversible organ damage and impaired intellectual development. Once treated, however, affected children's short- and long-term memory, reasoning capacity, and reading comprehension all improve dramatically, and school absenteeism drops as much as 25%.

Wave of Fish Advisories

New figures released by the U.S. EPA show that 35% of lake acreage in the United States and 24% of river miles contain enough pollution to warrant consumption advisories for fish caught in those waters. The advisories cover some 40 different substances; 98% of them involve PCBs, chlordane, dioxins, DDT, or mercury. Though the number of advisories rose from 2,814 in 2002 to 3,094 in 2003, EPA administrator Mike Leavitt attributed that increase to more monitoring rather than an increase in pollution. Environmental advocates say these latest findings point up the need to more strictly regulate coal-fired power plants, one of the primary sources of mercury.



CHILDREN'S HEALTH

Flu, Fetuses, and Schizophrenia

Pregnant women who contract the flu may increase the risk that their child will develop schizophrenia later in life, according to a recent addition to a growing body of research along these lines. The study, published in the August 2004 *Archives of General Psychiatry*, "is not definitive but is the strongest evidence thus far that a prenatal virus may be a risk factor [for schizophrenia]," says lead investigator Ezra Susser, head of epidemiology at Columbia University's Mailman School of Public Health.

"Influenza infection during pregnancy appears to be a risk factor," agrees Johns Hopkins University neurovirologist Robert Yolken, who adds it is probably one of many risk factors for developing schizophrenia. The severe mental illness, which usually involves delusions, hallucinations, and disordered thinking, affects about 1% of the U.S. population. The Mailman team's work is part of a larger study designed to examine prenatal infection and such factors as father's age and prenatal exposure to chemicals in influencing schizophrenia in adulthood.

The Mailman team looked for influenza antibody in archived blood samples from 64 women whose children developed schizophrenia as adults and a control group of 125 women whose children did not develop the disorder. The samples were collected as



A cold now, catastrophe later. Having the flu while pregnant may pave the way for future schizophrenia in children.

part of the Child Health and Development Study, which collected blood samples from more than 12,000 mothers of children born between 1959 and 1967 and followed the children's development into adulthood.

The risk of schizophrenia was tripled when the mother had the flu during the first half of pregnancy and increased sevenfold if exposure occurred in the first trimester. The overall risk is small, however. The findings suggest that about 97% of children born to women who got the flu while pregnant will not develop schizophrenia.

Although researchers do not know the mechanism of action, the Mailman team speculates that antibodies released by the mother's immune system may affect the developing brain. But direct effects from the flu virus are also possible.

Researchers believe schizophrenia may result from a combination of genetic and environmental factors, including complications during delivery and exposure to the herpes simplex virus type 2 and to rubella virus during pregnancy. "It may not be just one virus," Yolken says. "And [the key environmental factor] may vary from population to population, as genetic factors likely play a role." Moreover, different strains of herpes or flu viruses may play greater or lesser roles.

Until more study is completed, the Mailman team still advocates that pregnant women get the flu shot. Susser says, "The very safest thing would be to get vaccinated against the flu virus before becoming pregnant." —**Julie Wakefield**

NEUROLOGY

A Better Model for PD

The ubiquitin–proteasome system mediates protein recycling by tagging abnormal or unwanted proteins within cells with the small protein ubiquitin. Enzymes called proteasomes then dismantle the tagged proteins. Malfunctioning of this system is emerging as an important component of neurodegenerative diseases, such as Parkinson disease (PD), that feature the buildup of defective proteins and the gradual death of brain cells. This new PD research focus was validated by a recent study in which researcher Kevin St. P. McNaught and colleagues at the Mount Sinai School of Medicine induced a disorder closely resembling PD by exposing rats to proteasome inhibitors.

Researchers have long been able to create PD models in laboratory animals by using toxicants that kill dopamine nerve cells in an area of the brain called the substantia nigra. The substantia nigra is an important node in the brain circuitry that

controls movement, and neurons in this area are hardest hit by PD. But in neurotoxicant models, the animals do not develop the full range of clinical and pathological features of the human disease, especially those that result from nerve cell death in other brain regions.

In their quest for a more representative model of PD, McNaught and colleagues took note of recent evidence that malfunction of the ubiquitin–proteasome system is a central factor in both the rare hereditary and common sporadic forms of PD. Over a period of two weeks, they injected rats with both man-made and naturally occurring proteasome inhibitors. Within two weeks of exposure, the rats began to show parkinsonian symptoms, including slowness of movement, rigidity, and tremor. "These symptoms gradually worsened over a period of weeks to months, and could be reversed with drugs that are used to treat PD patients," says McNaught.

PET imaging and autopsy studies of the animals' brains showed changes very similar to those seen in PD, including the abnormal accumulation of protein in the substantia nigra. In response to the proteasome inhibitors, nerve cells all over the brain

boosted their proteasomal activity, but the substantia nigra and other PD-affected areas were unable to sustain this compensatory response, and ultimately showed reduced proteasomal activity as occurs in PD.

In the report of their findings, which was published in the July 2004 issue of the *Annals of Neurology*, the authors also raise the possibility that proteasome inhibitors in the environment, whether from bacteria, fungi, plant-based foods, or man-made sources, might play a role in the development of some cases of PD. Importantly, recent studies have shown that the widely used fungicide maneb is a potent proteasome inhibitor and can kill dopamine cells in culture. We must therefore determine the extent to which proteasome inhibitors are present in the environment and how humans might be exposed to these agents, says McNaught.

Jean Harry, principal investigator of the NIEHS Neurotoxicology Group, believes such a link is tenuous at this stage. She says, "What the study really offers the field is an exciting new model to address questions about the disease process and the potential impact of environmental factors." —**Hakon Heimer**

ehpnet

POV's Borders: Environment

The Public Broadcasting Service (PBS) has long been known for the quality of its programming, which runs the gamut from children's shows to revealing documentaries. Now PBS is taking its talents to the Internet with an award-winning series, *POV's Borders*. An outgrowth of PBS's long-running television series *POV*, each yearly installment of the online series seeks to challenge visitors' preconceptions about everyday aspects of our existence. The latest installment in the online series is *POV's Borders: Environment*. Located at <http://www.pbs.org/pov/borders/2004/index.html>, the multimedia presentation uses a plethora of tools to explore how people relate to the three essential elements of our existence: air, water, and the soil that grows our food.

According to the Air section of the website, there are 31 million vehicles in California serving a population of 36 million people. This portion of the website looks at what drives Californians' auto purchasing choices. There are video and print interviews with people who purchased electric and hybrid cars, an online chat room that allows visitors to voice their opinion about which type of vehicle is best for the environment, and a mini-documentary about the first service station in California to offer alternative fuels.

The Water section examines the debate in the United States over drinking bottled water versus tap water. Among the issues in this debate is the amount of plastic piling up as a result of bottled water consumption. In this section, one man tells how he reuses his water bottles. There is also a portion on America's most polluted waterway, Newtown Creek, which runs between Brook-



lyn and Queens in New York City. A short film describes how children have worked to help clean up this desolate waterway and reclaim it as a natural space. The site includes tips to help visitors do their own waterway mapping and links to other sites that focus on water quality, such as the Environmental Protection Agency's volunteer monitoring page.

The Earth section looks at the ground as a source of food. Two interactive features in this section teach visitors about heirloom varieties of plants and about saving seeds. There is also an interview with photographer and pasta maker Douglas Gayeton about the Slow Foods movement in Italy. This movement is trying to conserve traditional processes of raising animals and plants as well as producing food products.

Gayeton is also featured in Border Talk, one of three complementary sections of the site. The Border Talk section presents essays by artists, scientists, and others whose work is related to the environment. The For Educators section of the site provides six free lesson plans to accompany the Air, Water, and Earth pages. The PDF- and HTML-format lesson plans are suitable for middle school and high school classes. Finally, the Resources section provides a convenient index by category of all of the websites referenced throughout the site. —Erin E. Dooley

Malawi Bans Methyl Bromide

Although the Montréal Protocol stipulates that methyl bromide need not be banned in developing countries until 2015, protocol party Malawi is working to phase out use of the ozone-depleting pesticide by the end of 2004. Imports of the pesticide after 31 December 2004 are to be impounded.

Malawi is the second largest user of the pesticide in Africa, and tobacco is one of the country's principal sources of foreign cash flow. The ban will make the country the first in its region to phase out nonessential uses of the pesticide. The Malawian Agricultural Research and Extension Trust is working to raise awareness among the country's farmers about the hazards of using the chemical and about alternatives to using it, which include soil-less culture of tobacco plants and use of more benign chemicals such as dazomet.



Plutonium Accumulating in Japanese Bay

Fifty years ago, the United States performed tests of nuclear weapons in the Marshall Islands, an island group almost halfway between Hawaii and Tokyo. Now radioactive plutonium particles that match the fallout from those blasts have been found in Japan's Sagami Bay by researchers at the Japanese National Institute of Radiological Science. This is the first time such particles have been found in Japanese waters.

The researchers believe they pose no environmental risk. They plan to study other shorelines in Japan to determine how the particles traveled—useful information in the event of a nuclear emergency. At present researchers believe the particles were carried by the ocean currents.

Protecting Peanuts from Aflatoxins

The U.S. Agricultural Research Service has received EPA approval for the first biological pesticide to protect peanut crops against toxic *Aspergillus* mold strains that produce aflatoxins. Consumption of grains and nuts contaminated with aflatoxins has been linked with liver cancer and hepatitis B in humans. Afla-Guard, as the new treatment is known, is made from a nontoxic strain of *A. flavus*. It is applied beneath the plant canopy, where it competes against its aflatoxin-producing cousins, which generally colonize plants that are stressed by drought conditions. Afla-Guard also works on peanuts that are stored in warehouses. In field trials, the treatment reduced aflatoxin contamination by 70–90% after the first application, and even more with subsequent applications.

