Millennium Project
http://www.millennium-project.org

WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY

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Item 1. Biological Weapons Convention (BWC) Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons

About 500 participants from 95 countries, UN organizations such as WHO, FAO and the World Organization for Animal Health (OIE), regional disease surveillance organizations, academic institutions, NGOs, and corporations participated in the 2009 Meeting of Experts from States Parties to the Biological Weapons Convention in Geneva, August 24-28. The meeting focused on international cooperation for fighting infectious diseases, while also discussing peaceful uses of advances in bioscience and the establishment of mechanisms for promoting the implementation of the Convention's Article X on scientific and technological cooperation related to "bacteriological (biological) agents and toxins for peaceful purposes." The results of the meeting will be considered for the Meeting of States Parties, to be held December 7-11, 2009. Although in force since 1975, the treaty has no verification or compliance monitoring provisions or organization. According to the report *Ensuring Compliance With the Biological Weapons Convention*, some biodefense research might violate member-states commitments to the BWC. Along the same lines, *New Approaches to Biological Risk Assessment*, published by the British Royal Society and the International Council for the Life Sciences, calls for a harmonized international and inter-sectoral system to assess the "full spectrum" of bio-threats—ranging from naturally occurring diseases to accidental or intentional misuse of biological materials. The report acknowledges the difficulties generated by the variety of hazards and the limited data available on some threats. Reportedly, a meeting at the White House on August 13 represented the first in a series of meetings with biological experts for strengthening the strategy on bioterrorism, including inputs for the BWC and its 2011 review conference. [Related items: *Biological Weapons Convention Meeting* in July-August 2008, and other items on this issue in previous environmental security reports.]

Military Implications:
Relevant military personnel should review the results of the August meetings and consider making recommendations for the upcoming December meeting. Recommendations should increase collaboration with counterparts to improve internationally harmonized bio-control and response systems and the use of bio-nanosensor networks (some of which have been referenced in these monthly reports.)

Sources: (see an expanded list in the Appendix)
Biological Weapons Convention Expert Meeting Concludes
http://www.unog.ch/80256EDD006B9C2E/(httpNewsByYear_en)/CE96DCFC346B580DC1257620004DAC6F?OpenDocument
Biodefense Research Could Violate Weapons Conventions, Report Warns
http://gsn.nti.org/gsn/nw_20090820_6796.php
New approaches to biological risk assessment
http://royalsociety.org/document.asp?tip=0&id=8700
White House, Scientists Discuss Biological Threats
http://gsn.nti.org/gsn/ts_20090828_3718.php

Item 2. Entire Southern Hemisphere Covered by Nuclear-Free Zone Treaties

With the entry into force of the Pelindaba Treaty for an African Nuclear-Weapon-Free Zone, nuclear weapons will be banned throughout the entire Southern Hemisphere. The Treaty requires the establishment of an African Commission on Nuclear Energy to implement the agreement and to promote cooperation for the peaceful uses of nuclear science, and stipulates procedures by which the African Union could refer non-compliance cases to the UN Security Council. The other regional agreements banning nuclear weapons in their area are: the 1959 Antarctic Treaty, the 1967 Treaty of Tlatelolco (for Latin America and the Caribbean), the 1985 Treaty of Rarotonga (for the South Pacific), the 1995 Treaty of Bangkok (for Southeast Asia), and the 2006 Treaty of Semipalatinsk (for Central Asia).

Military Implications:
The Pelindaba Treaty, also covering nearby territories around the continent, triggers controversies around the island of Diego Garcia, which has a strategic role for the UK and U.S. military. Reportedly, there are calls on the Mauritius government to declare Diego Garcia "nuclear-weapon-free" in order to meet its treaty obligations. The way this issue will unfold will create a precedent for similar cases around the world. Military stationed in the Southern Hemisphere should be prepared to comply with an eventually total nuclear-free zone.

Sources:
Africa Renounces Nukes. Treaty's Entry into Force Makes Entire Southern Hemisphere Free of Nuclear Weapons
http://www.iaea.org/NewsCenter/News/2009/africarenounces.html
African Nuclear-Weapon-Free Zone in Force: What Next for Diego Garcia?
http://www.asil.org/files/insight090827pdf.pdf

Item 3. Gimcheon, South Korea to Create a Global Climate Change Situation Room

On August 19, 2009, the City of Gimcheon, South Korea, announced that it will establish a global climate change situation room. The Millennium Project has agreed to provide the collective intelligence system based on the GENIS model (Global Energy Network and Information System) with additions for climate science, adaptation, and mitigation. Collaboration will be sought with related efforts such the War Room on Climate Change proposed by Richard Branson (see *Branson calls for War Room on Climate Change at the United Nations* in February 2008 environmental security report.)

Military Implications:
Military personnel monitoring climate change, and developing policy-relevant information for mitigation and adaptation should consider how they might participate in the creation of such a climate change situation room and contact the project manager at <jglenn@igc.org> to determine appropriate modes of participation. Liaison with the Climate Change Situation Room in Gimcheon might also provide new opportunities to help implement the Army Strategy for the Environment.

Sources:
Climate Change Situation Room opening ceremony in Gimcheon, South Korea
http://www.millennium-project.org/millennium/Korea-CCSR.html
Global Energy Network and Information System (GENIS)
http://millennium-project.org/millennium/GENIS.pdf

Item 4. Technological Advances with Environmental Security Implications

4.1 Network of Autonomous Robots Monitors Difficult Environments

A NASA project recently tested the concept of a network of rugged, autonomous, environment-sensing "spiderbots" that can be placed into a hazardous environment (in this trial, dropped into Mount St. Helens) to communicate among themselves and with the outside world, including satellites, to monitor an environmental situation. The network bypasses inoperative nodes and can command satellites to provide additional coverage. The principal investigator is Prof. WenZhan Song of the School of Engineering and Computer Science, Washington State University.

Military Implications:
The military might consider investigating this technology for application in surveillance of hostile or difficult environments.

Source:
'Spiderbots' talk amongst themselves inside active volcano
http://www.jpl.nasa.gov/news/news.cfm?release=2009-117

4.2 Improved Techniques for Water Desalination

A team led by Bruce Logan, Kappe Professor of Environmental Engineering, Pennsylvania State University, has modified a microbial fuel cell. It simultaneously desalinates salty water, and internally produces the electrical power required for operation, thus lowering the cost of water treatment. A different line of investigation, by Professor Shin-Ho Chung and a group from the Computational Biophysics Group of the Research School of Biology at the Australian National University, led to the discovery that using boron nitride nanotubes in desalination filters allows four times faster water flow, yielding a much faster and more efficient desalination process. [Similar items: *New Process Improves Water Desalination Efficiency* in January 2009 and others in previous environmental security reports.]

Military Implications:
The military should follow these developments to see if they progress toward practical systems for water-scarce environments.

Sources:
Salt Rejection and Water Transport Through Boron Nitride Nanotubes
http://dx.doi.org/10.1002/smll.200900349
Using microbes and wastewater to desalinate water
http://pubs.acs.org/doi/full/10.1021/es902384g?prevSearch=logan%2Bbacteria%2Bdesalination&searchHistoryKey=
Nanotubes help to solve desalination problem
http://news.anu.edu.au/?p=1558

4.3 Grease-repelling Surface Coating Reduces Need for Detergents

A new surface coating reportedly repels oils while allowing water through; hence, surfaces can be cleaned using reduced quantities of detergents, which are damaging to the environment. The

research team is led by Prof. Jeffrey Youngblood, of the School of Materials Engineering at Purdue University.

Military Implications:
The military should follow this technology for its promise of reducing the environmental impact of surface cleaning.

Source:
Scientists Develop Self-Cleaning Material
http://www.azonano.com/news.asp?newsID=13153

4.4 Improved Battery Performance Techniques

4.4.1 Techniques Provide Improved Lithium-ion Battery Performance

An article in MIT's *Technology Review* reports that an advance in lithium-ion battery design by Prof. Yi Cui and colleagues at the Dept. of Materials Science and Engineering, Stanford University, has dramatically increased efficiency. A new anode structure using carbon nanowires coated with amorphous silicon provides about 2000 milliampere-hrs/g. This is an almost six-fold increase over today's graphite-based 360 mA-hrs/g. The article also briefly describes related work being carried out at other laboratories. In a related development, researchers at the Chinese Academy of Sciences' Key Laboratory of Molecular Nanostructure and Nanotechnology have synthesized a nanocomposite of $LiFePO_4$ nanoparticles embedded in a nanoporous carbon matrix as a superior cathode material for lithium-ion batteries. Although this compound offers 170 mA-hrs/g, it has other deficiencies that the new structure ameliorates. Next Alternative Inc. of Ottawa, Canada also claims to have a greatly improved battery design based on carbon nanotubes.

Military Implications:
The military should follow all these developments as they seem to hold promise of continued increases in the performance of environment-sparing power sources.

Sources:
Nanowire Advance for Lithium Batteries
http://www.technologyreview.com/energy/23240/page1/
Carbon−Silicon Core−Shell Nanowires as High Capacity Electrode for Lithium Ion Batteries
http://pubs.acs.org/doi/abs/10.1021/nl901670t
Superior cathode material for electrochemical energy storage devices
http://www.nanowerk.com/news/newsid=12231.php
Next Alternative Introduces Car Battery With Carbon Nanotube Technology
http://www.nanowerk.com/news/newsid=12068.php

4.4.2 New Ceramic Membrane Enhances Battery Performance

Ceramatec Inc. of Salt Lake City, Utah announced development of a new battery design, based on a paper-thin ceramic membrane. The company claims that their sodium-sulphur unit will store 20-40 kWh in a package the size of a refrigerator, operate below 90°C, and withstand 3,650 daily discharge/recharge cycles over 10 years. The expected sales price is around $2000.

Military Implications:
The military should investigate this development for its usefulness in renewable energy storage applications.

Source:
New battery could change world, one house at a time
http://www.heraldextra.com/news/article_b0372fd8-3f3c-11de-ac77-001cc4c002e0.html

Item 5. Updates on Previously Identified Issues

5.1 International Water Issues

5.1.1 Water to be Considered Integral Part to Copenhagen Negotiations
The Stockholm Statement adopted at the World Water Week conference held in Stockholm, August 16-22, 2009, calls for global water management strategies to be considered as integral parts of the negotiations for a global climate agreement in Copenhagen, in December. Some 2,500 water experts from 130 countries attended the meeting. It also stresses the need for a clear framework for more effective use of water across borders, as well as for better cooperation between officials involved in land and forest management, climate, and water issues. [Related item: *A New Step Toward Preventing Water Wars* in July-August 2008.]

Military Implications:
Relevant military personnel should follow the negotiations to see how they could be used to help support the Army Strategy for the Environment, reduce the likelihood of water-related conflicts, and identify potential impacts on military operations, as well as contribute to know-how and logistics.

Sources:
World Water Week
http://www.worldwaterweek.org
Experts: water issue crucial in world climate deal
http://www.google.com/hostednews/ap/article/ALeqM5jWIcs1HTs6jJh9W36Ni_qGRQx7xwD9A7ABMO1

5.1.2 Nile Basin Controversies Continue
The Cooperative Framework Agreement for water-sharing by the ten Nile basin countries was postponed for at least another six months. It is mainly opposed by Egypt, which doesn't want to renounce privileges given by previous agreements. Because of increased economic development in the region and the consequences of climate change, the Nile's flow is likely to decrease; hence, a Nile accord could be essential for preventing further escalation of disputes in an already vulnerable region. The ten Nile countries are: Burundi, the Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda. [Related items: *Water Scarcity* in February 2007 and several climate change-related items in previous environmental security reports.]

Military Implications:
Relevant military in AFRICOM should explore military-to-military consultation and environmental diplomacy to persuade the parties to reach an acceptable accord to prevent conflict.

Sources:
Egypt blocks Nile water deal
http://www.ethiopianreview.com/news/6468
Nile Basin countries may fight for water: expert
http://english.people.com.cn/90001/90777/90855/6716139.html

5.2 Powerful Greenhouse Gas HFCs Might be banned under the Montreal Protocol
Although hydrofluorocarbons (HFCs) are not ozone-depleting chemicals, their use and commercialization might be banned under the Montreal Protocol. Experts and policy makers increasingly call for HFCs' phaseout due to their global warming potential hundreds or even thousands of times greater than CO_2. Countries, like the Federated States of Micronesia, threatened by global warming, are advocating for a 90% HFC phaseout by 2030. The issue is expected to be discussed at the next meeting of the States Party to the Montreal Protocol, to be held November 4-8 in Port Ghalib, Egypt. [Previous item on this issue: *Regulations Might be Needed for New Greenhouse Gases* in April 2009 environmental security report.]

Military Implications:
[Similar to previous implications on this issue] The military and its contractors should consider substitutes and promote the phaseout of these compounds, because increased research and new regulations are possible.

Source:
Ozone Treaty May Hold Key to Halting Climate Change
http://www.ipsnews.net/news.asp?idnews=48211

5.3 Insecticide Ingredient Deet May Be a Neurotoxin
Deet (N,N-diethyl-3-methylbenzamide, aka N,N-diethyl-meta-toluamide) might be a toxin to the human central nervous system, as revealed by new research by a team of scientists led by Vincent Corbel from the Institut de Recherche pour le Développement in Montpellier, France and Bruno Lapied from the University of Angers. According to *Science Daily*, "Researchers say that more investigations are urgently needed to confirm or dismiss any potential neurotoxicity to humans, especially when deet-based repellents are used in combination with other neurotoxic insecticides." [Related item: *New Chemicals Considered for Toxic Lists* in January 2009 environmental security report.]

Military Implications:
Until the toxicity questions are settled, caution should be exercised in using products containing this compound; in particular the recommendations from the EPA's Fact Sheet on deet should be followed.

Sources:
The Insect Repellent DEET
http://www.epa.gov/opp00001/factsheets/chemicals/deet.htm
Popular Insect Repellent Deet Is Neurotoxic
http://www.sciencedaily.com/releases/2009/08/090804193230.htm

5.4 Study Reveals Extensive Danger from Lead in Foreign Paints

A new study reveals that approximately 73% of consumer paint brands tested from 12 countries in Africa, Asia, and South America exceeded the former U.S. standard of 600 parts per million (ppm) for lead in paint (now 90 ppm), with 69% of the brands having at least one sample exceeding 10,000 ppm. "A global ban on lead-based paint is drastically needed" underlines main author, Dr. Scott Clark, professor of environmental health at the University of Cincinnati. [Previous relevant items: *Low-fume Paint Requirements Spread* in the July 2009, and *Call for Global Ban on Lead-based Paints* in October 2007 environmental security reports.]

Military Implications:

Military procurement and contractors should review their paint purchases, inventories, and uses to ensure that the products meet proper U.S. safety standards. Preventive health entities should take the initiative to monitor procurement and uses and direct corrective actions when unsafe products are found.

Source:

Lead-Based Consumer Paint Remains a Global Public Health Threat
http://healthnews.uc.edu/news/?/8982

5.5 New Developments by Canada and the U.S. in Arctic Security

A high-level Canadian delegation, led by the Prime Minister, made a five-day tour of the northern military operations and held a cabinet meeting in Iqaluit as part of an effort to stress Canada's sovereignty in the region. Nevertheless, it is not clear yet how much Canada will allocate to increase its security capacity in the North. In the meantime, the U.S. Coast Guard is developing strategies to strengthen security in the Arctic region, including a new duty station. The U.S. is among the countries that consider the Northwest Passage an international waterway, rather than Canada's sovereign waters. [Related items: *Arctic Civil and Military Activities Increasing* in July 2009 and other items in previous environmental security reports.]

Military Implications:

[Similar to previous on this issue] The likelihood of potential new roles of coalition forces in the region is increasing for both national security and protection of the ecosystems. Relevant military personnel should seek improved cooperation with their counterparts in other countries and international organizations in developing proactive strategies, regulations, and enforcement procedures.

Sources:

Harper of the melting North
http://www.economist.com/world/americas/displaystory.cfm?story_id=14313727
Congress hears Alaskan views on Arctic Ocean issues
http://www.alaskajournal.com/stories/082809/loc_8_001.shtml

5.6 Climate Change

5.6.1 Scientific Evidence and Natural Disasters

In July 2009, the world's oceans reached the highest average temperature since record keeping began 130 years ago. Some NASA scientists suggest that warming oceans could cause

Earth's axis to shift more than previously estimated, with potential implications for interpreting how the Earth wobbles.

Another record was set by big tropical storms in the Atlantic, as the average frequency of hurricanes over the past decade was higher than at any time in the last 1,000 years, reveals a study published in the journal *Nature*.

As CO_2 levels are increasing at a faster rate than the IPCC worst-case scenario, the planet might be heading for an "irreversible" climate change by 2040 says a paper by Andrew Brierley of St. Andrews University and Michael Kingsford of the James Cook University in Australia, which specifically examines the effect of CO_2 emissions on ocean ecosystems.

5.6.2 Food and Water Security

Competition for food, water and energy is expected to worsen as the world's population increases faster than expected. The 2009 World Population Data Sheet by the Population Research Bureau reveals that world population will reach 7 billion in 2011 (a year earlier than expected), and 8.1 billion by 2025. With at least 97% of the growth occurring in developing countries, by 2050, nine in ten people under 25 will live in those countries, mostly in Africa and Asia. Africa's population reached 1 billion and will double by 2050.

Revitalizing Asia's Irrigation: To Sustainably Meet Tomorrow's Food Needs, a report by FAO and the International Water Management Institute calls for increased investments in irrigation systems and reforms in the way water is used for agriculture to feed an additional 2.5 billion people over the next 40 years. Otherwise, many developing nations face the risky prospect of having to import more than a quarter of their rice, wheat, and maize by 2050. "If nothing is done, you are going to get an increase in social unrest, migration and a fertile ground for terrorism," warns Colin Chartres, the director general of IWMI.

In China, 27% of the land area is now desert or suffering from land degradation, and experts warn that desertification is one of the greatest ecological threats to the entire Northeast Asia area.

5.6.3 Melting Glaciers and Sea Ice

Satellite records show that one of Antarctica's largest glaciers is thinning four times faster than thought ten years ago. At its current pace, Pine Island Glacier in west Antarctica could disappear in 100 years, 500 years sooner than previously thought. Meanwhile, at the other pole, three major glaciers — Gulkana and Wolverine in Alaska and South Cascade in Washington — are also decreasing at dramatic rates, according to a study by the U.S. Geological Survey.

5.6.4 Computer Modeling

A computer model developed by the Australian Bureau of Meteorology and the Commonwealth Scientific and Industrial Research Organisation has confirmed for the first time that there is a link between southeast Australia's changed weather patterns—decline in rainfall (drought)—and rising levels of greenhouse gases, aerosols, and ozone depletion.

5.6.5 Adaptation

The United Nations is setting up a Global Impact and Vulnerability Alert System to help poorer countries such as those in the Pacific region deal with the combined effects of the global economic crisis and climate change. "Mitigation and adaptation must both be our urgent

priorities," said UN Secretary-General Ban Ki-moon in a message to the 40th Pacific Leaders Forum in Cairns, Australia.

The study *Assessing the costs of adaptation to climate change: A critique of the UNFCCC estimates* reveals that the real costs are likely to be 2-3 times greater than the estimates by the UN Framework Convention on Climate Change (UNFCCC). Among other things, the UN estimates didn't include key sectors such as energy, manufacturing, tourism, and natural ecosystems. The UNFCCC estimates are $40 billion to $170 billion a year until 2030. Pointing out that some existing studies already suggest that costs will be considerably higher, the study calls for detailed case studies of what adaptation costs would be.

Reportedly, a draft resolution by African leaders will ask rich nations for $67 billion per year to help them cope with the impacts of global warming. The draft resolution is prepared for the summit to be held in December, at Copenhagen.

The UN International Strategy for Disaster Risk Reduction (UN/ISDR) warns that the frequency of landslides is expected to increase as climate change increases the intensity of rainfall. Actions such as building early warning systems to alert people living in landslide-prone areas are necessary to reduce impacts, says UN/ISDR.

5.6.6 Post-Kyoto Negotiations

An intersessional consultation, as part of ongoing negotiations for a post-Kyoto Protocol, was held in Bonn, August 10-14, 2009, attended by approximately 2,400 participants. One of the focal points was to revise and consolidate the nearly 200-page long text and prepare for negotiations at coming meetings. Vulnerable states call for a 1.5ºC (2.7ºF) temperature rise ceiling by the end of the century, meaning that rich nations should cut greenhouse gases by at least 45% below 1990 levels by 2020. However, average cuts promised so far by the rich total just 10% to16%. The next negotiations will be held in Bangkok, Thailand from September 28 to October 9, and Barcelona, November 2–6. Other related meetings (before Bangkok) are the UN High-Level Event on Climate Change, and the G-20 meeting in Pittsburgh, Pennsylvania.

China announced that its CO_2 emissions will start falling by 2050, said Su Wei, director-general of the climate change department at the country's National Development and Reform Commission. This sets the first officially announced timeframe. The current five-year plan to 2010 stipulates a target of reducing energy intensity by 20%, and the next five-year plan is expected to include tougher targets. Nevertheless, it is not clear if China will agree to some emissions cap ahead of the Copenhagen climate meeting.

Military Implications:

[Same as previous on this issue] The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it might be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

Sources: (see a more expanded list in the Appendix)

Global warming could change Earth's tilt
http://www.newscientist.com/article/dn17657-global-warming-could-change-earths-tilt.html

Big Tropical Storms in Atlantic Hit 1,000-Year High
http://www.abcnews.go.com/Technology/JustOneThing/story?id=8332131&page=1
Scientists claim planet is heading for 'irreversible' climate change by 2040
http://scotlandonsunday.scotsman.com/scotland/Scientists-claim-planet-is-heading.5515749.jp
2009 World Population Data Sheet
http://www.prb.org/Publications/Datasheets/2009/2009wpds.aspx
Asia facing unprecedented food shortage, UN report says
http://www.guardian.co.uk/world/2009/aug/17/asia-facing-food-crisis
Giant glacier in Antarctic is melting four times faster than thought
http://www.timesonline.co.uk/tol/news/uk/science/article6797162.ece
Alaska Glaciers Shrinking Fast: Survey
http://planetark.org/wen/54191
Study links drought with rising emissions
http://www.smh.com.au/environment/global-warming/study-links-drought-with-rising-emissions-20090815-elpf.html
Assessing the costs of adaptation to climate change: A critique of the UNFCCC estimates
http://www.iied.org/pubs/display.php?o=11501IIED
Summary of the Bonn Climate Change Talks
http://www.iisd.ca/vol12/enb12427e.html
China sets date for CO2 cut
http://www.ft.com/cms/s/0/cfc5d2fa-8933-11de-b50f-00144feabdc0.html?nclick_check=1

5.7 Nanotechnology Safety Issues
More detailed descriptions of the following nanotechnology issues are in the Appendix

- The 5th international NanoRegulation Conference to be held in Rapperswil, Switzerland November 25-26, 2009 will offer a comprehensive overview of the political and regulatory background of nanotechnology governance at the national, European, and global levels (more)
- Nanotech environmental downsides trivialized or ignored, state some expert papers (more)
- Responsible Nano Forum five-year review report and launch of new website www.nanoandme.org (more)
- ICPCNanoNet has begun to publish its series of annual regional reports describing nanoscience and nanotechnology initiatives and activities in eight ICPC regions (International Cooperation Partner Countries). (more)
- Improved investigative techniques for identifying engineered nanomaterials in the environment (more)
- Insects are affected by, and can spread, carbon nanoparticles (more)
- Databases on nanosafety (OECD database on nanomaterials safety research, and a planned automated nanosafety database) (more)
- New map of nanotech centers (more)
- Next meeting on Transatlantic Regulatory Cooperation: Securing the Promise of Nanotechnologies, September 23, Woodrow Wilson International Center for Scholars, Washington, D.C. (more)
- National Institute for Occupational Safety and Health (NIOSH) to sponsor conference on nanomaterials and worker health to be held in July 2010 in Colorado (more)

- Three papers on safety of engineered nanomaterials published by OECD (*Report of an OECD Workshop on Exposure Assessment and Exposure Mitigation: Manufactured Nanomaterials*; *Comparison of Guidance on Selection of Skin Protective Equipment and Respirators for Use in the Workplace: Manufactured Nanomaterials*; and *Emmision* (sic) *Assessment for Identification of Sources and Release of Airborne Manufactured Nanomaterials in the Workplace: Compilation of Existing Guidance*) (more)
- Fourth international conference on "Environmental Effects of Nanoparticles and Nanomaterials" will be held in Vienna, September 6–9, 2009 (more)

Item 6. Reports and Information Suggested for Review

6.1 IAEA Database Recorded 1,562 Nuclear Trafficking Incidents for the Period 1993–2008
The International Atomic Energy Agency reports that in 2008, 119 events were added to the agency's Illicit Trafficking Database. Fifteen of those were cases of illicit nuclear material possession or related incidents and 16 were cases involving the theft or loss of sensitive substances. Between 1993 and the end of 2008, the database had recorded 1,562 nuclear trafficking incidents, ranging from illicit disposal efforts to nuclear material of unknown provenance. As of the end of 2008, 103 IAEA member states participated in the reporting program.

Military Implications:
The military should increase its efforts, domestically and internationally, in proportion to the increasing incidence of nuclear material proliferation.

Sources:
IAEA Tracks Illicit Possession of Nuclear Materials
http://gsn.nti.org/gsn/nw_20090817_4827.php
IAEA Annual Report 2008 (1 January to 31 December 2008)
http://www.iaea.org/Publications/Reports/Anrep2008/anrep2008_full.pdf

6.2 International Framework Needed to Address Governance Gap over Geoengineering
A new report by the ETC group addresses the potential implications of geoengineering pointing out the urgent need for an international framework developed under the auspices of the UN to evaluate new technologies.

Military Implications:
Military personnel, who explore longer-range possibilities, should explore geoengineering techniques that could be weaponized and what international frameworks might prevent such abuse. [Related item: *Geo-engineering Promises/Threatens Major Consequences* in June 2009 environmental security report.]

Source:
The Emperor's New Climate: Geoengineering as 21st century fairytale
http://www.etcgroup.org/en/materials/publications.html?pub_id=762

6.3 Including Security Implications of Climate Change on the Copenhagen Agenda

The second conference "Climate Change & Security at Copenhagen: New Thinking on the Atlantic Contribution to Success" to be held October 7-8, 2009 in Brussels, will focus on the security aspects of climate change and trans-Atlantic co-operation, as inputs for the Copenhagen conference.

Military Implications:

Relevant military personnel should consider participation in the conference.

Source:

Climate Change & Security at Copenhagen - II: - New Thinking on the Atlantic Contribution to Success, 7-8 October 2009 – Brussels
http://www.envirosecurity.org/events/

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

Item 1. Biological Weapons Convention (BWC) Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons

Sources: (a more expanded list)
Biological Weapons Convention Expert Meeting Concludes
http://www.unog.ch/80256EDD006B9C2E/(httpNewsByYear_en)/CE96DCFC346B580DC1257620004DAC6F?OpenDocument
Biodefense Research Could Violate Weapons Conventions, Report Warns
http://gsn.nti.org/gsn/nw_20090820_6796.php
Ensuring Compliance With the Biological Weapons Convention
http://www.armscontrolcenter.org/policy/biochem/articles/bwc_compliance.pdf
New Method Needed for Assessing Disease Dangers, Report Says
http://gsn.nti.org/gsn/ts_20090828_1624.php
New approaches to biological risk assessment
http://royalsociety.org/document.asp?tip=0&id=8700
White House, Scientists Discuss Biological Threats
http://gsn.nti.org/gsn/ts_20090828_3718.php

5.6 Climate Change

Sources: (a more expanded list)

5.6.1 Scientific Evidence and Natural Disasters
In hot water: World sets ocean temperature record
http://www.sanluisobispo.com/living/health/story/822072.html
Global warming could change Earth's tilt
http://www.newscientist.com/article/dn17657-global-warming-could-change-earths-tilt.html
Big Tropical Storms in Atlantic Hit 1,000-Year High
http://www.abcnews.go.com/Technology/JustOneThing/story?id=8332131&page=1
Scientists claim planet is heading for 'irreversible' climate change by 2040
http://scotlandonsunday.scotsman.com/scotland/Scientists-claim-planet-is-heading.5515749.jp

5.6.2 Food and Water Security
2009 World Population Data Sheet
http://www.prb.org/Publications/Datasheets/2009/2009wpds.aspx
Beddington, the UK government's chief scientific adviser. BBC
http://news.bbc.co.uk/2/hi/science/nature/8213884.stm

Revitalizing Asia's Irrigation: To Sustainably Meet Tomorrow's Food Needs
http://www.iwmi.cgiar.org/Publications/Other/PDF/Revitalizing%20Asia%27s%20Irrigation.pdf
Asia facing unprecedented food shortage, UN report says
http://www.guardian.co.uk/world/2009/aug/17/asia-facing-food-crisis
Asia faces food shortage by 2050 without water reform
http://www.physorg.com/news169737873.html
Taming the Yellow Dragon
http://english.cri.cn/6909/2009/08/25/2001s511038.htm

5.6.3 Melting Glaciers and Sea Ice
Giant glacier in Antarctic is melting four times faster than thought
http://www.timesonline.co.uk/tol/news/uk/science/article6797162.ece
Alaska Glaciers Shrinking Fast: Survey
http://planetark.org/wen/54191

5.6.4 Computer Modeling
Study links drought with rising emissions
http://www.smh.com.au/environment/global-warming/study-links-drought-with-rising-emissions-20090815-elpf.html

5.6.5 Adaptation
New UN scheme to help poor countries weather economic crisis, climate change
http://www.un.org/apps/news/story.asp?NewsID=31678&Cr=climate+change&Cr1=
Assessing the costs of adaptation to climate change: A critique of the UNFCCC estimates
http://www.iied.org/pubs/display.php?o=11501IIED
Costs of adapting to climate change significantly under-estimated
http://www.iied.org/climate-change/key-issues/economics-and-equity-adaptation/costs-adapting-climate-change-significantly-under-estimated
Africa wants $67 billion a year to fight climate change
http://www.reuters.com/article/environmentNews/idUSTRE57N26M20090824
Landslide Impacts Can Be Reduced
http://www.unisdr.org/news/v.php?id=10775

5.6.6 Post-Kyoto Negotiations
Summary of the Bonn Climate Change Talks
http://www.iisd.ca/vol12/enb12427e.html
Vulnerable states team up for tougher climate pact
http://www.reuters.com/article/environmentNews/idUSTRE57D41F20090814
India opposes financing proposal to contain greenhouse emissions
http://www.livemint.com/2009/08/17220018/India-opposes-financing-propos.html
China sets date for CO2 cut
http://www.ft.com/cms/s/0/cfc5d2fa-8933-11de-b50f-00144feabdc0.html?nclick_check=1

5.7 Nanotechnology Safety Issues
More detailed descriptions of the nanotechnology issues

5.7.1 International NanoRegulation Conference to be Held in November
The 5th International NanoRegulation Conference will be held in Rapperswil, Switzerland, November 25-26, 2009. The conference will offer a comprehensive overview of the political and regulatory background of nanotechnology governance at the national, European, and global levels; discuss who in the nanotechnology value chain needs what kind of information; and suggest strategic guidelines for a feasible and effective information policy along the value chain and towards external stakeholders.

Military Implications:
Military personnel in the European theater concerned with nanotech regulation should consider attending this conference.

Source:
5th International NanoRegulation Conference. No data, no market? Challenges to nano-information and nano-communication. Rapperswil, Switzerland, 25–26 November, 2009
http://www.nanoeurope.com/wEnglisch/messen/nanoeurope/02_aussteller/FlyerNREG09_V20090810.pdf

5.7.2 New Paper Claims Nanotech Environmental Downsides Trivialized or Ignored
The International POPs Elimination Network's Nanotechnology (IPEN) Working Group and the European Environmental Bureau (EEB) issued a paper claiming, "there is emerging evidence … claims [of nanotech benefits] do not provide the whole picture, with serious environmental risks and costs being trivialised or ignored". The 8-page paper covers a variety of topics, and contains a large number of references to the literature. The EEB also published a series of papers on Nanotechnologies in the 21st Century. IPEN is a global network of more than 700 public interest NGOs, and EEB represents over 145 environmental organizations in 31 countries.

Military Implications:
As nanotechnology plays an increasing role in essential materiel, the military should consider taking extensive steps to assuage these worries on the part of the European environmental community and to ensure protection of personnel from validly demonstrated hazards.

Sources:
Nanotechnology and the environment: A mismatch between claims and reality
http://www.nanowerk.com/news/newsid=12357.php
Nanotechnology and the environment: A mismatch between claims and reality
http://www.eeb.org/documents/090713-OECD-environmental-Brief.pdf

5.7.3 Five-year Review of Royal Society Report
To mark the fifth anniversary of the publication of the Royal Society report on nanotechnology, the Responsible Nano Forum "invited opinion formers from science, risk, investment, NGOs, unions, business and consumer groups to reflect on the legacy of the report and what still remains to be done." The new report features contributions on: General Reflections; Regulation, responsibility, safety, and risk; Standardisation; Social, ethical, and public engagement; and International organisations. The Responsible Nano Forum also created a new website at www.nanoandme.org to provide a forum for discussion of nanotech issues.

Military Implications:
The five-year review report and the website might constitute a good input source for nanotech-related information.

Source:
A beacon or just a landmark? Reflections on the 2004 Royal Society/ Royal Academy of Engineering Report: Nanoscience and nanotechnologies: opportunities and uncertainties
http://www.responsiblenanoforum.org/pdf/beacon_or_landmark_report_rnf.pdf

5.7.4 Regional Reports on Nanotech Issued by International Group

ICPCNanoNet is a repository of published nanoscience research for scientists in the EU and International Cooperation Partner Countries (ICPC). It has begun to publish its series of annual regional reports describing nanoscience and nanotechnology initiatives and activities in eight ICPC regions: Africa, Caribbean, Pacific, Asia, Eastern Europe and Central Asia (EECA), Latin America, Mediterranean Partner Countries (MPC), and Western Balkan Countries (WBC). Their extensive content includes regional initiatives, national programs for nanoscience and nanotechnology, responsible government agencies, centers for nanoscience and nanotechnology research, and national nanoscience and nanotechnology networks. It is an EU FP7 support action coordinated by the UK Institute of Nanotechnology that brings together partners from the EU, China, India and Russia. For access to reports, registration is required.

Military Implications:
Relevant military personnel might consider the ICPCNanoNet repository as a source of professionally legitimate information on the state of research in nanotech around the world.

Source:
ICPC Reports
http://www.icpc-nanonet.org/content/category/7/20/46/

5.7.5 Improved Investigative Techniques for Identifying Engineered Nanomaterials in the Environment

A recently published note summarizes the present state of affairs in retrieving and analyzing nanoparticles from the environment. Some nanoparticles in the outside world have originated from masses of normally sized material of the same kind; others were coated originally or have acquired disguising coverings. This short article from *Environmental Science and Technology* of the American Chemical Society cites several current efforts to improve investigative techniques.

Military Implications:
Military personnel concerned with nanotech safety should follow up on these various improved technologies.

Source:
Hunting for engineered nanomaterials in the environment
http://pubs.acs.org/doi/full/10.1021/es902174z

5.7.6 Insects Are Affected by, and Can Spread, Carbon Nanoparticles

David Rand and Robert Hurt, and colleagues, at Brown University have published a study that, according to Nanowerk News, "raises the possibility that flies and other insects that encounter

nanomaterial 'hot spots,' or spills, near manufacturing facilities in the future could pick up and transport nanoparticles on their bodies, transferring the particles to other flies or habitats in the environment". Further, "adult [fruit] flies died or were incapacitated when their bodies were exposed to large amounts of certain nanoparticles." Larvae were unaffected by ingested nanomaterial. The scientists also found that contaminated flies could transfer the nanoparticles to other flies, and hence possibly to humans.

Military Implications:
Military personnel doing nanoparticle risk assessment should take this vector type into consideration in their work, and should also follow further research on such effects and transmission in these and similarly mobile components of the biosphere. Issues of remote, but imaginable, concern could bring litigation against nanoparticle users and weaponization of a unique system of dangerous nanoparticles and delivery insects.

Sources:
New insights into health and environmental effects of carbon nanoparticles
http://www.nanowerk.com/news/newsid=12021.php
Differential Toxicity of Carbon Nanomaterials in Drosophila: Larval Dietary Uptake Is Benign, but Adult Exposure Causes Locomotor Impairment and Mortality
http://pubs.acs.org/stoken/presspac/presspac/full/10.1021/es901079z

5.7.7 Databases on Nanosafety

OECD Database on Nanomaterials Safety Research

The July 2009 issue of the bimonthly newsletter published by the European Network on the Health and Environmental Impact of Nanomaterials notes the establishment of the OECD Database on Research into the Safety of Manufactured Nanomaterials, which "holds details of completed, current and planned research projects on safety, which are to be updated (electronically) by delegations."

Military Implications:
Military personnel involved in nanotech safety issues should become familiar with this database, and, as appropriate, use it to track developments in the field.

Sources:
Information about database:
http://www.oecd.org/document/26/0,3343,en_2649_37015404_42464730_1_1_1_1,00.html#Additional_Info
Database access: http://webnet.oecd.org/NanoMaterials

Automated Nanosafety Database Planned

According to a news release, a four-year R/D effort, the Nano Health Environment Commented Database (NHECD), is underway to "create and maintain an automated database that will retrieve, index and extract from scientific publications results related to the health and environmental impact of nanoparticles. The annotated, commented results and the extracted information will be stored at a central repository that will be available to research scientists, regulatory bodies and NGOs, [and] the general public." The EU FP7 project is coordinated by

Prof. Oded Maimon and managed by Abel Browarnik, both of Tel Aviv University's Dept. of Industrial Engineering.

Military Implications:
Military personnel involved with nanotech safety issues should follow evolution of this project toward completion, and also consider offering the developers the benefit of their experience.

Source:
NHECD
http://www.nhecd-fp7.eu/index.php?id=515

5.7.8 New Map of Nanotech Centers
An article in Nanowerk News calls attention to a new map issued by the Pew Trusts/Wilson Center's Project on Emerging Nanotechnologies. The new work plots as varying-diameter and color-coded circles the locales and metro centers of nanotech enterprises of various types around the U.S. Available adjacent to the map are links to raw data and inventories of entities in various application areas.

Military Implications:
Relevant military R&D, procurement, and preventive health personnel should familiarize themselves with this resource.

Sources:
Mapping nanotechnology in the U.S.
http://www.nanowerk.com/news/newsid=12202.php
PEN Map
www.nanotechproject.org/121

5.7.9 Transatlantic Regulatory Cooperation: Securing the Promise of Nanotechnologies
The EU and the US have undertaken a collaborative research project, *Regulating Nanotechnologies in the EU and US: Towards Effectiveness and Convergence*, to investigate the regulatory challenges raised by nanotechnologies and to assess the effectiveness of existing approaches. A conference, Transatlantic Regulatory Co-operation: Securing the Promise of Nanotechnologies, will be held September 10-11, 2009, in London, to discuss recommendations from the project, and to consider new ideas for the future. A subsequent, shorter meeting on the same subject will be held at the Wilson Center in Washington on September 23, 2009.

Military Implications:
Military personnel concerned with nanotech regulation should consider attending one of these conferences.

Sources:
London:
http://www2.lse.ac.uk/internationalRelations/centresandunits/regulatingnanotechnologies/nanohome.aspx
Transatlantic Regulatory Cooperation: Securing the Promise of Nanotechnologies
http://www.wilsoncenter.org/index.cfm?fuseaction=events.event_summary&event_id=544514

5.7.10 NIOSH to Sponsor Conference on Nanomaterials and Worker Health

NIOSH and other co-sponsors will convene a conference in July 2010 in Colorado to identify gaps in information and to address questions focusing on occupational health surveillance, exposure registries, and epidemiologic research involving nanotechnology workers.

Military Implications:

Appropriate military personnel should consider attending this conference in order to "share existing knowledge, identify major issues, examine successful approaches, and explore new approaches, techniques, and models".

Source:

Upcoming Conference; First Announcement. Nanomaterials and Worker Health: Occupational Health Surveillance, Exposure Registries, and Epidemiological Research
www.cdc.gov/niosh/topics/nanotech/NanoConfJuly2010.html

5.7.11 OECD Publishes Three Papers on Safety of Engineered Nanomaterials

The OECD has published three reports on the safety of engineered nanomaterials:

- *Report of an OECD Workshop on Exposure Assessment and Exposure Mitigation: Manufactured Nanomaterials* (90 pp.) Contents include presentations on Exposure Measurements--Latest Developments in Analytical Methodology; Distinction Between Carbonaceous Nanomaterials and Background Airborne Particulate Matter; Relevance of Dustiness and Aerosol Dynamics for Personal Exposure; Development of Exposure Situations for Manufactured Nanoparticles (MNPs); Control Banding Nanotool- A Qualitative Risk Assessment Method; Approaches for the Definition of Threshold Limit Values for Nanomaterials
  https://www.oecd.org/dataoecd/15/25/43290538.pdf
- *Comparison of Guidance on Selection of Skin Protective Equipment and Respirators for Use in the Workplace: Manufactured Nanomaterials* (25 pp.)
  https://www.oecd.org/dataoecd/15/56/43289781.pdf
- Emmision (sic) Assessment for Identification of Sources and Release of Airborne Manufactured Nanomaterials in the Workplace: Compilation of Existing Guidance (25 pp.)
  https://www.oecd.org/dataoecd/15/60/43289645.pdf

5.7.12 Nanotech Conferences Scheduled in Europe

The fourth international conference on "Environmental Effects of Nanoparticles and Nanomaterials" will be held in Vienna from September 6 to 9, 2009. About 200 scientists are expected to participate in the event. The conference will open with a workshop on the advantages and disadvantages of current methods and analytical techniques applicable to the fields of nanoscience and nanotechnology.

Europe's largest annual nanotechnology conference and exhibition, Nanotech Europe, will take place September 28-30, 2009 in Berlin. There will be sessions on Safe and Sustainable Development of Nanotechnology, and Assessing Exposure and Toxicology. 12 themes will be covered by over 180 speakers and 220 posters will be displayed.

Sources:
Conference: Effects of nanotechnology on the environment --Vienna:
http://www.nanowerk.com/news/newsid=12337.php
Environmental Effects of Nanoparticles and Nanomaterials Vienna conference announcement:
http://nano2009.univie.ac.at
Europe's Largest Annual Nanotechnology Conference and Exhibition --Berlin:
http://www.nanotech.net/