

**WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY**  
Subcontract No: 1048, LMI Task No: MAN0B.04, for the U.S. Army Environmental Policy Institute

**MARCH 2011 REPORT**

Note to Readers: Pages 1-14 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 15.

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## Item 1. Earthquakes, Tsunamis, and Nuclear Disasters in Japan

The world is still assessing the actual consequences and long-term impacts of the Tōhoku earthquake and tsunami that hit Japan's northeast coast on March 11, 2011. The 9  $M_w$  earthquake and subsequent tsunami with waves of over 20 meters (66 ft) killed over 11,000 people; more than 16,000 are missing (as of March 29), and others might be displaced for a very long time. More than 300 aftershocks of 5  $M_w$  or greater and numerous consequent phenomena such as soil liquefaction are further damaging infrastructure and threatening human security. The significant accidents are topped by the Fukushima Dai-ichi nuclear power plant, where three of the complex's six units are believed to have partially melted down. Radioactive contamination continues to spread into the land, air, sea, and water down to the Tokyo metropolitan area, which is some 200 km away. The scale of the disaster (in a relatively well-prepared country) and the potential increase of number and intensity of natural disasters around the world due to climate change may reawaken some sections of the environmental movement and trigger important reexaminations regarding preparedness and resilience, as well as the management of nuclear and other hazardous material. (See some assessments in the [Appendix](#).)

### **Military Implications:**

This complex environmental disaster should be cited to expand military-to-military resilience training and to develop a comprehensive international framework for response to natural disasters with relevant international organizations and counterparts. Since the military community is likely to be (fairly or unfairly) expected to solve natural mega-disasters in the U.S. and its territories, the community should be insisting that other government agencies be seriously planning and preparing. Potential, instantaneous disasters could emanate from such sources as West Coast subduction plates and fault zones, the Yellowstone hotspot and overseas oceanic sources, like the Canary Islands and anywhere in the Pacific Rim of Fire. (See the [Appendix](#) for some aspects to be considered.) Also, international assessments and scenarios should be created to assess the most vulnerable and at-risk areas. (E.g. The Millennium Project's 2020 Global Energy Scenarios study includes a similar nuclear accident in the "Environmental Backlash" scenario <http://www.millennium-project.org/millennium/scenarios/energy-scenarios.html - Scenario 2>)

**Sources:** (expanded list in the [Appendix](#))

Hayato Kobayashi, of The Millennium Project staff, reporting from Tokyo

Toxic plutonium seeping from Japan's nuclear plant

<http://abcnews.go.com/Business/wireStory?id=13241596>

Detection of radioactive material in the soil in Fukushima Daiichi Nuclear Power Station

<http://www.tepco.co.jp/en/press/corp-com/release/11032812-e.html>

Leaders tell EU neighbours to stress-test nuclear plants

<http://euobserver.com/9/32067/?rk=1>

## Item 2. Arab Post-Political Turmoil--a Time for Environmental Diplomacy

Environmental security led by water security will play an important role in establishing and maintaining stability in North Africa and the Middle East. Environmental diplomacy could be used to encourage closer cooperative relationships among the region's countries and the rest of the world. Experts recommend that the UN Security Council could use 'hydro-diplomacy' to ease

tensions over water issues in regions like the Middle East and North Africa. The UN estimates that 18 of the 30 water-scarce nations by 2025 will be in the Middle East and North Africa. The capital of Yemen is expected to run out of water much sooner. While water could exacerbate present turmoil in the region, it could also be used as a catalyst for peacebuilding. A similar argument was made by an editorial in SciDev Net, which suggests using current opportunities for a major push in ‘science diplomacy’ in today’s rapidly evolving Arab world.

**Military Implications:**

Relevant military personnel in CENTCOM and AFRICOM should consider plans to offer assistance to the new governing structures in the area in starting or improving environmental security efforts in their territories as part of the general peacebuilding effort.

**Sources:**

"Hydro-diplomacy" needed to avert Arab water wars

<http://www.trust.org/alertnet/news/hydro-diplomacy-needed-to-avert-arab-water-wars>

Countries experiencing water scarcity in 1955, 1990 and 2025 (projected)

[http://www.itt.com/waterbook/intl\\_scarcity.asp](http://www.itt.com/waterbook/intl_scarcity.asp)

Now is the time for science diplomacy in the Arab world

<http://www.scidev.net/en/editorials/now-is-the-time-for-science-diplomacy-in-the-arab-world.html>

**Item 3. China’s 12<sup>th</sup> Five-Year Plan: From GDP to Sustainability**

China’s National People’s Congress has adopted the 12<sup>th</sup> Five-Year Plan for National Economic and Social Development for the period 2011-2015. Reportedly, the Plan focuses on fairer and greener development, switching the focus “from GDP quantity to sustainable quality.” The Plan outlines new environmental targets with focus on improving energy efficiency, conserving scarce resources, and improving air and water quality. During the five years, the proportion of renewables should grow to 11.4% of the country’s energy supply (from the current 8.3%), and energy intensity be reduced by 16% and CO<sub>2</sub> emissions per GDP unit by 17% (meeting its Copenhagen commitments). A sharp rise in public security spending, which for the first time overtook the military budget, is aiming to reduce the rich-poor gap and the number of people living in poverty. [Related item: *China is Now the Largest Energy Consumer in the World*, in July 2010 report.]

**Military Implications:**

China’s Five-Year Plan is an important milestone in improving environmental security nationally, as well as globally. Environmental Security should be a key element in processes for developing US-China military strategic trust. [See *Environmental Security Proposed as Focus for US-China Military Strategic Trust* in the February 2011 report.]

**Sources:**

China adopts 5-year blueprint, aiming for fairer, greener growth

[http://news.xinhuanet.com/english2010/china/2011-03/14/c\\_13777814.htm](http://news.xinhuanet.com/english2010/china/2011-03/14/c_13777814.htm)

China ready to quell disquiet over new environmental policies

<http://www.guardian.co.uk/environment/blog/2011/mar/07/china-security-environment-policy>

Beijing Boosts Priority of Environment in Development Plan

<http://ictsd.org/i/news/biores/101976/>

#### **Item 4. Climate Adaptation, Development, and Peacebuilding Integrated Strategy**

A Woodrow Wilson International Center for Scholars panel argued that adopting a ‘triple bottom line’ integrated approach of peacebuilding, development, and adaptation to climate change is the only potentially successful strategy for lasting peace and sustainable development in regions with political instability or armed conflict. The panel recommended increased strategic cooperation among the organizations that work in these areas. Similar are the findings of the UN-commissioned report *Civilian Capacity in the Aftermath of Conflict: Independent Report of the Senior Advisory Group*. The report was passed on to the UN Security Council and the General Assembly. Follow-up action will be coordinated by a Steering Group of the heads of relevant UN entities led by UN Under-Secretary-General for Field Support Susana Malcorra.

##### **Military Implications:**

The triple bottom line should be considered as an element in peacebuilding and conflict prevention strategies, especially for AFRICOM. The military should explore ways to integrate its strategies for climate adaptation, development, and peacebuilding with those of other related organizations.

##### **Sources:**

Civilian Capacity in the Aftermath of Conflict: Independent Report of the Senior Advisory Group  
<http://www.civcapreview.org/>

Nimble UN, global partners needed to build stability in post-conflict States – report  
<http://www.un.org/apps/news/story.asp?NewsID=37700&Cr=post-conflict&Cr1=>

Climate Adaptation, Development, and Peacebuilding in Fragile States: Finding the Triple-Bottom Line. Dan Smith, International Alert, and Alexander Carius, Adelphi Research  
[http://www.wilsoncenter.org/index.cfm?fuseaction=events.event\\_summary&event\\_id=654210](http://www.wilsoncenter.org/index.cfm?fuseaction=events.event_summary&event_id=654210)

#### **Item 5. New UN Office to Help Central African Nations with Peacebuilding**

The UN Regional Office for Central Africa (UNOCA) that opened in Libreville, Gabon, is a political office designed to support Central African nations’ efforts for peacebuilding and conflict prevention, as well as help with cross-border issues related to organized crime and arms trafficking. The UNOCA is a reflection of the UN’s focus on preventive diplomacy for avoiding conflict and follows the UN Office for West Africa (UNOWA) and the UN Regional Centre for Preventive Diplomacy for Central Asia (UNRCCA).

##### **Military Implications:**

If not already accomplished, AFRICOM and other relevant military entities in Africa should liaise with UNOCA to share capacities and develop integrated strategies as referenced in the previous item. Environmental security could be an important focus for cooperation.

##### **Source:**

UN opens office to help Central African nations consolidate peace, prevent conflict  
<http://www.un.org/apps/news/story.asp?NewsID=37663&Cr=central+africa&Cr1=>

## Item 6. European Low-Carbon Roadmap to 2050

*Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system*, a white paper by the European Commission, outlines the roadmap for a low-carbon economy by 2050 in the EU. It sets targets by transportation sector, and includes measures aiming to dramatically cut Europe's dependency on imported oil and reduce transport emissions by 60% by 2050. The main pillar is infrastructure development for creating a 'Single European Transport Area' by 2030, estimated at €1.5 billion (approx. \$2 billion) to ensure an efficient transportation system across the continent. The 2050 objectives include: conventionally fuelled cars banned in cities by 2050 (50% reduction by 2030); aviation to increase low-carbon fuels use to 40%, and shipping to cut 40% from its carbon emissions. Measures refer to creating infrastructure for high-speed connection networks, expanding the EU's Single European Sky program to the European Common Aviation Area of 58 countries by 2050, implementing intelligent fuel and transport management systems, and encouraging new engine technologies. The EC is now expected to put forward various legislative proposals to implement the 2050 transport strategy.

### **Military Implications:**

It is not clear at this point if the new regulations that will be triggered by the European 2050 Roadmap will have exemptions for the military. In any event, the military entities stationed in Europe and their contractors should be prepared to respond to new standards and regulations to further reduce greenhouse gas emissions from transportation.

### **Sources:**

Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system

[http://ec.europa.eu/transport/strategies/doc/2011\\_white\\_paper/white\\_paper\\_com%282011%29\\_144\\_en.pdf](http://ec.europa.eu/transport/strategies/doc/2011_white_paper/white_paper_com%282011%29_144_en.pdf)

Vision of an interconnected Europe

[http://ec.europa.eu/news/transport/110328\\_en.htm](http://ec.europa.eu/news/transport/110328_en.htm)

Being ambitious. The European Commission maps a path to a low-carbon future. Now to walk it

<http://www.economist.com/node/18333149>

## Item 7. European Commission Opens Study on Maritime Planning

The European Commission has posted a questionnaire for collecting expert and public opinion on the importance, potential implementation strategies, and challenges for improving EU maritime spatial planning (MSP) and integrated coastal zone management. The questions are formulated around the importance of such strategies in view of better collaboration among Member States, as well as with EU neighboring countries, cohesive data collection and management, improving sustainable economic growth, resilience to coastal risks and impacts of climate change, and environmental protection. Conclusions about potential further actions will be decided by the end of 2011. Integrated Coastal Zone Management (ICZM) under the Barcelona Convention for the Mediterranean is the first significant step towards developing such international legislation. [Related item: *New Construction on Mediterranean Coastlines to be Banned* in January 2008 report.]

### **Military Implications:**

Military personnel involved in environmental security issues and operations in the EU arena should be prepared to respond to new coastal regulations and requirements in accordance with

potential new ICZM and MSP. These might find their way in or trigger amendments to Status of Forces Agreements. Also, since environmental security-type issues are among the challenges addressed by the consultation and future developments on the matter, relevant military personnel might seek cooperation with EU counterparts to share expertise and eventually coordinate data collection and management in a consistent way for better global integration and coordination.

**Sources:**

Commission seeks views on how to reduce pressure on Europe's coastal and marine areas  
<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/11/353&format=HTML&aged=0&language=EN&guiLanguage=en>

Possible ways forward for Maritime Spatial Planning and Integrated Coastal Zone Management in the EU (questionnaire)

<http://ec.europa.eu/yourvoice/ipm/forms/dispatch?form=MAREENV&lang=en>

**Item 8. Health Experts Call for Regulations to Combat Environmental Causes of Cancer**

The first International Conference on Environmental and Occupational Determinants of Cancer: Interventions for Primary Prevention took place in Asturias, Spain, on March 17-18, 2011. The conference was organized by the WHO in collaboration with a consortium of cancer organizations. Experts underlined that preventable cancers attributed to the environment and occupational factors comprise roughly 19% of all cancers and cause 1.3 million deaths per year. They adopted the 'Asturias Pledge,' which calls on governments to adopt regulations and implement mechanisms for preventive actions and enforcement of standards concerning environmental and occupational carcinogens. The conference recommended that the WHO lead a global effort for establishing a network of institutions for policy development, while civil society networks should raise awareness, and industry and the private sector should not only implement measures and better inform their workers on risks they face but also contribute to policy development.

**Military Implications:**

It is fair to speculate that the increased involvement of health experts in providing opinions on the health risks caused by environmental and occupational factors will accelerate the adoption of some new regulations on chemicals and processes proved or thought harmful to human health, as well as strengthening standards related to workplaces. Military personnel with environmental health responsibilities should review the results of the conference and be prepared to respond to new regulations.

**Sources:**

The Asturias Pledge – A new call to action on environmental and occupational cancer prevention  
[http://www.who.int/phe/news/asturia\\_pledge/en/index.html](http://www.who.int/phe/news/asturia_pledge/en/index.html)

Experts at UN meeting urge action to combat environmental causes of cancer

<http://www.un.org/apps/news/story.asp?NewsID=37812&Cr=cancer&Cr1>

## **Item 9. Technological Advances with Environmental Security Implications**

### **9.1 New Computer Model for Predicting ‘Tsunami Earthquakes’**

A new computer model developed by a team of researchers at the Georgia Institute of Technology may help to more accurately predict ‘tsunami earthquakes,’ which are more rare but produce larger tsunami waves than the more common “subduction earthquakes.” The new RTerg (Realtime erg.) system uses data from approximately 150 seismic stations to calculate the length of time it takes for the earthquake’s energy to build up and cause a tsunami. According to the researchers, the new technology could easily be incorporated by any earthquake processing or tsunami warning center that receives real-time global seismic information, which would allow for an easy transition to the new detection equipment. The technology is expected to be ready for general distribution soon.

#### **Military Implications:**

The military should follow the research and eventually consider it for incorporation in its own or collaborating organizations’ systems that deal with seismic and tsunami early warning.

#### **Sources:**

New System Can Warn of Tsunamis Within Minutes

<http://www.gatech.edu/newsroom/release.html?nid=64749>

Simple model could predict rare 'tsunami earthquakes'

<http://www.scidev.net/en/news/simple-model-could-predict-rare-tsunami-earthquakes-.html>

### **9.2 Open-source Software for DNA Order Screening Released**

A team led by Prof. Jean Peccoud, of the Virginia Bioinformatics Institute at Virginia Tech, Blacksburg VA, has released GenoTHREAT, a software tool for the detection of attempts to acquire synthetic DNA for bioterrorism attacks from commercial providers. The program allows bioinformatics analysis on an implementation of the government-proposed outline for a screening protocol for the automatic identification of potentially dangerous DNA sequences.

#### **Military Implications:**

Military personnel concerned with threats from synthetic biology should track the use of this and any similar programs as they evaluate algorithms for the detection of suspicious DNA orders.

#### **Source:**

Open-source software designed to minimize synthetic biology risks is released

<http://www.nanowerk.com/news/newsid=20626.php>

### **9.3 Nanotech-Augmented Membrane for Desalination**

Prof. Somenath Mitra and colleagues at the New Jersey Institute of Technology have reported development of a new membrane for water desalination. By inserting carbon nanotubes into membrane pores that separate pure water vapor from salt-laden liquid, the process runs six times as fast and at a 20C° lower temperature, which the scientists hope will make this desalination method competitive with others.

#### **Military Implications:**

This technique should be evaluated for providing effective and less expensive desalination systems for water-scarce areas, especially where only relatively low temperature waste heat is available.

**Sources:**

Water Desalination Using Carbon-Nanotube-Enhanced Membrane Distillation

<http://pubs.acs.org/doi/abs/10.1021/am100981s> (Abstract; purchase or subscription required for full text)

New desalination process using carbon nanotubes

<http://www.nanowerk.com/news/newsid=20537.php>

**9.4 New Detection and Cleanup Techniques****9.4.1 New Chemical Sensor Uses Triple Cascade of Tests**

A new highly sensitive chemical sensor announced by Prof. William Heineman of the Univ. of Cincinnati uses a sequence of three filtering techniques on samples to improve its performance. The process begins with a coating that allows only negative ions to pass, continues with electrolysis, and ends with spectroscopy. The device has been tested on radioactive waste at the Hanford site. A UC news release suggests applying it for detection of toxic heavy metals and polycyclic aromatic hydrocarbons at Superfund locations.

**Military Implications:**

This technique should be examined for possible use in environmental assessment and cleanup.

**Source:**

UC research produces novel sensor with improved detection selectivity

<http://www.physorg.com/news/2011-03-uc-sensor.html>

**9.4.2 Ionic Liquids Clean Up Contaminating Oil in the Environment**

Prof. Paul Painter and his group in the Dept. of Materials Science and Engineering at Pennsylvania State University are testing a process which efficiently removes petroleum from sand or other material that it is contaminating. The technique utilizes a group of ionic liquids based on 1-alkyl-3-methylimidazolium cations, consumes little water or energy, requires no heat, and ejects the contaminant material and solvent separately for further use.

**Military Implications:**

This process, when brought to commercial applicability, could be a valuable tool for cleaning up after oil spills or environmental damage in such operations as tar sand oil production. The process should be evaluated.

**Source:**

New process cleanly extracts oil from tar sands and fouled beaches

<http://www.physorg.com/news/2011-03-cleanly-oil-tar-sands-fouled.html>

**9.4.3 Computational models predict nanoparticle toxicity**

Two recent papers discuss the use of computational models to predict nanoparticle cell toxicity. Such a model was used to assess the toxicity to *E. coli* of 17 different types of metal oxide nanoparticles and reliably predicted the toxicity of all considered compounds.

**Military Implications:**

Military personnel with nanomaterial risk assessment responsibilities should explore the use of these models for rapidly screening nanomaterials and to prioritize testing.

**Source:**

Computational models predict nanoparticle toxicity

<http://www.nanowerk.com/news/newsid=20704.php>

Using nano-QSAR to predict the cytotoxicity of metal oxide nanoparticles

<http://www.nature.com/nnano/journal/v6/n3/full/nnano.2011.10.html#/affil-auth>

**9.4.4 Nanotechnology Used for Two New Anti-bacteria Water Filters**

Prof. Javid Rzayev and colleagues at the State University of New York at Buffalo have used block copolymers to create a nanomembrane containing pores about 55 nm in diameter – much larger than a water molecule but smaller than a bacterium, and thus suitable for use as a water filter component.

Chad Vecitis and a group at Yale Univ. report developing an anodic microfilter using a combination of electrolysis and filtration through a porous multi-walled carbon nanotube film to accomplish the removal and inactivation of viruses (MS2) and bacteria (*E. coli*) from water.

**Military Implications:**

These techniques should be further investigated for their applicability in field water supply systems and medical wastewater streams.

**Sources:**

A nano-solution to global water problem: Nanomembranes could filter bacteria

<http://www.nanowerk.com/news/newsid=20228.php>

Large Pore Size Nanoporous Materials from the Self-Assembly of Asymmetric Bottlebrush Block Copolymers

<http://pubs.acs.org/doi/abs/10.1021/nl103747m>

Nanotube-Based Filter Cleans Drinking Water

<http://pubs.acs.org/cen/news/89/i12/8912scene3.html>

Electrochemical Multiwalled Carbon Nanotube Filter for Viral and Bacterial Removal and Inactivation

<http://pubs.acs.org/doi/abs/10.1021/es2000062>

**9.5 Increasing Energy Efficiency Technologies****9.5.1 Organic-treated Nanotubes Replace Expensive Platinum in Fuel Cell Cathodes**

A team of engineers at Case Western Reserve University, Cleveland OH, led by Prof. Liming Dai, has published a paper announcing a major breakthrough in the design of fuel cell cathodes.

Fuel cells using carbon nanotubes treated with the \$100/kg polymer polydiallyldimethylammonium chloride produced as much energy as those using \$65,000/kg platinum. The new components are also claimed to be longer-lasting and more stable.

**Military Implications:**

This development should be followed as it progresses toward commercial exploitation in environment-sparing power supplies.

**Sources:**

Cheap Fuel Cell Catalyst Made Easy

<http://sites.merid.org/nanodev/more.php?articleID=3206>

Polyelectrolyte Functionalized Carbon Nanotubes as Efficient Metal-free Electrocatalysts for Oxygen Reduction

<http://pubs.acs.org/doi/full/10.1021/ja1112904>

### 9.5.2 Berkeley Lab Produces Nanocomposite for Hydrogen Storage

A scientific team at Lawrence Berkeley National Laboratory has reported developing a composite material for the storage of hydrogen. Made of magnesium metal nanoparticles encapsulated in a gas-barrier matrix, the new polymer allows rapid hydrogen breathability at non-extreme temperatures without oxidizing the metal after cycling. According to the researchers, the polymer offers a breakthrough in materials design for hydrogen storage, batteries, and fuel cells, allowing “rapid storage kinetics without using expensive heavy-metal catalysts.”

#### **Military Implications:**

The military should investigate this research for its possible application to clean combustion energy production.

#### **Sources:**

Berkeley Scientists Achieve Breakthrough in Nanocomposite for High-Capacity Hydrogen Storage  
<http://vcresearch.berkeley.edu/news/berkeley-scientists-achieve-breakthrough-nanocomposite-high-capacity-hydrogen-storage>

Air-stable magnesium nanocomposites provide rapid and high-capacity hydrogen storage without heavy metal catalysts

<http://www.nature.com/nmat/journal/vaop/ncurrent/full/nmat2978.html> (Abstract free, article \$18, or requires subscription to NATURE)

## **Item 10. Updates on Previously Identified Issues**

### **10.1 UN Convention on Biological Diversity Protocol Open for Signatures**

The Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress opened for signature on March 7, 2011. This supplementary protocol to the UN Convention on Biological Diversity provides international rules and procedures for liability and redress in the event of damage to biodiversity caused by trans-boundary movement of living modified organisms. It will enter into force 90 days after ratification by 40 countries. [Related item: *Biosafety Regulations Reviewed in Context of Worrying Forecasts* in October 2010 report.]

#### **Military Implications:**

[Similar to previous on this issue] Increased coherence among biodiversity agreements, UN-related bodies, and capacity building should lead to greater attention being paid to biodiversity impacts of military training and other operations.

#### **Sources:**

An Introductory Note in Preparation for Signature and Ratification of the Nagoya-Kuala Lumpur [sic] Supplementary Protocol on Liability and Redress

<http://bch.cbd.int/protocol/news/>

New biosafety protocol to UN treaty on biological diversity opens for signature

<http://www.un.org/apps/news/story.asp?NewsID=37701&Cr=biodiversity&Cr1=>

## 10.2 Greenness of New Technologies Needing Rare Earth Elements Questioned

The annual demand for rare earth elements has skyrocketed over the last decade from 40,000 tons to 120,000 tons, and by 2014 this might increase to 200,000 tons, if green and IT technologies continue as forecasted, notes *The Independent*. Meanwhile, China cut its exports to only about 30,000 tons a year and threatens to completely stop them by 2012. This had triggered a price rise from \$14.40 per tonne in July 2010 to \$109 per tonne in February 2011, with the February rise being triple the recent months' average.

The main problem is that rare earth mining and ore processing are extremely polluting. Present discrepancies between national environmental standards and regulations can make rare earth processing similar to hazardous waste dumping and might lead to increased environmental security issues. The Australian mining giant Lynas is now building the world's largest rare earth ore-processing plant in Malaysia (the first to be built outside China in about 30 years) for ore mined in Australia. Since the ore is slightly radioactive, fears increase over potential local unrest, as happened with the country's last such refinery, which is now one of Asia's largest radioactive waste sites.

Hence, in order to meet future demands and reduce the environmental footprint of "green technologies" and IT devices, international environmental standards for production, as well as recycling frameworks and regulations will be necessary. [Related item: *New Frameworks for Securing Supply of Rare Earth Elements* in February 2011 report.]

### **Military Implications:**

[Similar to previous on this issue] R/D for rare earths substitutes and new sources should be accelerated. Environmental pollution aspects should be managed in pace with any acceleration, under the stewardship principle as included in the *Army Strategy for the Environment*.

### **Sources:**

China rare earth prices explode as export volumes collapse

<http://www.reuters.com/article/2011/03/24/us-china-rareearth-idUSTRE72N0X720110324>

Global supply of rare earth elements could be wiped out by 2012

[http://www.naturalnews.com/028028\\_rare\\_earth\\_elements\\_mining.html](http://www.naturalnews.com/028028_rare_earth_elements_mining.html)

Malaysia gambles on rare earth

<http://www.montrealgazette.com/Malaysia+gambles+rare+earth/4413144/story.html>

China to lose monopoly on rare earth minerals

<http://www.vancouversun.com/China+lose+monopoly+rare+earth+minerals/4434648/story.html>

## 10.3 World Water Day 2011 Focused on Urbanization

This year's World Water Day theme was "Water for cities: responding to the urban challenge." If current trends continue, the number of people living in urban areas with perennial water shortage (less than 100 liters per person per day within their urban extent) could increase from the current 150 million to almost 1 billion by 2050 estimates the report *Urban growth, climate change, and freshwater availability* by the NAS.

### **Military Implications:**

Relevant military personnel should work with their counterparts in the water-scarce regions and fragile states and offer support to design water management improvement strategies as part of peacebuilding processes.

**Sources:** (expanded list in the [Appendix](#))

World water day 2011: Water for cities - responding to the urban challenge

<http://www.unwater.org/worldwaterday/>

Urban growth, climate change, and freshwater availability

<http://www.pnas.org/content/early/2011/03/21/1011615108.abstract>

Green hills, blue cities. An ecosystems approach to water resources management for African cities

[http://dev.grida.no/RRA\\_BlueCities/layout/RRA\\_GHBC\\_screen.pdf](http://dev.grida.no/RRA_BlueCities/layout/RRA_GHBC_screen.pdf)

## 10.4 Climate Change

### 10.4.1 Scientific Evidence and Natural Disasters

According to U.S. Geological Survey data, the number of mega-quakes increased from four in the 1980s, to six in the 1990s and 13 in the last decade, while the number of major earthquakes for the same decades increased from 1,085 to 1,492, and 1,611 respectively. Although there is no consensus among scientists about the link between the increased frequency and intensity of earthquakes and climate change, it is believed that the melting of glaciers might be a factor.

A recent study by NASA's Jet Propulsion Laboratory designed to understand the relationship between movements in the Earth's core, its rotation, and surface air temperatures revealed clear large-scale impacts of human-induced warming.

The Taiwan Central Weather Bureau reported that over the past century its temperature rose by 1.4°C (2.6°F), twice the global rate of 0.65°C (1°F), and the number of typhoons that hit Taiwan increased from 3.1 to 3.6 per year.

### 10.4.2 Food and Water Security

The FAO Food Price Index averaged 236 points in February, up 2.2% from January, the highest record in real and nominal terms since 1990 when FAO started monitoring prices.

Small-scale farmers can double food production in a decade by using simple ecological methods, according to the UN study "Agro-ecology and the right to food."

Kenya, where 80% of the farmers depend on rain for their crops, is suffering another extended drought. In Somalia, 2.4 million people (a third of the country's population) are in need of relief aid due to drought and two decades of conflict. In the Democratic Republic of the Congo, an estimated 51 million people (75% of the population) have no access to safe drinking water, although the country holds over 50% of Africa's water reserves, notes the UNEP study *Water Issues in the Democratic Republic of Congo – Challenges and Opportunities*.

### 10.4.3 Melting glaciers and sea ice

The Arctic sea ice extent reached a record low 14.64 million square kilometers (5.65 million square miles) on March 7, 2011 (the likely day of maximum ice coverage for the year), as shown by preliminary data at the National Snow and Ice Data Center in Boulder CO. A study found that the Arctic plankton blooming peak shifted from September in the 1990s, to July in 2009, occurring up to 50 days earlier. This is expected to also have a ripple effect for other species.

#### 10.4.4 Rising Seas Level

New research found that ice loss from Antarctica and Greenland has accelerated over the last 20 years and is occurring faster than models predict. If these trends continue, the two polar ice sheets would add 15 cm (5.9 inches) to the average global sea level by 2050.

#### 10.4.5 Migration

The President of Kiribati says that the situation in the country's outer islands is critical and that an increasing number of coastal villagers need to be relocated because of rising sea levels. While previously the villagers were asking the government to build sea walls so that they could remain in the village, now they ask for help with relocation, reported Kiribati President Anote Tong.

#### 10.4.6 Health

Warmer waters could increase the spread of harmful bacteria and toxic algal species, which, if ingested via contaminated seafood or water, could cause gastrointestinal infections and infectious diseases such as cholera.

Increased rainwater in urban areas could exceed sewage system capacities and cause storm water overflows, which could taint drinking water and increase risks of waterborne diseases like cholera.

#### 10.4.7 Post-Kyoto Treaty Negotiations

On March 14, 2011, the Council of Environment Ministers of the EU adopted the follow-up conclusions to the Cancun Conference. It confirmed its commitment for a second period under a Protocol that would preferably be a single legally binding instrument including the essential elements of the Kyoto Protocol, applied to all major economies. It also suggested that the upcoming Durban Climate Conference address the reforming of existing carbon market mechanisms and the establishment of new sectoral or other scaled-up market mechanisms.

#### **Military and Security 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:** (expanded list in the [Appendix](#))

JPL study highlights drastic scale of human-induced global warming

[http://www.pasadenastarnews.com/news/ci\\_17603445](http://www.pasadenastarnews.com/news/ci_17603445)

Tight cereal markets as food prices increase again

<http://www.fao.org/news/story/en/item/51913/icode/>

Arab world faces more food crises

[http://www.seeddaily.com/reports/Arab\\_world\\_faces\\_more\\_food\\_crises\\_999.html](http://www.seeddaily.com/reports/Arab_world_faces_more_food_crises_999.html)

UN expert makes case for ecological farming practices to boost food production

<http://www.un.org/apps/news/story.asp?NewsID=37704&Cr=farming&Cr1>

Arctic Sea Ice News and Analysis

<http://nsidc.org/arcticseaicenews/>

Cuba Cooperates with Seychelles on Hazards of Sea-level Rise

[http://www.cubaheadlines.com/2011/03/27/30352/cuba\\_cooperates\\_with\\_seychelles\\_on\\_hazards\\_of\\_sea\\_level\\_rise.html](http://www.cubaheadlines.com/2011/03/27/30352/cuba_cooperates_with_seychelles_on_hazards_of_sea_level_rise.html)

Rising waters in Kiribati threatening villages: president

<http://australianetworknews.com/stories/201103/3158434.htm?desktop>

3 Surprising Ways Global Warming Could Make You Sick

<http://news.nationalgeographic.com/news/2011/03/110301-global-warming-health-science-environment/>

Council conclusions. Follow-up to the Cancún Conference, 3075th ENVIRONMENT Council meeting. Brussels, 14 March 2011

[http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/envir/119875.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/envir/119875.pdf)

## 10.5 Nanotechnology Safety Issues

Detailed descriptions of the following nanotechnology issues are in the [Appendix](#)

- The OECD report *Nanosafety Work: The First Five Years* argues for coordinated international approach to address environmental and health risks of manufactured nanomaterials ([more](#))
- Nanotechnology Law and Policy includes the legal, regulatory and policy aspects concerning nanotechnology ([more](#))
- EC has launched the first European repository of nanomaterials ([more](#))
- Second edition of the Compendium NanoSafety Cluster 2011 by the EC ([more](#))
- First accreditation by the AssuredNano® nanotech EHS was awarded to a manufacturer of single-walled carbon nanotubes ([more](#))
- *Regulating Uncertain Risks of Nanomaterials*, conducted in Netherlands examines the applicability of existing regulation systems to the use of nanomaterials ([more](#))
- UK Food Safety Organization Calls for Increased Nanomaterial Vigilance ([more](#))
- *Risk and Precaution*, book by Prof. Alan Randall of Australia's Univ. of Sydney, uses nanotechnology as an example for a risk management framework ([more](#))
- NIOSH is seeking comments on hazard identification and risk management for updating the NIOSH 2009 nanotechnology strategic plan ([more](#))
- Several conferences to discuss current nanotech developments, including safety ([more](#))

## Item 11. Reports and Information Suggested for Review

### 11.1 National Security Implications of Climate Change for U.S. Naval Forces

*National Security Implications of Climate Change for U.S. Naval Forces*, a new report by the National Research Council of the NAS, argues that climate change raises challenges to America's current naval capabilities, requiring serious changes to the design of their fleets, training, and ships' deployment.

#### **Military Implications:**

All relevant military personnel should be familiar with the report's findings and recommendations, which are in line (but more detailed) with the arguments on the changing

climate presented in last year's Quadrennial Defense Review Report. This is Army-relevant owing to the large numbers of vessels used and the amount of waterborne training conducted for littoral zone operations.

**Sources:**

US navy faces up to a new enemy – climate change

<http://www.newscientist.com/article/dn20228-us-navy-faces-up-to-a-new-enemy--climate-change.html>

US Navy ill-prepared for new Arctic frontier: study

<http://news.yahoo.com/s/afp/climatewarmingusrussiamilitaryoil>

**11.2 Considerations for “Green Buildings”**

A new website, [www.BuildingRating.org](http://www.BuildingRating.org), offers a collection of more than 500 documents and a host of other resources that cover all aspects of building energy efficiency, including legislative and regulatory examples and policy implementation.

ASTM International has released *Standard Practice for Building Energy Performance Assessment for a Building Involved in a Real Estate Transaction (E2797-11)*, a standard for collecting, compiling, and analyzing energy use in buildings, in order to develop data to assess building energy performance.

The Latham & Watkins LLC law firm has prepared a brief report discussing a number of considerations that should be taken into account in applying the concept of a "green building" to new construction.

**Military Implications:**

Military personnel, Civil Works project managers, and contractors charged with evaluating and/or planning to reduce the environmental and energy footprint of buildings should explore these resources.

**Sources:**

[www.BuildingRating.org](http://www.BuildingRating.org)

New ASTM standard for measuring energy performance in commercial

<http://www.lexology.com/library/detail.aspx?g=c305c8ff-4a19-4845-b93a-9763d86fb2a6>

Green Building Projects: The Growing Trend Brings Both Opportunities and Potential Liability Risks

<http://www.lw.com/Resources.aspx?page=FirmPublicationDetail&publication=4016#page=1>

**11.3 New Set of Tools for Estimating Data Center Carbon Footprint**

The commercial company APC recently introduced a set of free Web-based tools, using a simple approach, for estimating the carbon footprint of a data center anywhere in the world.

**Military Implications:**

These tools could be of assistance to military planners in deciding on the location and characteristics of new construction or modifications to existing facilities.

**Source:**

Estimating a Data Center's Electrical Carbon Footprint

[http://www.apcmedia.com/salestools/DBOY-7EVHLH\\_R0\\_EN.pdf](http://www.apcmedia.com/salestools/DBOY-7EVHLH_R0_EN.pdf)

## APPENDIX

### Reference Details

This Appendix contains expanded background information on some items.

### Item 1. Earthquakes, Tsunamis, and Nuclear Disasters in Japan

The important reassessments following the Tōhoku earthquake and tsunami that hit Japan's northeast coast on March 11, 2011 will probably include:

#### Preparedness and resilience actions:

- Improve early warning capability, preparedness, and peoples' resilience. Although this is an ongoing effort with lots of energy allocated to it, since present capabilities are at only 10-15 seconds alert before an earthquake (and variable time before a tsunami), planning should improve and reaction frameworks be designed for worst case scenarios and beyond.
- An international plan should be designed for post-disaster help and recovery. Since in most cases large natural disasters go beyond any country's capacity to cope with them alone, coordinated international action is necessary. The "Mid-Term Review of the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters" reveals that many countries are lacking capacity or a legal basis, or coordination of different entities to react to disasters. This is even more true at international levels.
- A framework should be developed for disaster-induced migration (could be part of environmental refugees' framework) to address sudden massive movement of people. This is even more necessary in the case of movement between ethnically non-friendly areas.
- Food security should be included in all disaster scenarios. Since Japan was already the world's largest food importer, with 60% of its food imported, the devastation and contamination of its domestic food increased fears over food price rises and growing constraints on world food supplies; both in Japan and elsewhere.

#### Changes to nuclear regimes

Nuclear power plants generate only 14% of the world's electricity. Their lifespan is typically 40 years and today their median age is about 27 years, with many approaching retirement. Safe decommissioning and the nuclear waste issues are still not solved; hence, the Fukushima disaster might trigger important regime and development changes, such as:

- New security requirements and regimes for future nuclear power plants and nuclear weapons facilities, and reassessment of the existing ones. Almost all countries having nuclear energy have begun the assessment of their facilities' safety. In some (including the U.S.) there are suggestions for moratoriums on building new ones until the reassessments of standards and safety measures can be completed.
- Clear plans of action in case of nuclear accident are needed. At the Fukushima plant, while pumping water to keep the fuel rods cool, researchers are still struggling to design a plan for safely storing the pumped-out, contaminated water.

- Nuclear countries should all consider adopting the international liability instruments addressing nuclear accidents (Paris Convention on Third Party Liability in The Field of Nuclear Energy, Vienna Convention on Civil Liability For Nuclear Damage, and Convention on Supplementary Compensation For Nuclear Damage)
- Radiation has to be assessed and reported accurately to avoid confusion and panic and to keep people safe. While radiation has spread to areas surrounding the plant, contaminating some vegetables, milk, and tap water, and radiation was found even in the rain and the dust, lack of clear reporting spread panic not only in Japan, but also around the world.

### Nuclear power plants worldwide



Source: When the steam clears. The Fukushima crisis will slow the growth of nuclear power. Might it reverse it? <http://www.economist.com/node/18441163>

### Sources: (expanded list)

Hayato Kobayashi, The Millennium Project staff, reporting from Tokyo

Toxic plutonium seeping from Japan's nuclear plant

<http://abcnews.go.com/Business/wireStory?id=13241596>

When the steam clears. The Fukushima crisis will slow the growth of nuclear power. Might it reverse it?

<http://www.economist.com/node/18441163>

Detection of radioactive material in the soil in Fukushima Daiichi Nuclear Power Station

<http://www.tepco.co.jp/en/press/corp-com/release/11032812-e.html>

More radioactive water spills at Japan nuke plant

<http://enews.earthlink.net/article/top?guid=20110328/af21d4a0-6577-4cab-a555-46982cd03905>

Radiation in seawater off nuclear plant spikes to 1,250 times normal

<http://edition.cnn.com/2011/WORLD/asiapcf/03/26/japan.nuclear.disaster/?hpt=T2>

Japan says high seawater radiation levels are no cause for alarm

<http://www.csmonitor.com/World/Asia-Pacific/2011/0322/Japan-says-high-seawater-radiation-levels-are-no-cause-for-alarm>

Japan's Nuclear Crisis Causes Run on Radiation Detectors

<http://www.nytimes.com/2011/03/22/business/22geiger.html>

Liquefaction seen over wide areas along Tokyo Bay

<http://news.asiaone.com/News/Latest%2BNews/Asia/Story/A1Story20110325-270180.html>

Disneyland car park drenched; visitors evacuated

<http://www.asiaone.com/News/Latest%2BNews/Asia/Story/A1Story20110312-267751.html>

Japan earthquake poses questions about EU nuclear safety

<http://euobserver.com/9/31981/?rk=1>

Japan's Nuclear Crisis Stokes Fear in Europe

[http://www.nytimes.com/2011/03/14/world/europe/14atom.html?\\_r=1](http://www.nytimes.com/2011/03/14/world/europe/14atom.html?_r=1)

China puts hold on nuclear power approvals

[http://www.upi.com/Science\\_News/Resource-Wars/2011/03/16/China-puts-hold-on-nuclear-power-approvals/UPI-50171300304606/](http://www.upi.com/Science_News/Resource-Wars/2011/03/16/China-puts-hold-on-nuclear-power-approvals/UPI-50171300304606/)

U.S. nuclear plants safe and will apply lessons from Japan crisis

<http://edition.cnn.com/2011/OPINION/03/25/fertel.pro.nuclear.energy/>

Should the U.S. 'put the brakes' on nuclear? Some Dems think so

<http://thehill.com/homenews/sunday-talk-shows/149165-should-america-put-the-breaks-on-nuclear-power>

Large and Deadly Earthquakes This Year

<http://earthquake.usgs.gov/earthquakes/eqarchives/year/mag7.php>

Study: Big quakes don't set off others far away

<http://enews.earthlink.net/article/top?guid=20110327/c4bf0584-6f17-4ecd-a2aa-1bbfcd40536a>

In times of dwindling resources, disaster risk reduction is an easy win

<http://www.unisdr.org/news/v.php?id=18296>

UN-managed Asian tsunami trust fund broadened to cover disaster preparedness

<http://www.un.org/apps/news/story.asp?NewsID=37696&Cr=natural+disaster&Cr1=>

Leaders tell EU neighbours to stress-test nuclear plants - 25.03.2011 - 16:54

<http://euobserver.com/9/32067/?rk=1>

Will Japan's Crisis Send Food Prices Even Higher?

<http://moneywatch.bnet.com/economic-news/blog/daily-money/will-japans-crisis-send-food-prices-even-higher/2300/>

## Item 6. Updates on Previously Identified Issues

### 8.4 World Water Day 2011 Focused on Urbanization

**Sources:** (expanded list)

World water day 2011: Water for cities - responding to the urban challenge

<http://www.unisdr.org/arabstates/events/v.php?id=17677> and

<http://www.unwater.org/worldwaterday/>

Urban growth, climate change, and freshwater availability

<http://www.pnas.org/content/early/2011/03/21/1011615108.abstract>

Billion-plus people to lack water in 2050: study

<http://www.google.com/hostednews/afp/article/ALeqM5gJJDWVHwr62fSiDe5oOGPXu2yw9w>

On World Water Day, UN calls for greater investment in providing clean water for all

<http://www.un.org/apps/news/story.asp?Cr1=sanitation&NewsID=37855&Cr=water>

Africa's urbanization outpaces capacity to provide water, sanitation – UN

<http://www.un.org/apps/news/story.asp?Cr1=sanitation&NewsID=37836&Cr=water>

Green hills, blue cities. An ecosystems approach to water resources management for African cities

[http://dev.grida.no/RRA\\_BlueCities/layout/RRA\\_GHBC\\_screen.pdf](http://dev.grida.no/RRA_BlueCities/layout/RRA_GHBC_screen.pdf)

## 8.5 Climate Change

**Sources:** (expanded list)

### 8.5.1 Scientific Evidence and Natural Disasters

Could global warming be causing recent earthquakes?

<http://www.montrealgazette.com/technology/Could%20global%20warming%20causing%20recent%20earthquakes/4445389/story.html>

JPL study highlights drastic scale of human-induced global warming

[http://www.pasadenastarnews.com/news/ci\\_17603445](http://www.pasadenastarnews.com/news/ci_17603445)

Warming in Taiwan twice the global average: weather bureau

[http://focustaiwan.tw/ShowNews/WebNews\\_Detail.aspx?Type=aALL&ID=201103090033](http://focustaiwan.tw/ShowNews/WebNews_Detail.aspx?Type=aALL&ID=201103090033)

### 8.5.2 Food and Water Security

Tight cereal markets as food prices increase again

<http://www.fao.org/news/story/en/item/51913/icode/>

Arab world faces more food crises

[http://www.seeddaily.com/reports/Arab\\_world\\_faces\\_more\\_food\\_crises\\_999.html](http://www.seeddaily.com/reports/Arab_world_faces_more_food_crises_999.html)

UN expert makes case for ecological farming practices to boost food production

<http://www.un.org/apps/news/story.asp?NewsID=37704&Cr=farming&Cr1>

Rebuild small seed enterprises. Farmers' seed ventures key to food security in developing countries

<http://www.fao.org/news/story/en/item/51581/icode/>

Promoting the Growth and Development of Smallholder Seed Enterprises for Food Security Crops

<http://typo3.fao.org/fileadmin/templates/agphome/documents/PGR/PubSeeds/seedpolicyguide6.pdf>

Climate-linked drought pushes Kenyan farmers to sell land

<http://www.trust.org/alertnet/news/climate-linked-drought-pushes-kenyan-farmers-to-sell-land>

East Africa: Climate Change 'Will Bring Drought, Not Rain'

<http://allafrica.com/stories/201103040199.html>

Somalia, on the brink of a humanitarian disaster – UN Independent Expert

<http://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=10783&LangID=E>

WFP Steps Up Response to Somalia Drought with New Food Distributions in Mogadishu

<http://www.wfp.org/news/news-release/wfp-steps-response-somalia-drought-new-food-distributions-mogadishu>

Uganda facing food crisis

<http://www.sundayvision.co.ug/detail.php?mainNewsCategoryId=7&newsCategoryId=123&newsId=749533>

Water Issues in the Democratic Republic of the Congo: Challenges and Opportunities -  
Technical Report

<http://www.reliefweb.int/rw/rwb.nsf/db900sid/LSGZ-8F7H9J?OpenDocument>

UN official calls attention to severe drought in Somalia on World Water Day

<http://www.un.org/apps/news/story.asp?NewsID=37857&Cr=somali&Cr1=>

#### 8.5.3 Melting glaciers and sea ice

Arctic Sea Ice News and Analysis

<http://nsidc.org/arcticseaicenews/>

Arctic Sea Ice Ties Another Record Low

<http://www.climatecentral.org/blog/arctic-sea-ice-sets-another-record-low/>

Shifting spring: Arctic plankton blooming up to 50 days earlier now

[http://www.washingtonpost.com/wp-dyn/content/article/2011/03/06/AR2011030603417\\_2.html](http://www.washingtonpost.com/wp-dyn/content/article/2011/03/06/AR2011030603417_2.html)

In Arctic, climate-change threats include giardia, food poisoning

[http://www.thearcticsounder.com/article/1109in\\_arctic\\_climate-change\\_threats\\_include](http://www.thearcticsounder.com/article/1109in_arctic_climate-change_threats_include)

#### 8.5.4 Rising Seas Level

Polar ice loss quickens, raising seas

<http://www.bbc.co.uk/news/science-environment-12687272>

Cuba Cooperates with Seychelles on Hazards of Sea-level Rise

[http://www.cubaheadlines.com/2011/03/27/30352/cuba\\_cooperates\\_with\\_seychelles\\_on\\_hazards\\_of\\_sea\\_level\\_rise.html](http://www.cubaheadlines.com/2011/03/27/30352/cuba_cooperates_with_seychelles_on_hazards_of_sea_level_rise.html)

#### 8.5.5 Migration

Rising waters in Kiribati threatening villages: president

<http://australianetworknews.com/stories/201103/3158434.htm?desktop>

#### 8.5.6 Health

3 Surprising Ways Global Warming Could Make You Sick

<http://news.nationalgeographic.com/news/2011/03/110301-global-warming-health-science-environment/>

Climate change could spark cholera return

<http://www.cbc.ca/news/politics/story/2011/03/01/water-conference-cholera.html>

In Arctic, climate-change threats include giardia, food poisoning

[http://www.thearcticsounder.com/article/1109in\\_arctic\\_climate-change\\_threats\\_include](http://www.thearcticsounder.com/article/1109in_arctic_climate-change_threats_include)

Study links longer allergy season to climate change

<http://www.inforum.com/event/article/id/313783/group/News/>

#### 8.5.7 Post-Kyoto Treaty Negotiations

Council conclusions. Follow-up to the Cancún Conference, 3075th ENVIRONMENT Council meeting. Brussels, 14 March 2011

[http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/envir/119875.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/envir/119875.pdf)

## 11.5 Nanotechnology Safety Issues

Detailed descriptions of the nanotechnology issues

### 11.5.1 OECD Report Reviews Past Nanotech Risk Study and Recommends Future

According to Meridian *Nanotechnology and Development News*, the Organization for Economic Cooperation and Development released a report, *OECD Nanosafety Work: The First Five Years*, which says. "...as countries consider whether manufactured nanomaterials require special regulation, they will need a coordinated international approach to address environmental and health risks." It reviews past efforts and discusses the work of OECD's Working Party on Manufactured Nanomaterials, which helps countries implement policies to address nanotech EHS problems. Also of interest is the new OECD Work on Environment brochure, which highlights the OECD's environmental work for 2011-2012.

#### **Military Implications:**

Nanotech-related ES personnel should review the "Five Years" report for insight into past efforts, and also to ensure that their work is coordinated with that of the Working Party.

#### **Sources:**

Nanosafety at the OECD: The First Five Years 2006-2010

<http://www.oecd.org/dataoecd/6/25/47104296.pdf>

OECD WORK ON ENVIRONMENT 2011-2012

<http://www.oecd.org/dataoecd/16/35/47058547.pdf>

OECD Says Coordination Needed to Address Manufactured Nanomaterials' Potential Risks

<http://sites.merid.org/nanodev/more.php?articleID=3163>

### 11.5.2 Nanotechnology Law and Policy Cases and Materials

According to the announcement, this comprehensive 538-page book. "...includes an examination of the scope of nanotechnology as a science and as a commercialized application of science, and the legal, regulatory and policy aspects of this emerging technology."

#### **Military Implications:**

This work should be of enormous assistance as a reference for any personnel dealing with nanotech regulation.

#### **Sources:**

Forthcoming new treatise: Nanotechnology Law and Policy

<http://www.nanolawreport.com/2011/02/articles/forthcoming-new-treatise-nanotechnology-law-and-policy/>

Victoria Sutton. Nanotechnology Law and Policy, CAP, 2011

<http://www.cap-press.com/isbn/9781594607516>

### 11.5.3 EC Joint Research Center Launches Repository of Nanomaterials

According to Meridian *Nanotechnology and Development News*, "The European Commission's Joint Research Center has launched the first European repository of nanomaterials that contains a representative range of 25 different types of reference nanomaterials, including carbon

nanotubes, silver nanoparticles, titanium dioxide, cerium oxide, zinc oxide, bentonite, gold and silicon dioxide."

**Military Implications:**

This resource should be investigated to determine what role it can play in standardizing nanotech risk assessment internationally.

**Source:**

Small Material, Big Impact: European Repository of Reference Nanomaterials Will Improve Safety Assessment

<http://sites.merid.org/nanodev/more.php?articleID=3155>

Small material, big impact: European Repository of Reference Nanomaterials will improve safety assessment

[http://ec.europa.eu/dgs/jrc/index.cfm?id=2300&obj\\_id=2950&dt\\_code=PRL&lang=en](http://ec.europa.eu/dgs/jrc/index.cfm?id=2300&obj_id=2950&dt_code=PRL&lang=en)

11.5.4 EC Releases Compendium NanoSafety Cluster 2011 Overview of Projects

The European Commission has released the second edition of the Compendium NanoSafety Cluster 2011. This 230-page publication provides summaries of EU FP6 and FP7 nanosafety projects. The Nanosafety Cluster, a projects and stakeholders open forum, has as its main aims synergy among these projects, collaboration for maximizing impact, policy elaboration, planning of future actions, and international cooperation.

**Military Implications:**

This publication provides an excellent source of information on current European nanosafety efforts.

**Source:**

European Commission releases the second edition of the Compendium NanoSafety Cluster 2011

<http://www.nanowerk.com/news/newsid=20637.php>

Compendium

[http://www.nanoimpactnet.eu/uploads/file/NanoSafetyCluster/Compendium\\_2011\\_web.pdf](http://www.nanoimpactnet.eu/uploads/file/NanoSafetyCluster/Compendium_2011_web.pdf)

NanoSafety: <http://www.nanosafetycluster.eu/>

11.5.5 Nanotech Accreditation Scheme Gives Out First Certification

The AssuredNano® nanotech EHS accreditation scheme has awarded its first certification, to Thomas Swan & Co. Ltd., a manufacturer of single-walled carbon nanotubes. The evaluation covers 19 aspects of the production process, including manufactured nanomaterial types and characteristics; nanoparticle exposure, risk, and risk assessment and management; life cycle analysis; and exposure control and measurement.

**Military Implications:**

This arrangement should be reviewed for its quality, ideas on evaluation, and possible future use of its findings.

**Sources:**

Assured Nano: <http://www.assurednano.com/>

Thomas Swan Pioneers Responsible Nano Accreditation

<http://www.nanowerk.com/news/newsid=20640.php>

#### 11.5.6 Study Examines Regulation of Nanotech with Uncertain Risks

A study, *Regulating Uncertain Risks of Nanomaterials*, conducted under the sponsorship of three Netherlands ministries, "examines the possibilities and limitations for such regulation under existing legislation covering the environment, consumer protection and occupational health and safety, given the uncertain risks attached to the use of nanomaterials," according to *Nanowerk News*. It discusses governmental powers and others' obligations in this area, with an emphasis on Dutch and EU legislation.

#### **Military Implications:**

ES personnel concerned with nanotechnology should review this publication to gain insight into the European situation and views on the "uncertain risk" question.

#### **Sources:**

Study analyses the possibilities and bottlenecks for regulating nanomaterials with uncertain risks  
<http://www.nanowerk.com/news/newsid=20689.php>

Regulating Uncertain Risks of Nanomaterials

[http://www.chemicalwatch.com/downloads/Dutch\\_STEM\\_publication\\_2010\\_Regulating\\_uncertain\\_risks\\_of\\_nanomaterials\\_summary\\_and\\_conclusions.pdf](http://www.chemicalwatch.com/downloads/Dutch_STEM_publication_2010_Regulating_uncertain_risks_of_nanomaterials_summary_and_conclusions.pdf) (26-page English summary; contains link to Dutch original)

#### 11.5.7 UK Food Safety Organization Calls for Increased Nanomaterial Vigilance

The UK Institute of Food Science and Technology is calling for increased attention to possible environmental and health hazards arising from the use of anti-microbial nanomaterials in food packaging, from both direct contact and their disposal in waste, including the possibility of heightened bacterial resistance.

#### **Military Implications:**

These stated views from a respected institution are very likely to increase the pressure for stricter regulation of nanomaterials, with consequent effects on military procurement. (See related item 6.8.7 EU Launches Public Consultation on Risk Assessment of Nanomaterials in Food in the January 2011 issue of this report.)

#### **Source:**

Assess Risk from Nano-pollution and Antimicrobials in Packaging – IFST  
<http://sites.merid.org/nanodev/more.php?articleID=3173>

#### 11.5.8 Nanotech a Major Example in New Book, Risk and Precaution

In his new book, *Risk and Precaution*, Prof. Alan Randall of Australia's Univ. of Sydney, uses nanotechnology as an example of a field in which his proposed framework for risk management should be applied. According to the author, his scheme, "...would combine elements of traditional risk management with a more precautionary approach, screening more innovations for risk, identifying real threats sooner, and allowing less-risky innovations to proceed. If we can quickly identify those cases where further testing is necessary, precaution could be less intrusive and costly while still providing substantial protection from harm."

#### **Military Implications:**

ES personnel concerned with risk assessment in any environmental field should review his framework for possible application in their work.

**Sources:**

The risky business of innovation: a new framework for risk management

<http://sydney.edu.au/news/84.html?newscategoryId=2&newsstoryid=6470>

The risky business of innovation: a new framework for risk management

<http://www.nanowerk.com/news/newsid=20385.php>

**11.5.9 NIOSH Requests Hazard and Risk Comments to Update Nanotech Strategic Plan**

NIOSH is seeking comments on the types of hazard identification and risk management research that it should consider in updating the NIOSH 2009 nanotechnology strategic plan. It would like to build on the accomplishments of ongoing research to develop strategic research goals and objectives through 2015. NIOSH identified ten critical research areas for the effort and five key goals; they are laid out in the Federal Register announcement. NIOSH requests comment on how research in these areas can be enhanced. Comments are due 15 April 2011.

**Military Implications:**

ES personnel involved with nanotechnology should consult the announcement for opportunities to provide applicable comments.

**Source:**

Request for Information: Update of NIOSH Nanotechnology Strategic Plan for Research and Guidance [Docket Number NIOSH 134-A]

<http://edocket.access.gpo.gov/2011/2011-5110.htm>

**11.5.10 Conferences to Discuss Current Nanotech Developments, Including Safety**

- A two-day symposium, Safety issues of Nanomaterials along their life cycle, will be held 4-5 May 2011 at LEITAT Technological Center, Barcelona. Sessions will include International, national and regional initiatives on Nanotechnology / Nanosafety; Synthesis, characterization and applications; Human health impact; Environmental impact; Risk assessment; and Life cycle assessment of Nanomaterials. <http://www.nanowerk.com/news/newsid=20638.php>
- EuroNanoForum 2011, to be held in Budapest, 30 May – 1 June 2011, will present updates on the latest developments in nanotechnology from over 70 leading research centers, information about industrial applications, and data on future R&D funding strategies from the European Commission and 14 other funding agencies. <http://www.leitat.org/nanoLCA/>
- Greener Nano 2011 (GN11) will be held at HP Headquarters in Cupertino, CA 1-3 May 2011, and, "...will address challenges and opportunities for nanotechnology and delineate how companies can incorporate green nanotechnology into its products and processes." <http://oregonstate.edu/conferences/event/greenernano/index.htm>
- The Univ. of Cincinnati NIOSH Education and Research Center (ERC) will sponsor a 10 May 2011, conference, Nanotechnology -- Health and Safety Considerations, at the Dept. of Environmental Health, Univ. of Cincinnati College of Medicine. <http://eh.uc.edu/erc/ERC-Nanotechnology-symposium.pdf>