



*Fourth International Dialogue
on Underwater Munitions*

October 1-3, 2012— San Juan, Puerto Rico

4

PROGRAM

Welcome to the **Fourth International Dialogue** on Underwater Munitions

I would like to take this opportunity to thank everyone for allocating time out of your busy schedule to attend the Fourth International Dialogue on Underwater Munitions (IDUM) in Jan Juan. After a successful third dialogue in Sopot, Poland we find ourselves meeting in San Juan, Puerto Rico where the islands of Vieques and Culebra experienced years of military live-fire exercises involving the air, land, and sea, by US and NATO led forces, including off-shore dumping activities.

One of IDUM's success stories for his year's event was to sponsor three Working Groups to bring together a cadre of 35 distinguished stakeholders and experts in science, technology, and policy to develop and present draft reports in advance of the main IDUM. These draft reports will be presented at IDUM and developed into a formal report that will be presented to the Secretary General of the United Nations in 2013 in support of the United Nations Resolution on Sea Dumped Munitions.

Thanks to generous participation by the international community at three previous IDUMs, there has been a paradigm shift in the collective risk assessment of underwater munitions. It is a shift away from viewing them solely as an energetic threat, to recognizing their threat potential as point source emitters of pollution. This view is supported by a growing body of evidence linking a higher incidence of cancer in people exposed to these materials; and that people all over the world are affected through contaminated fresh water and food supplies. We have learned that the technology to non-destructively remove these point sources, as well as the ability to conduct zero emissions disposal operations is available, and that by getting rid of the source you generally get rid of the problem; though sensitive ecosystems will need time to recover. For all these reasons it is imperative that we use this opportunity to refine the message that meaningful progress is not only possible, but economically viable, and find ways to share this message with policy makers, decision makers, and stakeholders alike.

Over the years toxins have and continue too leak from sea dumped munitions worldwide. Sea dumped munitions are a cause for concern whereas they are "point-source" emitters of pollutions – if you get rid of the source, you generally get rid of the problem, though in some cases the health impacts may be long-term, lasting longer than the elimination of the source. In some cases with the elimination of the source sensitive ecosystems may have an opportunity to re-build themselves

Contents

Welcome.....	1
UN Resolution	4
Keynote Speakers	6
Agenda	10
Floor Plan	18
Abstracts.....	20
Sponsors	36
ISAB Committee	40

over time, but only if the source is removed. These toxins impact worldwide on human health and environment and can continue to until they are removed and disposed of environmental friendly.

I wish each and every one great success at the IV IDUM.

Sincerely,



Terrance P. Long CPSM. SSM. CD.

Chairman, IDUM

Welcome to the Dialogue

When I came to the Second International Dialogue on Underwater Munitions held in Honolulu (Hawaii) two years ago I could never imagine that the next one will be organized in Poland . Then almost alone as a speaker I wanted to raise awareness about dumped chemical munitions in the Baltic waters, a far distant and almost unknown sea among the most of that Dialogue participants, and warn about the excessive investments planned on its bed. In my keynote address then I compared the Dialogue community as a loose one but devoted and having strong interest to be listened world-wide.

Last year, the Third Dialogue took place in Poland, I had a privilege to be a co-organizer of this event which gathered representatives of governmental and scientific institutions as well as engineering experts from all around the world. Poland is still proud of hosting it and feels fully committed to continue its engagement on the way forward.

Poland has special interest in the subject of underwater munitions and its impact of human health and marine environment of the Baltic Sea. It's our only sea and we are witnessing more and more intensive economic activities, including large investments in energy field and a fast-growing shipping industry exploiting bigger and bigger vessels, tankers included. Unfortunately, the Baltic Sea's waters were used for the disposal of between 13,000 and 50,000 metric tons of chemical munitions and yet unknown, but higher quantity of conventional munitions. Some experts believe the amounts of dumped munitions in the Baltic Sea are much higher than reported, including particularly conventional munitions that have gone unrecorded. Many conventional munitions such as bombs, rockets, artillery shells and sea mines remain from both world wars, and the dumping of munitions by the Allied Forces proceeding both wars. To complete the picture, may I add that dumping by the former Soviet Union and the EU countries continued up until the 1970s.

Participation in the Second IDUM in Hawaii inspired me to strengthen Polish and European actions related to dumped munitions. That's why I decided to benefit from a group of devoted experts from around the world forming practically the newly established International Scientific Advisory Board on Sea-dumped Chemical Weapons and program as well held the Third IDUM on the Polish Baltic coast. It went smoothly and contributed greatly to our common goal. As a matter of fact it concluded that scientific evidence and state-of-the-art technology are in place to take action and start removing the dumped munitions on the surface.

However, there are still a lot of efforts to do in order to further engage the international community and transform the Resolution into Law, or still differently the soft instrument into a harder one. And as I already said to put all chemical weapons on equal footing and open the existing Convention on Prohibition of Chemical Weapons on that part of them, which has been dumped on the bed of seas and oceans.

That's why the Fourth IDUM, here in San Juan – seems to me a crucial event as it could give us a

Fourth International Dialogue on Underwater Munitions

October

1-3

2012

Intercontinental San Juan Resort & Casino

WELCOME

I

perfect opportunity to be fully understood and listened and make a step forward e.g. prepare a concrete proposal on how to make working in practice the United Nations Resolution. On all playing grounds, political, legal, technical, economic and social. The latter means still more and more efforts to raise public awareness on the issue and have it at large on our side.

As other examples of acting at European level in this field I would like to mention the work of Helsinki Commission. The HELCOM is a regional organization responsible for the quality of the Baltic Sea Waters and its ecosystems and was formed by the 1974 Convention on the Protection of the Marine Environment of the Baltic Sea Area. HELCOM established an ad hoc Expert Group on dumped chemical munitions (HELCOM MUNI) in 2010 to review the existing information on dumped chemical munitions in the Baltic Sea. HELCOM MUNI is tasked with assembling knowledge about underwater munitions in the Baltic and developing conclusions and recommendations for dealing with them. Poland and Germany have invested a significant effort in conducting this expert group and fulfilling its mandate. Needless to say that it works with the existing HELCOM infrastructure. Sincerely, the HELCOM MUNI concept was inspired to a great extent by the results of the Second IDUM held in Hawaii. The final report of the HELCOM MUNI

will be soon available to the IDUM participants.

Poland is also leading the flagship project to “Assess the need to clean up chemical weapons” with the EU Strategy for the Baltic Sea Region. In order to fully harmonize the latter and not duplicate efforts, the work is being done at present under the HELCOM framework and the CHEMSEA project, which stands for “Chemical Munitions Search and Assess.” The aim of the CHEMSEA Project is to update existing information on chemical weapons dumped in the Baltic Sea and to develop additional recommendations on how to further proceed with them. Needless to say that the activities of HELCOM MUNI and that particular project are interrelated.

Let me finish my introduction by saying that we have now the chance to decide how we can put into action our convictions and our hopes to make the world free of dumped chemical munitions and ensure the better and safe future for all sea and ocean users. Again ‘THINK GLOBALLY and ACT LOCALLY’ becomes valid here in San Juan.

Sincerely,



Dr. Andrzej Jagusiewicz
Co-Chairman, IDUM

Registration and Information Desk

The Registration and Information Desk will be located in the Grand Foyer of the Intercontinental San Juan Resort & Casino. This desk will be open throughout the Dialogue if you should need directions or have any questions. If you have a personal or professional emergency during the Dialogue, please see our Registration Desk for special assistance.

The **Registration Desk** hours are:
Sunday, September 30 18:00 - 20:00
Monday, October 1 07:00 - 18:00
Tuesday, October 2 07:00 - 18:00
Wednesday, October 3.....07:00 - 18:00

Message Board

To promote networking during the Dialogue a message board is located near the registration/information desk. We encourage you to check the board daily for updates and messages.

Name Badges

Dialogue delegates must wear name badges for access to sessions and social functions. Should you misplace your name badge, please obtain a replacement badge at the registration desk.

Dress

Business casual dress is recommended for all Dialogue activities.

Business Center

High-speed internet access, computers, scanners, faxing, postal and office supplies as well as photocopying are some of the services and equipment available. User fees apply.

Concierge

Conveniently located next to the front desk, a multilingual and knowledgeable team at the Concierge Desk welcomes the opportunity to assist with reservations and provide local information on shopping, cultural activities, sightseeing, dining, entertainment and other interests.

Fourth International Dialogue on Underwater Munitions

October
1-3
2012

Intercontinental
San Juan Resort &
Casino

WELCOME

SEPTEMBER 30th

Plan to join us on Sunday evening for some early networking.

Evening Reception September 30 from 6:00 PM to 8:00 PM on the Board Walk

The International Dialogue on Underwater Munitions would like to take this opportunity to invite to an evening reception hosted by **VRHabilis LLC**



General Assembly

Distr.: Limited
24 November 2010

Original: English

Sixty-fifth session
Second Committee
Agenda item 20
Sustainable development

Austria, Azerbaijan, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Ecuador, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Monaco, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Somalia, Spain, Sweden, Ukraine and United Kingdom of Great Britain and Northern Ireland: revised draft resolution

Cooperative measures to assess and increase awareness of environmental effects related to waste originating from chemical munitions dumped at sea

The General Assembly,

Recalling the recommendations of the United Nations Conference on the Human Environment,¹ held in Stockholm in June 1972,

Noting relevant provisions of Agenda 21,² adopted at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, in June 1992 and reaffirmed in the Plan of Implementation of the World Summit on Sustainable Development (“Johannesburg Plan of Implementation”),³ adopted in Johannesburg, South Africa, in September 2002,

Recalling relevant international and regional instruments such as the United Nations Convention on the Law of the Sea,⁴ the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter,⁵ the Convention for the

¹ See Report of the United Nations Conference on the Human Environment, Stockholm, 5-16 June 1972 (A/CONF.48/14/Rev.1).

² Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution I, annex I.

³ Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002 (United Nations publication, Sales No. E.03 II.A. I and corrigendum), chap. I, resolution I, annex.

⁴ United Nations, Treaty Series, vol. 1833, No. 31363.5 Ibid., vol. 1046, No. 15749.

Protection of the Marine Environment of the North-East Atlantic,⁶ the Convention on the Protection of the Marine Environment of the Baltic Sea,⁷ the Cartagena Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region⁸ and the Lima Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific,⁹

Taking note of the final report of the ad hoc Working Group on Dumped Chemical Munitions to the sixteenth meeting of the Helsinki Commission, and noting that the Helsinki Commission, at its ministerial meeting held in Moscow from 18 to 20 May 2010, agreed to establish the Helsinki Commission Expert Group to update and review the existing information on dumped chemical munitions in the Baltic Sea,

Noting that Member States, international and regional organizations and civil society have undertaken activities to discuss the issues related to waste originating from chemical munitions dumped at sea and to promote international cooperation and exchange of experience and practical knowledge,

Noting also the concerns about the potential long-term environmental effects related to waste originating from chemical munitions dumped at sea, including their potential impact on human health,

1. Notes the importance of raising awareness of the environmental effects related to waste originating from chemical munitions dumped at sea;
2. Invites Member States and international and regional organizations to keep under observation the issue of the environmental effects related to waste originating from chemical munitions dumped at sea, to cooperate and voluntarily share relevant information on this issue;
3. Invites the Secretary-General to seek the views of Member States and relevant regional and international organizations on issues related to the environmental effects of waste originating from chemical munitions dumped at sea, as well as on possible modalities for international cooperation to assess and increase awareness on this issue and to circulate such views to the General Assembly at its sixty-eighth session for further consideration.

⁶ Official Journal of the European Communities, L 104.

⁷ United Nations, Treaty Series, vol. 2099, No. 36495.

⁸ *Ibid.*, vol. 1506, No. 25974.

⁹ *Ibid.*, vol. 1648, No. 28325.

Dialogue Chair

Terrance Long

Founder, Chairman of the Board of Director and Chief Executive Officer (CEO), International Dialogues on Underwater Munitions (IDUM).



Mr. Long's experience and diversity are key elements in the conception and development of the International Dialogues on Underwater Munitions (IDUM) on Sea Dumped Chemical and Conventional Munitions. The main goal of the IDUM is to create Public Awareness and Support for an International Treaty on all Classes of Munitions in a Marine Environment. Mr. Long is a recognized international expert for Munitions Response

Programs with more than thirty years' experience and is a retired Canadian Military Engineer who served in Canada, Asia, Africa and Europe specializing in Explosive Ordnance Disposal (EOD) and Demining. He completed ordnance programs at Canadian Forces School of Mechanical Engineering (CFSME); Canadian Forces School of Aerospace and Ordnance Engineering (CFSAOE); NATO Advance EOD program at the British Army School of Ammunition United Kingdom and Northern Ireland; Hazardous Materials Technician at Maritime Environmental Training Institute (METI); Advance Combat Intelligences and the Master's Program in Project Management at Saint Mary's University, Halifax, Nova Scotia. Mr. Long's service has included tours with the United Nations Peacekeeping Forces Middle East (UNEFME); Demining Instructor for the United Nations Offices and Commission on Afghanistan (UNHOCA);

Mr. Long received Appointments as: EOD Chief Canadian Forces Base (CFB) Toronto; United Nations Development Program (UNDP) as a Demining Expert; Scientific Committee, Polish Naval Academy, Marine Safety & Security and a member of the International Scientific Advisory Board (ISAB) on Sea Dumped Chemical Weapons (DCW). He appeared before Committees and Commissions to discuss the effects from underwater munitions on human health and the environment. They have included but not limited to: Canadian Senate Standing Committee on Fishery and Oceans; Canada-Nova Scotia Offshore Petroleum Board; Helsinki Commission (HELCOM) for protection of the Baltic Sea, OSPAR Commission for protection and conserving of the North-East Atlantic Ocean, Organization for the Prohibition of Chemical Weapons (OPCW), Chemical Weapons Convention (CWC) and a Key Note Speaker in Germany for Minimizing Risks for the Environment in Marine Ammunition Removal in the Baltic and North Sea (MIREMAR). Mr. Long appeared at the 2nd Committee in November 2010 in New York at the United Nations Second Committee on Sea Dumped Weapons, titled: Cooperative measures to assess and increase awareness

of environmental effects related to waste originating from Chemical Munitions Dumped at Sea to provide an overview of the strategic, economic, environmental, and social aspects of the Resolution on Sea Dumped Chemical Munitions.

Mr. Long is an Associated Partner for the Chemical munitions Search & Assess (CHEMSEA) project for the Baltic Sea Region.

Dialogue Co-Chair

Dr. Andrzej Jagusiewicz

Chief Inspector of Environmental Protection in Poland, Co-Chairman, International Dialogue on Underwater Munitions (IDUM)



PhD in environmental engineering, economist and global/EU negotiator. His mission is spreading the synergetic and ecosystem-based approach to achieve good environmental status in terrestrial and marine ecosystems.

A graduate of the Environmental Engineering Department at the Warsaw University of Technology (1964), Post-Graduate Foreign

Trade Studies at the Warsaw School of Commerce (1971) and the Summer School of Renewable Energy Sources at the University of PARIS VII (1974). In 1976 he earned a doctoral degree in atmospheric pollution forecasting at the Wroclaw University of Technology. He speaks fluently English, French and Russian.

For 40 years of his professional career he has held responsible positions in government administration, United Nations organs, scientific institutions, business, the Polish Parliament and non-governmental organizations.

A co-founder of the industry constructing dust control facilities in Poland and the Institute of Environmental Protection. Almost half of his life he has worked abroad, among others, for Electricite et Gaz de France in Paris, the company PRAT-DANIEL S.A. also in Paris and the United Nations Economic Commission for Europe in Geneva.

A Polish representative in various negotiating and political bodies in the United Nations and the European Commission, among others, the CAFE Steering Committee, the Air Quality Committee and the Advisory Council of the Global Monitoring for Environment and Security (GMES) program, HELCOM Convention, the Executive Body of the UNECE Convention on Long-Range Transboundary Air Pollution (also its Vice-Chair) and the first ever Polish Marine Director. Presently the Vice-Chair of the Bureau of the Management Board of the European Environmental Agency serving for the second 3-year term.

Moreover, an expert of the United Nations and the European Commission (TAIEX), a member of the Scientific Committee of the French periodical "Pollution Atmospherique" and a university lecturer. The member of the Scientific /Programming Committee of the French journal "Pollution atmospherique" and the Polish review "AURA".

Numerous publications on various aspects of environmental protection in the era of globalization and regionalization, including the European integration in UN publications and foreign, mostly French and English periodicals, including the Marine Technology Journal.

A co-author of the book in English "Cleaning the Air" published in November 2004 by the United Nations and a co-editor and co-author of the publication released by the Monitoring Library entitled "The 25 years of the UNECE Convention on Long-Range Transboundary Air Pollution" and The Indicative Report on the State of the Environment in Poland vis a vis the Community Background both in Polish and English. He does not belong to any political party. Married, the father of a son and two daughters.

Keynote Speakers



Honorable Katherine Hammack

Assistant Secretary of the Army (Installations, Energy & Environment)
Office of the Assistant Secretary of the Army
Washington, DC

Ms. Katherine Hammack was appointed as the Assistant Secretary of the Army for Installations, Energy and Environment (ASA IE&E) by President Obama on 28 June 2010. She is the primary advisor to the Secretary of the Army and Chief of Staff of the Army on all Army matters related to Installation policy, oversight and coordination of energy security and management. She is also responsible for policy and oversight of sustainability and environmental initiatives; resource management including design, military construction, operations and maintenance; base realignment and closure (BRAC); privatization of Army family housing,

lodging, real estate, utilities; and the Army's installations safety and occupational health programs.

Prior to her appointment, Ms. Hammack was a leader in Ernst & Young LLP's Climate Change and Sustainability Services practice. In that capacity she assisted clients with obtaining Leadership in Energy and Environmental Design (LEED) green building certification for their buildings and identification of sustainability strategies. She was the key LEED advisor to the largest LEED for new construction building in the world (8.3 million sq ft) which received LEED-NC Silver certification. She was also the key LEED advisor on the largest existing green building certification for building operation and maintenance (9.6 million sq ft) which received LEED-EB Gold level certification.

Ms. Hammack has over 30 years of experience in energy and sustainability advisory services. She has experience in the evaluation of energy conservation projects, including ventilation upgrades, air distribution, indoor air quality, lighting efficiency, cogeneration, sustainable design, solar energy and building operation.

Ms. Hammack has a bachelor's degree in mechanical engineering from Oregon State University and an M.B.A. from University of Hartford. She is a Certified Energy Manager, LEED Accredited Professional and a Certified Indoor Air Quality Manager. She has been an active member of ASHRAE, where she has been on the 90.1 Energy Efficiency Standard Committee and on the Standard 189 High Performance Green Buildings Standard Committee. Ms. Hammack is a founding member of U.S. Green Building Council in Washington, D.C.

Ambassador Vaidotas Verba



Ambassador of the Republic of Lithuania Permanent Representative to The Organization For Prohibition of Chemical Weapons (OPCW), The Netherlands.

Ambassador Verba will discuss his country's efforts with the establishment of the International Advisory Board on Dumped Munitions in The Hague and

Fourth International Dialogue on Underwater Munitions

October

1-3
2012

Intercontinental
San Juan Resort &
Casino

SPEAKERS

the recent United Nation's Resolution on Chemical Munitions Dumped at Sea, titled: Cooperative measures to assess and increase awareness of environmental effects related to waste originating from Chemical Munitions Dumped at Sea.

Ambassador Verba was born on September 26, 1966, in Raseiniai, Republic of Lithuania. Ambassador Verba is married and has one son, Norbertas. Ambassador Verba attended Vilnius University, Faculty of Law, MA. He also attended the University of Birmingham, Graduate School of Political Science and International Studies as well as Lithuanian Physical Education Academy. In 2007, Ambassador Verba was appointed the Ambassador of the the Republic of Lithuania to The Netherlands, Permanent representative to The Organization For Prohibition of Chemical Weapons, in The Hague. During 2004 until 2007, Ambassador Verba held the position of Director, Consular Department, Ministry of Foreign Affairs of The Republic of Lithuania. During 2003 until 2004, Ambassador Verba held the position of the Acting Director, Consular Department, MFA of The Republic of Lithuania. In 2003, Ambassador Verba held the position of the Deputy Director, Consular Department, MFA of The Republic of Lithuania and from 2000 to 2003, Ambassador Verba held the position of the Minister Counsellor, Lithuanian Embassy in Canada. In 1997-2003, Ambassador Verba held the position of Head, Consular Information and Analysis Division, Consular Department, MFA of The Republic of Lithuania. and 1994-1997, Ambassador Verba held the position of First Secretary, Visa Division, Consular Department. From 1990 until 1992, Ambassador Verba held the position of Senior Officer for Foreign Relations, Lithuanian Physical Education and Sport Department un the Government of the Republic of Lithuania. During 1988 until 1990, Ambassador Verba held the position of Scientific Fellow,

Working Group Chairs

Dr. Tobias Knobloch



Dr. rer. nat. Tobias Knobloch was born in Hanover, Germany, on March 26, 1982. He studied biology and life science at the Leibniz University of Hanover and earned his doctoral degree in 2010 in the field of organic chemistry, synthesizing novel bacterial antitumor agents by combining the flexibility of biosynthesis with methods from the toolbox of organic chemistry.

Dr. Knobloch currently works in the field of sea-dumped munitions at the German Federal Maritime and Hydrographic Agency (Bundesamt fuer Seeschifffahrt und Hydrographie – “a partner to maritime shipping and a supporter of environmental conservation efforts and maritime uses”). He is a member of the coordinating editorial board of the German national cross-administrative working group on munitions

in German marine waters and co-author of the study “Munitions in German Marine Water – Stocktaking and Recommendations (Effective 2011)”. In addition, he is co-author and co-developer of the continually growing lighthouse project www.underwatermunitions.de / www.munition-im-meer.de.

Dr. Knobloch leads the German delegation to the Baltic Marine Protection Commission's (Helsinki Commission – HELCOM) ad hoc Expert Group to update and review the existing information on dumped chemical munitions in the Baltic Sea (HELCOM MUNI). He is also co-author and -editor of the HELCOM MUNI outcome report currently under preparation.

Dr. Thomas Stock

DYNASAFE Germany GmbH



PhD in chemistry. Trained as analytical chemist with background in chemical toxicology. Since 1985 closed to questions of chemical disarmament and arms control. Between 1988 and 1996 Project Leader and Program Manager of the CBW Research Programme at SIPRI (Stockholm International Peace Research Institute). Work focussed on: chemical weapons, old and abandoned chemical weapons, destruction technologies, environmental aspects, waste disposal technologies, and verification techniques and technologies.

After 1996 in private industry in different positions, such as Project Leader and Sales Manager. Since 2002 with DYNASAFE, Swedish born company, as Sales Manager, Project Manager and now Managing Director of DYNASAFE Germany. Performing several CW related projects.

Expertise in: chemical warfare agents, old and abandoned chemical weapons, destruction of explosives, thermal off-gas treatment and other waste treatment processes, destruction technologies, analytical chemistry, toxicology, arms control and disarmament, chemical disarmament and project management.

Published extensively on CW destruction, OCW and ACW, chemical disarmament and technology aspects.

Paul F. Walker

Green Cross International (GCI)



Paul Walker is the International Director of the Environmental Security and Sustainability (ESS) Program for Green Cross International (GCI) and manages the Washington DC office for GCI and its US national affiliate, Global Green USA.

The ESS Program, formerly known as the “Legacy of the Cold War Program,” is an international effort to facilitate and advocate the safe and sound demilitarization, nonproliferation, and remediation of nuclear, chemical, biological, and conventional weapons stockpiles.

Walker is a former Professional Staff Member of the Armed Services Committee in the U.S. House of Representatives where he served as a senior advisor to the Chairman and full committee. Walker holds a Ph.D. in security studies from the Massachusetts Institute of Technology; an M.A. from Johns Hopkins School for Advanced International Studies; a Russian Honors Certificate from the Defense Language Institute of the West Coast; and a Post-Doctoral Fellowship from the Center for Science and International Affairs at Harvard University. He is also a Vietnam-era U.S. Army veteran.

Walker has worked, spoken, and published widely in the areas of international security, threat reduction, non-proliferation, and weapons demilitarization for over three decades and took part in the first on-site inspection by US officials of the Russian chemical weapons stockpile at Shchuch’ye in the Kurgan Oblast in 1994. Since that time he has worked closely with the Organization for the Prohibition of Chemical Weapons (OPCW), US and Russian officials, the Cooperative Threat Reduction (CTR) Program, the G-8 Global Partnership, and other multilateral regimes to help foster cooperative, timely, and safe elimination of nuclear, chemical, and biological weapons and related systems. He has helped to permanently eliminate over 50,000 tons of chemical weapons and millions of munitions in six countries to date.

In December 2009 at the 14th Conference of the States Parties in The Hague he led the effort to establish the CWC Coalition, an international

NGO network to support the Chemical Weapons Convention and OPCW. He is also a founding member of the Fissile Material Working Group (FMWG) which supported the 2010 and 2012 Nuclear Security Summits in Washington DC and Seoul, South Korea. Recent articles include “Strengthening the OPCW” in OPCW Today (April 2012), “Abolishing Chemical Weapons: Progress, Challenges, and Opportunities,” in Arms Control Today (November 2010) (see <http://www.armscontrol.org/epublish/1/v40n9>); and “The legacy of Reykjavik and the future of nuclear disarmament,” (with Jonathan Hunt) in the Bulletin of the Atomic Scientists (December 2011) (see <http://www.thebulletin.org/web-edition/features/the-legacy-of-reykjavik-and-the-future-of-nuclear-disarmament>).

Dipl.-Ing. (FH) Claus Böttcher



Claus Böttcher was born in Hamburg, Germany, on April 26, 1968. He studied Forest Engineering at the University of Applied Science at Göttingen. From 1990 to 2007 he was engaged in different professional activities with the State Forest

Administration.

Since 2008 Mr. Boettcher works in the field of sea-dumped munitions, e.g. mitigation strategies to sea mammals during blasting operations and related aspects of public relations. He serves as managing director of the German national cross-administrative working group on munitions in German marine waters and as co-author of the study “Munitions in German Marine Water – Stocktaking and Recommendations (Effective 2011)”. In addition, he is co-author and co-developer of the continually growing lighthouse project www.underwatermunitions.de / www.munition-im-meer.de.

Mr. Böttcher is member of the German delegation to the Baltic Marine Protection Commission’s (Helsinki Commission – HELCOM) ad hoc Expert Group to update and review the existing information on dumped chemical munitions in the Baltic Sea (HELCOM MUNI). He is also contributes to the HELCOM MUNI outcome report currently under preparation.

Fourth International Dialogue on Underwater Munitions

October

1-3

2012

Intercontinental San Juan Resort & Casino

SPEAKERS

On **Sunday, September 30, 2012***

TIME	ACTIVITY	
5:30 PM to 6:30 PM	REGISTRATION NOTE: VISA cannot be processed on site for registration, VISA Checks welcomed	Board Walk
6:00 PM to 8:00 PM	EVENING RECEPTION Sponsored by: VRHABILIS	

DAY I: **Monday, October 1, 2012***

TIME	ACTIVITY	
7:00 AM to 9:00 AM	Registration & Networking (Dress Business Casual) IDUM Secretary: Ms. Anna Sosnowska, Specialist, Chief Inspectorate of Environmental Protection, Poland	Grand Foyer
9:00 AM to 10:15AM	OPENING CEREMONIES [Grand Ballroom] Moderator: Mr. Jean Pierre Savelkoels, aDeDe, Antwerp, Belgium Welcoming Remarks from Secretary of State Honorable Kenneth McClintock Hernández Secretary of State for Puerto Rico Chairmen's Opening Remarks Mr. Terrance P. Long, Chairman, IDUM Co-Chairmen's Opening Remarks Dr. Andrzej Jagusiewicz, Chief Inspector of Environmental Protection, Poland & Polish Head of Delegation to Helsinki Commission Welcoming Remarks from the Government of Lithuania AMBASSADOR VAIDOTAS VERBA Ambassador of the Republic of Lithuania Permanent Representative to The Organization For Prohibition of Chemical Weapons (OPCW), The Netherlands. Speaker, President of the College of Physicians and Surgeons of Puerto Rico Dr. Eduardo Ibarra Ortege Speaker, Resident of Vieques Mrs. Myrna Pagan Keynote Address HONORABLE KATHERINE HAMMACK Assistant Secretary of the Army (Installations; Energy & Environment) Office of the Assistant Secretary of the Army Washington, DC	Grand Ballroom
10:15 AM to 10:30 AM	Break & Networking	

ALL SESSIONS WILL BE HELD IN GRAND BALLROOM AND ATLANTIC BALLOOM.

TIME	ACTIVITY	
10:30 AM to 12:00 PM	<p>PLENARY SESSION I CHAIR: Dr.Thomas Stock, ISAB</p> <p>COUNTRY & REGIONAL REPORTS <i>Research Effort to Locate Military Munitions Disposal Sites World Wide,</i> Mr. Rick Stauber, Training Department, Developer/ EOD SME, NCI Information Systems, Inc., Contractor Supporting, EOD Directorate, Ft. Lee, VA</p> <p><i>CMW and UXO Ocean Dumpsites, Gulf of Mexico,</i> Dr. William R Bryant, Department of Oceanography, Texas A&M University, College Station</p> <p><i>Project Underwater munitions, Government of the Federal State of Schleswig-Holstein, GERMANY, Munitions in German Marine Waters – moving forwards requires acting in concert,</i> Dipl.-Ing. (FH) Claus Boettcher</p> <p><i>Preliminary Investigation of Contamination From Underwater Munitions in Norway.</i> Helle K Rossland, Norwegian Defence Research Establishment (FFI)</p>	Grand Ballroom
12:00 PM to 1:00 PM	<p>LUNCH Moderator: Tom Rancich, VRHABILIS</p> <p>KEYNOTE SPEAKERS Dr. Tobias Knobloch, Federal Maritime and Hydrographic Agency, Germany, M.Sc. Life Science, German representative to Ad Hoc Working Group on Chemical Weapons in the Baltic Sea of the Helsinki Commission (HELCOM MUNI)</p> <p>Dr. James W. Porter, Meigs Professor of Ecology Odum School of Ecology, University of Georgia, Athens, GA <i>Human and Environmental Health Issues Associated with UWUXO on Vieques.</i></p>	Caribbean Ballroom
1:00 PM to 2:00 PM	<p>PLENARY SESSION 2</p> <p>WORKING GROUPS DRAFT REPORTS CHAIR: Mr. Terrance P. Long, Chairman, IDUM</p> <p>SCIENCE WORKING GROUP CHAIR: Dr. Paul Walker, Global Green, USA and Co-CHAIR: Dr. Tobias Knobloch, Federal Maritime and Hydrographic Agency, Germany, M.Sc. Life Science, German representative to Ad Hoc Working Group on Chemical Weapons in the Baltic Sea of the Helsinki Commission (HELCOM MUNI)</p>	Grand Ballroom

Fourth International Dialogue on Underwater Munitions

October
1-3
2012

Intercontinental San Juan Resort & Casino

AGENDA

TIME	ACTIVITY	
	<p>POLICY WORKING GROUP CHAIR: Ms. Malgorzata Ochorok-Jedynak, Senior Specialist, Chief Inspectorate of Environmental Protection, Poland and Co-CHAIR: Dipl.-Ing. (FH) Claus Boettcher, Government of the Federal State of Schleswig-Holstein, GERMANY</p> <p>TECHNOLOGY AND POTENTIAL RESPONSES WORKING GROUPS CHAIR: Gary Willmore, President, WaveCrest Offshore Solutions Inc., USA, and Director IDUM, USA and Co-CHAIR: Dr. Thomas Stock, Dynasafe & ISAB, The Hague</p>	
2:00 PM to 3:15 PM	<p>PLENARY SESSION 3 CHAIR: Dr. Thomas Stock, Dysafe, ISAB, The Hague</p> <p><i>Effects of Military Activities and Environmental Contamination on the Island of Sardinia</i>, Helen Jaccard, Veterans For Peace</p> <p><i>Military Munitions Policy and US Environmental Law</i>, Steven B. Pollack, Attorney, IL, USA</p> <p><i>US Policy Relating Munitions in the Underwater Environment</i>, J. C. King, COL (R) US Army, Director for Munitions and Chemical Matters ODASA (ESOH) Pentagon</p>	Grand Ballroom
3:15 PM to 3:30 PM	Break & Networking	
3:30 PM to 4:45 PM	<p><i>Overview of the Vieques Restoration Program to Address Underwater Munitions</i>, Dan W. Waddill, PE, PhD, Vieques Restoration Branch Head, Naval Facilities Engineering Command, NAVFAC Atlantic</p> <p><i>Operations Office Integrating Endangered Species Concerns in the Analysis of Underwater Munitions Site Clean Up Priorities</i>, Dr. Lisamarie Carrubba, NOAA/National Marine Fisheries Service, Caribbean Field Office, Protected Resources Division</p> <p><i>NOAA's Projects on Vieques Island, Puerto Rico</i>, Diane E. Wehner, NOAA Office of Response and Restoration</p> <p><i>The fishy and untold stories of bomb-cratered coral reefs in the forgotten Culebra Island, Puerto Rico: From social injustice and massive destruction, to community-based ecological rehabilitation</i>, Edwin A. Hernández-Delgado, Julio Oms- Hernández, Mary Ann Lucking, & Samuel E. Suleimán-Ramos. University of Puerto Rico, Center for Applied Tropical Ecology and Conservation, Coral Reef Research Group</p>	Grand Ballroom

ALL SESSIONS WILL BE HELD IN GRAND BALLROOM AND ATLANTIC BALLROOM.

4:45 PM to 6:00 PM	<p>PLENARY SESSION 4 - Grand Ballroom CHAIR: Terrance Long</p> <p>Panel Discussion: <i>Puerto Rico and the Caribbean Islands - An Opportunity to Consider Remediation Based On Human Health and Environmental Concerns</i></p> <p>Dr. James Porter, Meigs Professor of Ecology, Odum School of Ecology</p> <p>Paul F.Walker, Ph.D., Global Green, USA, ISAB, The Hague</p> <p>Helen Jaccard, Veterans For Peace</p> <p>Mary Ann Lucking, University of Puerto Rico, Center for Applied Tropical Ecology and Conservation, Coral Reef Research Group (TBC)</p> <p>Dan W.Waddill, PE, PhD, Vieques Restoration Branch Head, Naval Facilities Engineering Command, NAVFAC Atlantic (TBC)</p> <p>Diane E. Wehner, NOAA Office of Response and Restoration, NOAA's Projects on Vieques Island, Puerto Rico</p> <p>Edwin A. Hernández-Delgado, University of Puerto Rico, Center for Applied Tropical Ecology and Conservation, Coral Reef Research Group (TBC)</p> <p>Additional panelists to be announced</p>
--------------------	--

Fourth International Dialogue on Underwater Munitions

October
1-3
2012

Intercontinental
San Juan Resort & Casino

Tuesday, October 2, 2012*

TIME	ACTIVITY	
7:00 AM to 8:00 AM	Networking (Dress Business Casual)	Grand Foyer
8:00 AM to 10:00 AM	SESSION I - BREAKOUT	
	Grand Ballroom	Atlantic Ballroom
	<p>CHAIR: Diane E. Wehner, NOAA Office of Response and Restoration NOAA's Projects on Vieques Island, Puerto Rico</p> <p><i>Technologies and Operations for Detection and Removal of Underwater Munitions</i>, Martin Miele, PGp, PG, Principial Geophysicist, Arcadis US Inc.</p> <p><i>Towed Electromagnetic Array (TEMA) for Underwater MEC/UXO Detection – Seeing to New Depths</i>, Richard Funk, Ryan Cross, Burr Bridge, Robert J. Feldpausch Tetra Tech EC, Inc., Bothell, WA</p>	<p>CHAIR: Dr. Joseph K Asahina, Chief of Technology, Nuclear and CWD division, Kobe Steel, Japan</p> <p><i>CWC First 15 Years – Sea Dumped Chemical Weapons – Achievements and Future Perspectives</i>, Dr. Thomas Stock, Dynasafe, Germany.</p> <p><i>The future of US and International Policy on Defense Waste in a Marine Environment</i>, James Barton, Underwater Ordnance Recovery</p>

AGENDA

TIME	ACTIVITY	
	<p>Grand Ballroom</p> <p><i>Data Fuzing of Technology in Autonomous Underwater Vehicles for Underwater Munitions Detection</i>, Terrance P. Long, President, Wentworth Environmental Inc, Thomas deWilde, Geophysicist, aDede</p>	<p>Atlantic Ballroom</p> <p><i>Ocean-Dumped Chemical Weapons: History, Challenges, and Prospects</i>, Stanislaw Witek, Ph.D. Chairman, Paul F.Walker, Ph.D., Co-Chairman, International Scientific Advisory Board on Sea-Dumped Munitions</p>
10:00 AM to 10:30 AM	Break & Networking	
10:30 AM to 12:00 PM	SESSION 2 - BREAKOUT	
	<p>Grand Ballroom</p> <p>CHAIR: Dipl.-Ing. (FH) Claus Bottcher Government of the Federal State of Schleswig-Holstein, GERMANY</p> <p><i>Types, Mechanisms, and Processes Related to Using Waterjet Technology for the Demilitarization of Underwater Conventional and Chemical Munitions</i>, Paul L. Miller, Director, Advanced Technology Systems, Gradient Technology</p> <p><i>Technical, Natural Resource, and Public Use Challenges with Addressing Underwater Munitions at the Former Mullet Key Bombing and Gunnery Range, Pinellas County, Florida</i> , Mr. Frank Araico, USACE - Jacksonville District, Ms. Rebecca Terry, USACE - Huntsville Center, and Ms. Susan Burtnett, ARCADIS US, Inc. / PIKA-Pirnie JV, LLC</p> <p><i>Investigative Challenges of Underwater Sites at Culebra, PR</i></p>	<p>Atlantic Ballroom</p> <p>CHAIR: Steve Stacy, PG, Senior Geophysicist, ARCADIS, Malcolm Pirnie</p> <p><i>Historical Research as an Instrument in the Recovery of Underwater Munitions</i>, Tim De Craene, aDeDe, Belgium</p> <p><i>Pipeline System and the Successful Management of the Munitions Risk</i>, Mr. Simon Bonnell, Project Manager, Task Force Manager Finland, Nord Stream</p> <p><i>Project Impacts Resulting From Sensitive Environments and Ecosystems: A Case Study From the Chesapeake Bay, United States</i>, Larry S. Jordan Jr.</p>
12:00 PM to 1:00 PM	<p>LUNCH</p> <p>Moderator: Paul Miller, Gradient Technology</p> <p>LUNCH SPEAKER</p> <p>Dr. Andrzej Jagusiewicz, Chief Inspector of Environmental Protection, Poland & Polish Head of Delegation to Helsinki Commission</p>	Caribbean Ballroom

ALL SESSIONS WILL BE HELD IN GRAND BALLROOM AND ATLANTIC BALLROOM.

Fourth International Dialogue on Underwater Munitions

October
1-3
2012

Intercontinental San Juan Resort & Casino

TIME	ACTIVITY					
1:00 PM to 3:00 PM	<p align="center">SESSION 3 - BREAKOUT</p> <table border="1"> <thead> <tr> <th data-bbox="402 210 820 252">Grand Ballroom</th> <th data-bbox="820 210 1201 252">Atlantic Ballroom</th> </tr> </thead> <tbody> <tr> <td data-bbox="402 252 820 1039"> <p>CHAIR: Geoff Carton, CALIBRE Systems</p> <p><i>A report on recent underwater remedial actions performed in Military Munitions Response Program, U.S. Army Corps of Engineers.</i></p> <p><i>Sea-Disposed Munitions: A Practical Solution to Reduce the Risk of Exposure in Varied Environments</i>, Bunch, B.W.^a, Bailey, S.E.^a, Ruiz, C.E.^a, Chapman, R.S.^a, Sheehan, P.L.^b, Martin, W.A.^a, ^a USACE, Engineer Research and Development Center, Vicksburg, ^b US Army Armament Research, Development, and Engineering Center, Picatinny, NJ</p> <p><i>An Intergovernmental Perspective on Chemical Munitions Dumped in the Baltic Sea</i>, HELCOM MUNI</p> </td> <td data-bbox="820 252 1201 1039"> <p>CHAIR: Mark Huller, Sr. Marketing Manager, Battelle</p> <p><i>Overview of the Aquatic Ecotoxicology of the Explosives</i>, Guilherme Lotufo (Presenter), US Army Engineer Research and Development Center</p> <p><i>Development of Human Health and Ecological Risk Based Screening Levels for Conventional Munitions Compounds in Marine Sediments and Biological Tissue Samples</i>, Harry D. Craig, U.S. Environmental Protection Agency Region 10, Oregon</p> <p><i>Safe Destruction of Sea Dumped Munitions on Recovering Site</i>, Dr. Joseph K Asahina, Chief of Technology, Nuclear and CWD division, Kobe Steel, Japan</p> </td> </tr> </tbody> </table>		Grand Ballroom	Atlantic Ballroom	<p>CHAIR: Geoff Carton, CALIBRE Systems</p> <p><i>A report on recent underwater remedial actions performed in Military Munitions Response Program, U.S. Army Corps of Engineers.</i></p> <p><i>Sea-Disposed Munitions: A Practical Solution to Reduce the Risk of Exposure in Varied Environments</i>, Bunch, B.W.^a, Bailey, S.E.^a, Ruiz, C.E.^a, Chapman, R.S.^a, Sheehan, P.L.^b, Martin, W.A.^a, ^a USACE, Engineer Research and Development Center, Vicksburg, ^b US Army Armament Research, Development, and Engineering Center, Picatinny, NJ</p> <p><i>An Intergovernmental Perspective on Chemical Munitions Dumped in the Baltic Sea</i>, HELCOM MUNI</p>	<p>CHAIR: Mark Huller, Sr. Marketing Manager, Battelle</p> <p><i>Overview of the Aquatic Ecotoxicology of the Explosives</i>, Guilherme Lotufo (Presenter), US Army Engineer Research and Development Center</p> <p><i>Development of Human Health and Ecological Risk Based Screening Levels for Conventional Munitions Compounds in Marine Sediments and Biological Tissue Samples</i>, Harry D. Craig, U.S. Environmental Protection Agency Region 10, Oregon</p> <p><i>Safe Destruction of Sea Dumped Munitions on Recovering Site</i>, Dr. Joseph K Asahina, Chief of Technology, Nuclear and CWD division, Kobe Steel, Japan</p>
Grand Ballroom	Atlantic Ballroom					
<p>CHAIR: Geoff Carton, CALIBRE Systems</p> <p><i>A report on recent underwater remedial actions performed in Military Munitions Response Program, U.S. Army Corps of Engineers.</i></p> <p><i>Sea-Disposed Munitions: A Practical Solution to Reduce the Risk of Exposure in Varied Environments</i>, Bunch, B.W.^a, Bailey, S.E.^a, Ruiz, C.E.^a, Chapman, R.S.^a, Sheehan, P.L.^b, Martin, W.A.^a, ^a USACE, Engineer Research and Development Center, Vicksburg, ^b US Army Armament Research, Development, and Engineering Center, Picatinny, NJ</p> <p><i>An Intergovernmental Perspective on Chemical Munitions Dumped in the Baltic Sea</i>, HELCOM MUNI</p>	<p>CHAIR: Mark Huller, Sr. Marketing Manager, Battelle</p> <p><i>Overview of the Aquatic Ecotoxicology of the Explosives</i>, Guilherme Lotufo (Presenter), US Army Engineer Research and Development Center</p> <p><i>Development of Human Health and Ecological Risk Based Screening Levels for Conventional Munitions Compounds in Marine Sediments and Biological Tissue Samples</i>, Harry D. Craig, U.S. Environmental Protection Agency Region 10, Oregon</p> <p><i>Safe Destruction of Sea Dumped Munitions on Recovering Site</i>, Dr. Joseph K Asahina, Chief of Technology, Nuclear and CWD division, Kobe Steel, Japan</p>					
3:00 PM to 3:30 PM	Break & Networking					
3:30 PM to 5:00 PM	<p align="center">SESSION 4 - BREAKOUT</p> <table border="1"> <thead> <tr> <th data-bbox="402 1165 820 1207">Grand Ballroom</th> <th data-bbox="820 1165 1201 1207">Atlantic Ballroom</th> </tr> </thead> <tbody> <tr> <td data-bbox="402 1207 820 1953"> <p>CHAIR: Bart Van der Speeten, Vice President, IDUM Europe</p> <p><i>Recent US Work Relating to Munitions in the Underwater Environment</i>, Geoff Carton, CALIBRE Systems</p> <p><i>Chemical Munitions Risk Assessment – a Complex Approach</i>, Jacek Bełdowski, CHEMSEA</p> <p><i>Planning and organizing an underwater UXO Clearance operations with divers in an inshore and offshore environment</i>, Arthur Hollmann, Director Bluestream UXO Clearance, The Netherlands</p> </td> <td data-bbox="820 1207 1201 1953"> <p>CHAIR: John Herbert, SAIC</p> <p><i>Development of a Blast Barge System for the Disposal of Underwater Unexploded Ordnances</i>, Timothy W. Shelton, John Q. Ehr Gott, Jr., and Ramon J. Moral U.S. Army Engineer Research and Development Center</p> <p><i>Static Detonation Chamber Technology – application for chemical weapons destruction</i>, Dr. Thomas Stock, Sales Manager, Dynasafe Germany GmbH</p> <p><i>Effective Offshore UXO Risk Mitigation – The complete solution</i>, Kevin Kneebone C Dir, BACTEC</p> </td> </tr> </tbody> </table>		Grand Ballroom	Atlantic Ballroom	<p>CHAIR: Bart Van der Speeten, Vice President, IDUM Europe</p> <p><i>Recent US Work Relating to Munitions in the Underwater Environment</i>, Geoff Carton, CALIBRE Systems</p> <p><i>Chemical Munitions Risk Assessment – a Complex Approach</i>, Jacek Bełdowski, CHEMSEA</p> <p><i>Planning and organizing an underwater UXO Clearance operations with divers in an inshore and offshore environment</i>, Arthur Hollmann, Director Bluestream UXO Clearance, The Netherlands</p>	<p>CHAIR: John Herbert, SAIC</p> <p><i>Development of a Blast Barge System for the Disposal of Underwater Unexploded Ordnances</i>, Timothy W. Shelton, John Q. Ehr Gott, Jr., and Ramon J. Moral U.S. Army Engineer Research and Development Center</p> <p><i>Static Detonation Chamber Technology – application for chemical weapons destruction</i>, Dr. Thomas Stock, Sales Manager, Dynasafe Germany GmbH</p> <p><i>Effective Offshore UXO Risk Mitigation – The complete solution</i>, Kevin Kneebone C Dir, BACTEC</p>
Grand Ballroom	Atlantic Ballroom					
<p>CHAIR: Bart Van der Speeten, Vice President, IDUM Europe</p> <p><i>Recent US Work Relating to Munitions in the Underwater Environment</i>, Geoff Carton, CALIBRE Systems</p> <p><i>Chemical Munitions Risk Assessment – a Complex Approach</i>, Jacek Bełdowski, CHEMSEA</p> <p><i>Planning and organizing an underwater UXO Clearance operations with divers in an inshore and offshore environment</i>, Arthur Hollmann, Director Bluestream UXO Clearance, The Netherlands</p>	<p>CHAIR: John Herbert, SAIC</p> <p><i>Development of a Blast Barge System for the Disposal of Underwater Unexploded Ordnances</i>, Timothy W. Shelton, John Q. Ehr Gott, Jr., and Ramon J. Moral U.S. Army Engineer Research and Development Center</p> <p><i>Static Detonation Chamber Technology – application for chemical weapons destruction</i>, Dr. Thomas Stock, Sales Manager, Dynasafe Germany GmbH</p> <p><i>Effective Offshore UXO Risk Mitigation – The complete solution</i>, Kevin Kneebone C Dir, BACTEC</p>					

AGENDA

5:00 PM to 7:00 PM	Evening Reception
--------------------	-------------------

DAY 3: **Wednesday, October 3, 2012***

TIME	ACTIVITY	
7:00 AM to 8:00 AM	Networking (Dress Business Casual)	Grand Foyer
8:00 AM to 8:30 AM	SESSION 5 - BREAKOUT	
	Grand Ballroom	Atlantic Ballroom
	<p>CHAIR: Bart Van der Speeten, Vice President, IDUM Europe</p> <p><i>Hawaii Undersea Military Munitions Assessment (HUMMA): Overview of Past and Future Programs</i></p>	<p>CHAIR: John Herbert, SAIC</p> <p><i>NOAA's Ordnance Reef Coral Assessment and Mitigation Project, Diane E. Wehner, NOAA Office of Response and Restoration</i></p> <p><i>Opportunities and Challenges for using underwater images mosaics to map and monitor underwater munitions</i></p>
8:30 AM to 10:00 AM	<p>OPEN PANEL DISCUSSION Moderator: Mr. Terrance P. Long, Chairman IDUM</p> <p>Panel J. C. King, COL (R) US Army, Assistant for Munitions and Chemical Matters, ODASA(ESOH)</p> <p>Dr. Thomas Stock, International Science Advisory Board (ISAB)</p> <p>Dr. Tobias Knobloch, Federal Maritime and Hydrographic Agency, Germany, M.Sc. Life Science, German representative to Ad Hoc Working Group on Chemical Weapons in the Baltic Sea of the Helsinki Commission (HELCOM MUNI)</p> <p>Mary Ann Lucking, University of Puerto Rico, Center for Applied Tropical Ecology and Conservation, Coral Reef Research Group (TBC)</p> <p>Dr. Andrzej Jagusiewicz, Chief Inspector of Environmental Protection, Poland & Polish Head of Delegation to Helsinki</p> <p>Mr. Simon Bonnell, Project Manager, Task Force Manager Finland, Nord Stream</p> <p>Bart van der Speeten, President, aDeDe, Antwerp, Belgium, & Vice President of Operations, Europe (EU), IDUM</p>	Grand Ballroom
10:00 AM to 10:30 AM	Break and Networking	

ALL SESSIONS WILL BE HELD IN GRAND BALLROOM AND ATLANTIC BALLROOM.

TIME	ACTIVITY	
10:30 AM to 12:00 PM	<p>CLOSING RECEPTION & CEREMONIES Moderator: Bart van der Speeten, President, aDeDe, Antwerp, Belgium, & Vice President of Operations, Europe (EU), IDUM</p> <p>THE WAY FORWARD Mr. Terrance P. Long CPSM. SSM. CD, Chairman IDUM</p> <p>Closing Keynote Address Dr. Andrzej Jagusiewicz, Chief Inspector of Environmental Protection, Poland & Polish Head of Delegation to Helsinki Commission</p>	Grand Ballroom
12:00 PM to 1:00 PM	Light Lunch and Networking (TBC)	Board Walk
1:00 PM	Fourth IDUM END	

Fourth International Dialogue on Underwater Munitions

October

1-3

2012

Intercontinental San Juan Resort & Casino

Note: The order of presentation of papers is subject to change.

Posters

1. *Corrosion Evaluation of Underwater Military Munitions*, Shengxi Li, Jeffrey Nelson, Ryan Sugamoto, L.H. Hihara, Hawaii Corrosion Laboratory, University of Hawaii, Manoa, Honolulu, HI, R. George, B. Wild, Environmental Sciences, SPAWAR Systems Center Pacific, San Diego, CA

2. *Modeling Munitions Constituents in Aquatic Environments*, P-F. Wang¹, Q. Liao², R. George¹, B. Wild¹, ¹SPAWAR Systems Center Pacific, Environmental Sciences, San Diego CA and ²University of Wisconsin, Milwaukee, WI

3. *Munitions Constituent Properties, Fate, and Transformation Studies*, R. George¹, G. Rosen¹, G. Lotufo², M. Chappel², B. Wild¹, ¹SPAWAR Systems Center Pacific, Environmental Sciences, San Diego CA and ²US Army Corps of Engineers, Environmental Research and Development Center, Vicksburg MS

4. *NGOs: AVOID HEX ON THE BEACH and other munitions constituents*, I. Ludwichowski, Nature and Biodiversity Conservation Union, Neumünster and Berlin/Germany, K. Detloff¹ Nature and Biodiversity Conservation Union, Neumünster and Berlin/Germany, P. Deimer, Society for the Conservation of Marine Mammals, Germany, H.-J. Schütte, Society for the Conservation of Marine Mammals, Germany, U. Karlowski, Dolphin Conservation Society, Munich/Germany, S. Koschinski, Marine Zoology, Nehnten/Germany

AGENDA

Ocean-Dumped Chemical Weapons: History, Challenges, and Prospects

Stanislaw Witek, Ph.D. Chairman and Paul F. Walker, Ph.D. Co-Chairman, International Scientific Advisory Board on Sea-Dumped Munitions

Over the past warring century all major powers dumped hundreds of thousands of tons of conventional and chemical munitions in every ocean of the world (with perhaps the exception of the Antarctic). This was the accepted method for cost-efficient and safe stockpile disposal, with little thought given to the potential long-term public health and environmental consequences. Included are an estimated 300,000 tons of chemical and biological agents dumped until the mid-1960s, with over 29,000 tons still remaining in US Atlantic and Pacific coastal waters, 40,000 tons in the Baltic, 21,000 tons off Australian shores, 6,600 tons along Japan's coastline, and many other unknown sites.

This enduring, dangerous legacy of the World Wars, out of sight and mind for many decades, has begun appearing on beaches, in fishermen's nets, and on land in many places around the globe in the last twenty years – the Baltic, Hawaii, East Coast of the US, Black Sea, Japan, Mediterranean, and elsewhere. Danish fishermen, for example, have reported hundreds of cases of old chemical munitions being caught in fishing nets since the mid-1980s. A US fishing vessel was recently quarantined off the New England coast after a mustard agent weapon contaminated the boat and injured the crew.

This paper will review some of this most recent history, illustrating the prevalence and danger of sea-dumped munitions. It will review steps taken to date, including the establishment of an International Scientific Advisory Board (ISAB) by the Lithuanian Foreign Ministry, to begin to better understand and address this problem. It will note the importance of the December 2010 United Nations resolution on sea-dumped munitions. And will conclude with policy recommendations for more aggressively evaluating and tackling this growing threat to public health and the environment on a regional and global scale.

First 15 Years Chemical Weapons Convention and sea-dumped CW - achievements and future perspectives

Dr Thomas Stock, DYNASAFE Germany GmbH

The Convention on the Prohibition of the Development, Stockpiling and Use of Chemical Weapons and on Their Destruction (Chemical Weapons Convention, CWC) entered into force in 1997. The main focus of CWC under the disarmament component is on the safe and secure destruction of all existing chemical weapons stockpiles as well as abandoned and old chemical weapons (ACW/OCW). In addition, the convention regime contains a mechanism for verification of all these destruction activities.

Any recovery or remediation of sea-dumped CWC will also have to take into consideration the provisions of the CWC. As the CWC was focussed mainly on existing stockpiles of CW

on land, the CWC does not require the recovery CW dumped in territorial waters if the dumping occurred prior to 1 January 1985. However, any CW that is recovered (either from land or water) must not be re-disposed of through dumping, burial or open-pit burning and its recovery and disposal should be reported to the Organisation for the Prohibition of Chemical Weapons (OPCW), based in The Hague.

The presentation will review the existing obligations under the CWC for sea-dumped CW and the relevant practise from the last 15 years after the convention entered into force. In addition, in the light of the forthcoming CWC Review Conference a discussion of possible improvements as well "new perspectives" will be performed under the aspect that the CWC is besides the disarmament component also focussing on enhancing security as co-operation and assistance among the treaty States Parties. Hereby the experience so far achieved in dealing with OCW will be technically evaluated against possible application for future application on sea-dumped CW.

Safe Destruction of Sea Dumped Munitions on Recovering Site.

Dr. Joseph K Asahina, Chief of Technology, Nuclear and CWD division, Kobe Steel

Recovering of sea dumped munitions is of great importance from the environmental protection views point and consequently, safe destruction of recovered munitions is also of great interest for the local people.

Kobe Steel has long experience of survey, recovering, transportation and destruction of approximately 3,000 chemical weapons at Port Kanda, Japan since 2003.

Based on the experience and lessons learned, Kobe Steel developed a safe and compact on-site destruction system, including a mobile detonation chamber DAVINCHlite and improved off-gas system.

Two types of barge are designed for installation and operation of the destruction system on recovering site, depending on the sea condition, i.e., away from the sea shore or close to it.

The main factors to select the barge type are the difference of high and low tide condition and height of waves.

The presentation includes a plastic model of a new system named a self elevating barge system.

Effects of Military Activities and Environmental Contamination on the Island of Sardinia

Helen Jaccard, Veterans for Peace

For over 50 years the island paradise of Sardinia, Italy has been used by militaries and arms manufacturers to

- Test new bullets, bombs, missiles and drones
- Test the effects of explosions and fires on armor and pipelines
- Hold practice exercises that launch massive attacks from the sea onto the beach
- Destroy old chemicals and weapons
- Base nuclear submarines
- Store massive amounts of fuel and munitions

This military activity has produced

- Severely malformed babies and animals
- Alarming rates of cancers – types typically caused by radioactivity
- Long-term environmental contamination with chemicals and heavy metals

including jet fuel, napalm, thorium, tungsten, asbestos, white phosphorous and other substances which are poisonous, radioactive, and highly carcinogenic.

The People Demand

- Truth – What chemicals and metals have been used in testing? Exactly what happened in each test and military activity?
- Close all of the bases – stop using Sardinia for testing and military exercises and radar facilities – completely de-militarize the island, remove all foreign troops.
- Clean and decontaminate the land, groundwater and sea.
- Prosecute the arms manufacturers who contaminated the environment.
- Provide health care to all people affected by military activity on the island
- Provide financial assistance to farmers and fishers

Political actions being taken and the success of these actions will be discussed.

Development of Human Health and Ecological Risk Based Screening Levels for Conventional Munitions Compounds in Marine Sediments and Biological Tissue Samples

Harry D. Craig, U.S. Environmental Protection Agency Region 10 Oregon Operations Office, Portland, Oregon

The effects of corrosion or other environmental processes on legacy underwater munitions may result in the release of explosives and propellant compounds into marine and freshwater environments over centuries. Conducting adequate site characterization requires establishing whether releases have occurred, the magnitude of releases, and assessing whether harmful human health or ecological effects may occur as a result of potential exposures to these compounds. Laboratory analytical methods have been developed for analysis of environmental matrices such as sediment and surface waters, and more recently adapted for biological tissue matrices for consumed marine species, such as bottomfish, shellfish, and invertebrates.

This presentation will review the available and emerging analytical methods for analysis of these matrices, as well as development of carcinogenic and non-carcinogenic human health risk based screening levels for munitions compounds in tissue samples, based on U.S. EPA human health risk assessment protocols. This paper will also review the development of ecological risk based screening criteria for munitions compounds in sediments, based on equilibrium partitioning procedures and porewater toxicity No Observed Adverse Effect Levels (NOAEL) and Lowest Observed Adverse Effect Levels (LOAEL) utilizing U.S. EPA ecological risk assessment protocols.

Recent US Work Relating to Munitions in the Underwater Environment,

Geoff Carton, CALIBRE Systems

In 2004, the US government renewed its research and development efforts and performed a number of investigations related to munitions in the underwater environment. These efforts have, among others matters, addressed detection, discrimination, site characterization, migration of munitions and/or munitions constituents, corrosion, ecotoxicity, recovery, and treatment. Because US programs are primarily driven by risk management, much of the focus has been on site characterization and developing tools to help evaluate risk.

Fourth International Dialogue on Underwater Munitions

October

1-3
2012

Intercontinental
San Juan Resort &
Casino

ABSTRACTS

Towed Electromagnetic Array (TEMA) for Underwater MEC/UXO Detection – Seeing to New Depths

Richard Funk, Tetra Tech EC, Inc.

Development of the towed electromagnetic array (TEMA) has continued over the last year at Tetra Tech with implementation of full telemetry, the addition of underwater video capability and an increased operational depth of over 100 meters.

The new, modular design of the current generation TEMA can be operated as a single, one meter wide tow body for wide area assessment, or as an array of three systems for full coverage surveys. The TEMA can be surface towed, deployed at an adjustable fixed depth, or towed on the bottom. The EM61 units can be configured to collect data just as they do on land; with the top and bottom coil co-located with a 30 cm separation, or without the top coil. This flexibility in system configuration allows for the collection of three time gates (261, 376 and 527µsec) as well as the differential signal, or four time gates (261, 376, 527 and 727µsec) for seamless integration with terrestrial EM61 data.

Development of the full telemetry system reduced interference from signals picked up by cables carrying the analog signals from the coils. The EM data and data from all ancillary sensors, including altitude, attitude and heading, are now carried from the towfish to the topside unit via a single shielded twisted pair cable.

A digital video camera and LED lighting mounted on the tow body, new this year, add live feed video of the bottom to the topside display. Going live for the first time on a recent survey, the video confirmed that the tow body operates in 'ground effect' when towed, skimming along the bottom as opposed to dragging as sleds do. The digital video, recorded on a DVR, provides a preliminary look at items detected by the sensors and identification of munitions items located on the sediment surface is now possible in a single sensor pass.

Tetra Tech has combined off the shelf electronics to the maximum extent possible with custom designs, where they were required for performance or operational reasons, to produce the latest generation TEMA. Plans to improve the flight characteristics of the TEMA and automate flight control are already in progress. Looking forward, Tetra Tech hopes to move beyond EM61 coil technology and to develop a higher powered EM system for improved detection of underwater MEC/UXO.

Chemical munitions risk assessment – a complex approach

Jacek Beldowski

The Chemical Munitions Search & Assessment (CHEMSEA) EU project unites 11 organizations from Poland, Sweden, Finland, Lithuania and Germany, as well as a number of associated organizations, including IDUM. The project is currently examining the risks associated with WW2 munitions dumped in the Baltic Sea. Having compiled all available archive information, project

team selected several areas for its activity: Bornholm Deep, well recognized by previous projects was selected for biota studies, while Gotland Deep historical dumpsite, Gdansk Deep unconfirmed Dumpsite and munitions transport routes were selected for surveying. Biomarker studies of fish show some indication of response in the dumpsite, compared to control area, while survey studies show large scatter of probable CW objects in all three study areas. Exposure experiments, based on caged mussels located in the Bornholm Dumpsite area, will provide the biota response data for Chemical Warfare Agents dissolved in minute concentrations above the dumpsite.

Based on those results models are being prepared to calculate possible leakages propagation, and GIS maps showing probability of bottom contamination are being assembled. This will be the basis of guidelines, on how to operate in risk areas for marine entrepreneurs and fishermen, as well as recommendations for maritime administrations of Baltic Countries, regarding environmental risk, and procedures to be employed in dumpsites.

Static Detonation Chamber Technology – application for chemical weapons destruction,

Dr. Thomas Stock, SALES MANAGER, Dynasafe Germany GmbH

DYNASAFE Demil Systems is world provider for Static Detonation Chamber (SDC) technology for the destruction of chemical weapons as well conventional ammunitions. The technology has been applied in the last decade on a number of plants. Hereby, DYNASAFE is not only supplying the SDC, also the relevant off-gas treatment systems are in many cases part of the system.

The presentation will give a basic overview on the SDC technology and the relevant off-gas treatment systems. In the last 10 years DYNASAFE has supplied several SDC system for the destruction of old chemical weapons (OCW) as well actual stockpiled CW to different customers. The presentation will discuss the major plant features, campaign achievements and experiences so far gained. Hereby safety, security and environmental aspects will be touched upon.

Additional focus will be given on the aspect if this technology can be applied for the destruction of recovered sea-dumped CW.

The fishy and untold stories of bomb-cratered coral reefs in the forgotten Culebra Island, Puerto Rico: From social injustice and massive destruction, to community-based ecological rehabilitation

Edwin A. Hernández-Delgado*, Julio Oms-Hernández, Mary Ann Lucking, & Samuel E. Suleimán-Ramos. University of Puerto Rico, Center for Applied Tropical Ecology and Conservation, Coral Reef Research Group

Several islands across the archipelago of Puerto Rico (PR) were historically used as targets for naval training activities by the U.S. Navy and other NATO countries, including the island municipalities of Culebra (1901-1975) and Vieques (1941-2000). Long-term socio-economic, health and ecological impacts of naval training activities in PR have still been poorly documented. Social injustices in Culebra included relocating in 1901 the town of San Ildefonso de la Culebra, renaming it Dewey after a U.S. Navy admiral, taking over all beaches/coastlines for amphibious landing maneuvers, ship to shore bombing, aerial firing ranges, napalm testing, and other activities that had already been outdated technologically. Also, access to beaches, navigation and fishing were prohibited, while coral reefs were bombarded, and local young women were harassed or violated by the military. Bombing occurred 24/7 for decades, and there was even an attempt to remove the entire culebrense population to the island of St. Croix, USVI, in an attempt to have control of the entire island and use it as naval training ground. There is also still a vast amount of unexploded ordnance all around Culebra. Ecological impacts of bombing have been often described in the literature as minimal, with recurrent allegations of hurricane confounding effects. However, lack of natural recovery of coral and fish assemblages on bomb-cratered reefs has never been addressed. This study was aimed at: 1) documenting what was the condition of benthic communities on 35-50 year-old craters at Culebra Island in comparison to adjacent sites; 2) comparing coral recruitment rates within and outside craters; 3) comparing fish community structure within and outside; and 4) addressing the preliminary impacts of a community-based bombarded coral reef rehabilitation effort using low-tech approaches to cultivate threatened Staghorn coral (*Acropora cervicornis*) and rehabilitate depleted coral reefs.

Bomb-cratered reefs were largely dominated by heavily fragmented benthos, with % coral cover usually below 2% and dominance by

non reef-building taxa (i.e., filamentous algal turfs, macroalgae, cyanobacteria, sponges, and sporadic octocorals and ephemeral hard coral species). Benthic spatial heterogeneity was also significantly lower within craters which also resulted in a lowered functional value as fish nursery ground. Overall fish species richness, abundance and biomass were significantly lower within craters. Though coral larval settlement occurred within the crater, coral spat mortality was high largely due to the unstable fragmented bottom. Low-tech, community-based approaches to culture, harvest and transplant *A. cervicornis* into formerly bombarded grounds have proved successful in increasing benthic heterogeneity, fostering coral sexual reproduction and genetic recombination, and helping restore on fish community structure, while fostering meaningful community-based participation. However, introducing and fostering compliance with coral reef conservation measures (i.e., no take marine reserve) in a community still traumatized by historical military practices and past actions of Government as the island was declared spoils of war at the turn of the century has been a paramount challenge. Therefore, community-based approaches have proved to be a highly successful alternative to restore impacted coral reefs ecosystems that were never restored by the U.S. Navy after they left.

Effective Offshore UXO Risk Mitigation – The complete solution

Kevin Kneebone C Dir, BACTEC

BACTEC has extensive experience in dealing with Marine UXO Risk Mitigation from survey, relocation and disposal of conventional munitions. BACTEC is now part of the Dynasafe group of companies and utilising their technical expertise for delivering demil systems for both conventional and chemical munitions. The group can now provide the complete solution for the clearance of chemical and conventional munitions offshore with an integrated safe and environmentally friendly solution.

Fourth International Dialogue on Underwater Munitions

October
1-3
2012

Intercontinental
San Juan Resort &
Casino

ABSTRACTS

Corrosion Evaluation of Underwater Military Munitions

Shengxi Li, Jeffrey Nelson, Ryan Sugamoto, L.H. Hihara, Hawaii Corrosion Laboratory, University of Hawaii, Manoa, Honolulu, HI R. George, B. Wild, Environmental Sciences, SPAWAR Systems Center Pacific, San Diego, CA

Large numbers of munitions potentially exist on the seafloor of the world's oceans, and while there is general knowledge of corrosion processes in seawater for metals that comprise underwater military munitions (UWMM) components, there is little or no understanding of specific corrosion behaviors for munitions, which impacts such important parameters as time to breach for initial munition constituents (MC) release, and time to depletion of MC inside the munition under continued corrosion. Corroded UWMM have been investigated here for purposes of developing a scientific basis for predictive modeling of specific corrosion behaviors associated various classes of UWMM in the marine environment. The initial focus has been to characterize corrosion behaviors associated with demilitarized DMM upon recovery from the seafloor after 60+ years. Laboratory-based studies were undertaken to evaluate corrosion products and, if present, any calcareous deposits associated with DMM, along with compositional metallographic analysis and morphological analysis of DMM casing materials that include steel and copper. In future efforts, normal and galvanic corrosion on DMM or metallic surrogates will be evaluated under one or more of the following conditions: artificial seawater (abiotic), real seawater (biotic), or marine sediment (biotic and/or abiotic), either collected from the DMM recovery site, field exposed at a similar site, or artificially prepared with similar technical specifications. The efforts described in this paper seek to a) develop an initial understanding of corrosion mechanism(s), and b) enhance capabilities in prediction of casing failure that would allow penetration of seawater into the interior.

Modeling Munitions Constituents in Aquatic Environments

P-F. Wang¹, Q. Liao², R. George¹, B. Wild¹

¹SPAWAR Systems Center Pacific, Environmental Sciences, San Diego CA and ²University of Wisconsin, Milwaukee, WI

The ability to characterize, assess, and predict potential munition constituent (MC) source loading and distribution has significant implications for making scientifically defensible risk management decisions with regard to underwater ordnance leave-in-place (LIP) mitigation and blow-in-place (BIP) vs. removal options. The objectives of this study were to develop a basic understanding of the release rate and subsequent fate and transport of MC in water and in sediment. As a baseline scenario, this study directly addresses the amount of MC introduced into the environment from the case of a single breached munition. The information determined for MC release from a single breached shell was incorporated into the calibrated hydrodynamic/transport model to predict fate and transport of the MC and/or degradation products. To address the specific release function and its predictive ability,

we conducted analytical, empirical and numerical modeling studies of MC source release from breached shells under various hydrodynamic and shell integrity conditions. Empirical studies were conducted for release scenarios both in water column and in sediment. The semi-analytical release rate function was validated by results from both the empirical study and the numerical modeling study, using the FLUENT model. The calibrated model, TRIM2D, and EPA's WASP7 model were both used for simulating fate and transport of TNT released by design from a breach shell in San Diego Bay, CA.

Munitions Constituent Properties, Fate, and Transformation Studies

R. George¹, G. Rosen¹, G. Lotufo², M. Chappel², B. Wild¹

¹SPAWAR Systems Center Pacific, Environmental Sciences, San Diego CA and ²US Army Corps of Engineers, Environmental Research and Development Center, Vicksburg MS

The issue of Munitions Constituents in the Marine Environment is related to the quantities of unexploded military munitions that can be found on the seafloor in various locations throughout the world. These munitions (bombs and projectiles) are the result of explosives (armed and fuzed) that did not detonate upon impact (duds). In addition, discarded military munitions (unarmed and unfuzed) also contribute to the issue in scenarios where these items may have resulted from disposal actions prior the existence of current environmental regulations. Over time, it is expected that even intact munitions in seawater will corrode (breach) to the point where munitions constituents (MC), which are explosives compounds found in munitions, will be released into the water column or directly into the sediment pore water (if buried). While addressing the chemical, physical, and biological properties, and environmental behaviors of common MCs, we found that TNT (and its primary degradation products), RDX, and HMX, present low ecological risk under expected exposure scenarios in the marine environment. This conclusion is substantiated by the development of a large body of data illustrating that these chemicals typically undergo extensive degradation upon contact with marine sediment. Other related efforts to date have focused on the release and transport of munitions constituents, and include the development of a fate and effects model described in a companion paper that can be used to predict the direction and concentration of a plume of MC from a breached projectile on the seafloor.

NOAA's Projects on Vieques Island, Puerto Rico

Diane E. Wehner, NOAA Office of Response and Restoration

The National Oceanic and Atmospheric Administration (NOAA) provides technical support on the investigation and cleanup of hazardous waste sites around the county. NOAA received funding from Congress from 2005 to 2007 to provide additional assistance in the cleanup and protection of the marine and coastal resources of Vieques Island, PR. NOAA completed a series of projects with this funding, including a Land and Fiddler Crab Study, an Underwater Ordnance Demonstration Project, a Coral Reef Restoration Project, an Ecological Characterization of the Marine Resources of Vieques and Education and Outreach. This presentation will highlight the results of the Land and Fiddler Crab Study and the Ecological Characterization of the Marine Resources of Vieques. The Land and Fiddler Crab Study was conducted to evaluate chemical concentrations of hazardous substances in land and fiddler crabs on Vieques. Land and fiddler crabs were sampled from a variety of habitats on the both the east and west end of the island. Results of the study were used by the Agency for Toxic Substance and Disease Registry (ATSDR) to conclude that eating land crabs from the areas sampled does not pose a human health risk and by the U.S. Fish and Wildlife Service to determine whether select refuge areas could be opened to the harvesting of land crabs. The land and fiddler crab data have also been used in the ongoing investigation by the U.S. Navy. The Ecological Characterization of the Marine Resources of Vieques was conducted to determine the overall marine health of the waters of Vieques. Detailed information on benthic habitats, fish and invertebrate communities, and water quality were collected around Vieques. Chemical contamination in sediment and coral tissue was also examined. Results of this study provide baseline data on the overall health of the coral reef ecosystems in Vieques. These data will help in the development of a strategy for long-term monitoring for Vieques coastal and marine ecosystems that will support the cleanup and protection of the natural resources.

NOAA's Ordnance Reef Coral Assessment and Mitigation Project

Diane E. Wehner, NOAA Office of Response and Restoration

The underwater environment presents significant challenges for recovery of military munitions. The Department of Defense (DoD) is responsible for addressing the legacy of contamination associated with these munitions, including unexploded ordnance (UXO) present from current and former testing and training ranges and disposal of discarded military munitions (DMM). Current remedial practices often employ divers for manual retrieval of munitions which presents significant explosive safety risks. Alternatively, blow-in-place detonation of munitions is often employed which can result in significant injury to corals and other natural resources present in the area. In an effort to evaluate the use of remote means to recover munitions, the U.S. Army completed a demonstration of the Remotely Operated Underwater Munitions Recovery System (ROUMRS) in July 2011 to recover DMM present at Ordnance Reef (Site HI-06) off the coast of Wai'anae, Oahu, HI. Working in collaboration with the DoD, the National Oceanic and Atmospheric Administration (NOAA) and the State of Hawaii surveyed corals and munitions present in the area prior to initiation of the recovery effort. This allowed for the demonstration project to be planned and executed in manner that minimized injury to corals present. Post-recovery surveys documented what injury to corals that did occur and will allow for the design of a coral mitigation project appropriate for the injury that was identified. Details regarding the pre- and post- recovery surveys and coral assessment and mitigation process will be presented.

Fourth International Dialogue on Underwater Munitions

October

I-3
2012

Intercontinental
San Juan Resort &
Casino

ABSTRACTS

Project Impacts Resulting From Sensitive Environments and Ecosystems: A Case Study From the Chesapeake Bay, United States.

Larry S. Jordan Jr., ARCADIS, 300 East Lombard St, Baltimore, Maryland 21202

The location of a site containing munitions or munitions constituents significantly impacts the means and methods by which the area can be investigated and remediated. The cost of investigating or remediating a munitions dump site or range significantly increases if the area is a water site. For water sites, physical characteristics of the area where a site is located (e.g. water depth, currents, visibility) may significantly impact project cost and duration. One important aspect of the location of a site that may be overlooked is the ecological and environmental sensitivity of the area.

Potential project issues resulting from sensitive environments are often not identified until after the project has been started and may not be reflected in costs developed during the proposal stage. An evaluation of projects completed in the Chesapeake Bay region provide a case study for the potential impacts that sensitive habitats may pose to the duration and cost of a project.

Poor water quality and the resulting ecosystem degradation have resulted in a robust and highly protective regulatory regime in the Chesapeake Bay which may impact any or all aspects of a site investigation or remediation. Site activities may be subject to oversight by over a dozen Federal, State, or County agencies. Projects implemented in the region have been subject to extremely prohibitive time of year restrictions, and extensive review and lengthy public review periods. The sensitive environments encountered are not limited to the Chesapeake Bay and may be encountered in any highly regulated coastal areas.

Human and Environmental Health Issues Associated with UWUXO on Vieques.

James W. Porter, Ph.D., Meigs Professor of Ecology, Odum School of Ecology, University of Georgia

Between 1943 and 2003, land and sea areas on the eastern end of Isla de Vieques, Puerto Rico were used as a naval gunnery and bombing range. Viequean coral reefs are littered with leaking and unexploded underwater ordnance (UWUXO). Radiological, biological, and chemical surveys were conducted to assay the health of these coral reefs.

Water, sediment, and biotic samples revealed that: (a) every animal tested on the seaward reef of Vieques near unexploded ordnance contained at least one potentially toxic compound leaking from in situ ordnance [1,3,5-Trinitrobenzene; 1,3-Dinitrobenzene; 2,4-Dinitrotoluene + 2,6-Dinitrotoluene; 1,3-Dinitrobenzene; 4-Nitrotoluene; 2,4,6-Trinitrotoluene; 2-Nitrotoluene; Hexahydro-1,3,5-Trinitrotriazine]; (b) concentrations of these substances in fish and lobster tested do not exceed EPA's Risk Based Concentrations for commercially edible seafood, but (c) concentrations of these substances in several of the non-commercial species tested (e.g., feather

duster worms, corals, and sea urchins) greatly exceed these concentrations. For chromium in sediments, and for TNT in both water and sediment, there is an exponential decline of carcinogen concentrations with increasing distance from the unexploded ordnance. An organism's mobility and proximity to UWUXO determine its body burden of toxic compounds: (1) the closer an organism is to a leaking bomb, the higher its body burden will be, and (2) the less mobile (and therefore more sessile) an organism is, the higher the concentration of toxic substances will be.

Our data show, unequivocally, that toxic substances leaching from UWUXO have entered the marine food web of the Vieques coral reef. Further, since the concentration of explosive compounds is highest near the unexploded ordnance, UWUXO may be considered as point-source pollution. We recommend that surface UWUXO on the Vieques coral reef be picked up and removed. If you pick up the bomb, you get rid of the problem. We therefore propose the institution of an "underwater range maintenance" program. We assert that this action will have immediate and beneficial effects on the coral reef ecosystem by removing these point sources of pollution from the environment.

Because they are often subtle, causal relationships between cancer clusters (such as those on Vieques) and environmental pollution are difficult to prove. This does not mean that environmental pollution does not cause adverse human health effects. Rather, it means that a high degree of care must go into the design and implementation of sampling programs intended to establish, or eliminate, pollution as the source of disease. These studies (1) must avoid under-sampling of the key pollutants and their degradation products and (2) must include sophisticated, carefully controlled, and longevous studies of human health in the affected area.

Military Munitions Policy and U.S. Environmental Law

Steven B. Pollack, Director, Blue Eco Legal Council

The Clean Water Act, Resource Conservation and Recovery Act, (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA commonly known as Superfund) all regulate military waste depending on its location and disposal status. U.S. EPA by its Military Munitions Rule further interprets, by reference to RCRA, the fate of munitions disposed of into the environment.

This paper suggests structural improvements to how the system operates at federal facilities.

Winds of Change – Germany’s Program on Underwater Munitions

Claus Boettcher, Government of the Federal State of Schleswig-Holstein, GERMANY

The German national report 2011 - Munitions in German Marine Waters - stocktaking and recommendations

The Wars’ legacy at sea is not obvious, but up to 1.6 million metric tons of conventional munitions and more than 5,000 metric tons of chemical warfare materials rest in German marine waters alone.

Drawing the attention of the political decision makers to the urging need of dealing with this matter is not an easy task. Building upon the recently established maxim that sea-dumped munitions are “a problem which concerns the society as a whole” a cross-administrative working group, consisting of Federal and four coastal States government representatives, was formed. A first outcome report, bundling the administrative knowledge, taking stock of the situation and pointing out possible solutions, was published in December 2011.

Initially, the focus of the problem of underwater munitions was almost solely directed at the ecological impacts. Nowadays, with the political target to achieve the energy transition in Germany, additional economic factors have become obvious.

Taking in account, that the responsible German authorities have agreed, to judge dumped munitions in the open sea as a “latent danger” to mankind, animals and the environment, further questions were raised, e.g.

“Are there legal consequences, if one does follow or does not follow the recommendations?”

There is no simple answer on questions like these in Germany, but there is a need for further investigation to provide technology and procedures, that will even allow doing the necessary. The expert group on underwater munitions will initialize and resource pilot projects, as well as baseline work, like making historical information available from German and Allied archives.

Integrating Endangered Species Concerns in the Analysis of Underwater Munitions Site Clean Up Priorities

Dr. Lisamarie Carrubba, NOAA/National Marine Fisheries Service, Caribbean Field Office, Protected Resources Division

A Formerly Used Defense Site in Culebra, and recently closed naval training facilities in Vieques and Ceiba, Puerto Rico have extensive underwater habitats that are used by species protected under the Endangered Species Act (ESA), including sea turtles and corals. Portions of these areas contain Munitions and Explosives of Concern (MEC) that need to be addressed by the U.S. Army Corps of Engineers (COE) and Department of the Navy (Navy), respectively, from a human health and safety standpoint. In order to meet both the human health and ESA-listed species needs, the National Marine Fisheries Service (NMFS) is working with the COE and the Navy to identify areas containing habitat for sea turtles and corals, as well as elkhorn and staghorn coral colonies. At the same time, visual surveys and surveys using magnetometers and other non-invasive technologies are being used to overlay MEC and suspected MEC on habitat maps that also contain the locations of ESA-listed coral colonies. Other National Oceanic and Atmospheric Administration efforts are also ongoing to test technologies for mapping anomalies in areas of Vieques. Through these cooperative efforts, NMFS is better able to assist the COE and the Navy in developing strategies to avoid and minimize the potential impacts of surveys and intrusive investigations on sea turtles, corals, and their habitat. These surveys, coupled with field and remedial investigations completed following agreed upon guidelines to protect ESA species, will also be used to develop a decision matrix for clean up options.

Fourth International Dialogue on Underwater Munitions

October

I-3
2012

Intercontinental
San Juan Resort &
Casino

ABSTRACTS

Technical, Natural Resource, and Public Use Challenges with Addressing Underwater Munitions at the Former Mullet Key Bombing and Gunnery Range, Pinellas County, Florida

Mr. Frank Araico, United States Army Corps of Engineers - Jacksonville District

Ms. Rebecca Terry, United States Army Corps of Engineers - Huntsville Center

Ms. Susan Burtnett, ARCADIS US, Inc. / PIKA-Pirnie JV, LLC

The former Mullet Key Bombing and Gunnery Range, located near Saint Petersburg, Florida, was used for bomb training during World War II. Practice and high explosive bombs have been recovered from the surrounding Gulf of Mexico and Tampa Bay. The land and water where the bomb targets were located was returned to public use and is currently a county park, with a heavily-used campground, boat ramp and beach that is visited by two million people a year.

The year-round use, coupled with the presence of protected plant and animal species, makes investigating and addressing underwater munitions a challenge. To focus the MEC investigation and reduce impacts to human and ecological use at the park, historical research was conducted by the United States Army Corps of Engineers to refine information gathered during the site inspection. Based on the supplemental historical documents obtained, the area requiring underwater MEC investigation was significantly reduced and the investigation focused more on land targets instead of the originally suspected, but not well-documented, water targets.

Near-shore natural resource considerations included protected seagrass, mangroves, and marine animal presence. Specialized underwater probes with extended reaches to minimize environmental damage were incorporated as an innovative approach for investigating areas inhabited by protected species. Additionally, heavy, year-round use of this recreational area increased the need for public agency involvement, and coordination with other agencies and investigations ongoing in the area. Hurricane season, nesting season, and heavy use periods at the park were considered when scheduling field efforts.

This presentation will provide the benefits of supplemental historical research to focus study areas, use of innovative technologies to reduce effects on natural resources, and coordination efforts needed to successfully investigate heavily-used public areas.

Technologies and Operations for Detection and Removal of Underwater Munitions

Martin Miele PGp, PG, Principal Geophysicist, Arcadis US Inc.

This presentation will discuss the operations, capabilities, limitations, and relative costs of various geophysical sensors and removal technologies currently available for underwater munitions detection and recovery. Participation in this presentation will provide each attendee with a better overall understanding of the underwater munitions technologies and operations available including various types of removal

technologies ranging from remote surface operations to diving operations.

Geophysical sensors are the tools used to detect military munitions. Magnetometers and electromagnetic induction (EMI) technologies are used to detect the metallic component of munitions on or beneath the marine floor environment. The various types of magnetic and electromagnetic sensors are discussed as well as their deployment platforms. Sonar systems are also used which emit sound waves reflected off the sediment floor (in some special cases below the sediment floor) or off of features lying on the sediment surface (e.g., logs, rocks, UXO lying proud) and return to a receiver (echo)". All of these detection technologies can be deployed either by themselves or in conjunction with another technology. Removing underwater munitions can be complex and expensive. By nature, it involves complex or complicated operations. It also requires trained personnel. Each site poses different challenges. Things to consider include: the condition of munitions (deteriorated, encrusted, etc.); the configuration of munitions (fuzed or not); the density and type of munitions; characteristics of the marine floor (sandy or rocky, etc.); and environment of operation (water depth, waves, currents wind, etc.). These characteristics will drive site specific requirements.

Data Fuzing of Technology in Autonomous Underwater Vehicles for Underwater Munitions Detection,

Terrance P. Long, President, Wentworth Environmental Inc, Thomas deWilde, Geophysicist, aDede

Looking for a way to overcome the challenges and limitations of marine UXO surveys, ADEDE and WEI have combined Iver2 Autonomous Underwater Vehicle (AUV) and Side-Scan Sonar (SSS) technology with marine Overhauser magnetometry. As proven by an ultimate test survey on Lake Ontario, near Toronto, ON, Canada, this method is far more reliable than regular ship towed surveys. Two pipelines and a lost anchor could easily be recognized with the combined results of the magnetometer and the SSS. On top of this, deviations from survey lines are far smaller and less likely than in regular towed surveys, allowing surveys with a denser grid to be performed in rougher waters, significantly increasing survey resolution.

The future of US and International Policy on Defense Waste in a Marine Environment,

James Barton, Underwater Ordnance Recovery

This paper projects the future US and international policy shift towards indemnification of sovereign liability for armed forces, manufacturers, and facilitators linked to defense wastes abandoned in a marine environment through the efforts of a non-profit led consortium of nations and treaty organizations sharing global interest in human health and natural resources.

Historical Research as an Instrument in the Recovery of Underwater Munitions

Tim De Craene, aDeDe

In Western Europe, historical research has become an important tool in analyzing the risk related to unexploded ammunition in military and commercial project areas. In these historical studies, aerial photography, archival sources, literature and historical maps are studied and compared by historians and EOD specialists. The resulting conclusions, recommendations and risk maps assist the client or the involved institutions in their assessment of the risk related to UXO during their scheduled works.

In many cases, historical research allows for a reduction of the risk area, and thus it is praised for its time and cost efficiency. As it also identifies the possible munitions to be found, preliminary historical research also improves the safety of the field staff and helps in determining the further steps in the in the UXO removal process.

Historians are now facing new challenges by the growing demand for historical studies on offshore and coastal areas. This presentation will elaborate the possibilities and the difficulties encountered on the historical quest for underwater munitions. Through a number of case studies mainly executed on the occasion of offshore dredging works and coastal development operations, we will examine the possible sources, their reliability, the advantages and constraints of the historical research.

Planning and organizing an underwater UXO Clearance operations with divers in an inshore and offshore environment,

Arthur Hollmann, Director Bluestream UXO Clearance, The Netherlands

The execution of an Underwater UXO Clearance operations has multiple factors.

First there is the planning of the UXO threat, What is there to be expected and what safety measures for the environment and nearby structure should be taken?

Second there is the planning of equipment. Do we need ROV's and what specifics do they need? Or do we need divers and what equipment and what type of depth do we support them?

And finally there is then, in the case we will proceed with divers, the questions what type of divers do we need, what training and certification background should they have and

which individuals fit in the team.

To smoothly execute all these phases in the project we have developed several management tools to support our project manager in the choices that have to be made.

In the first stage of the project, in the preliminary phase, we consult with our Health and Safety department about the possible threats for the environment and what safety precaution have to be met. IN procedures and execution. Once all procedures are covered and choices are made, as part of this preliminary phase, of what type of equipment is used, the second phase can proceed.

The main problem with being offshore is that you do not have the opportunity to get a quick fix out of the workshop. So, the second phase of the project, planning of the equipment, is extremely important. You do not want to send too much equipment of and you definitely do not want to send too less equipment to the project. Checks and balances are required, to come to the best certified kit for the job.

Finally we need to assemble the crew, ROV or diving. That's mainly about knowing, keeping track of them and good communications.

Types, Mechanisms, and Processes Related to Using Waterjet Technology for the Demilitarization of Underwater Conventional and Chemical Munitions

Paul L. Miller, Director, Advanced Technology Systems, Gradient Technology

Waterjets, a non-traditional technology, are finding increasing use in the demilitarization of conventional and chemical weapon munitions both on dry land and underwater. The generalized term "waterjet," however, can encompass no less than seven different technology subtypes that are similar in certain areas and radically different in others. These differences in technology can be either significant or superficial depending on their application. This paper differentiates the types and mechanisms used in the various waterjet technologies, the demilitarization processes, and an overview of the history of waterjets.

Fourth International Dialogue on Underwater Munitions

October

I-3
2012

Intercontinental
San Juan Resort &
Casino

ABSTRACTS

Research Effort to Locate Military Munitions Disposal Sites World Wide,

Mr. Rick Stauber, Training Department, Developer/EOD SME, NCI Information Systems, Inc.

When a nation goes to war, it is not just the nation's military forces that are involved, but also the entire nation. In any war, a nation's industrial complex is a major player – what other entity is capable of supply the weapon systems, technology and supplies needed to support the nation's fighting forces? Among the need for clothing, food, trucks, and weapons is the need for tremendous amounts of munitions.

However, what happens to excess munitions and supplies, or to captured enemy munitions when the war is over? It all becomes a part of the demobilization process, a process that has been planned for all the while during the war. We are not here to discuss the process of demobilization, countless pages have been written on those. We are here to talk about one small phase of the program that brings a nation back to the normal peacetime status. We are going to present some of the facts and issues the United States and its Allies has faced during the 20th Century with respect to excess, captured and unsafe munition. We have focused primarily on chemical munitions and the early 19th Century's (prior to 1970) practice of sea disposal. We will also address work conducted to address the disposal of conventional munitions.

To highlight these problems examples will be given utilizing known and suspected sea disposal locations within the Caribbean.

Pipeline System and the Successful Management of the Munitions Risk,

Mr. Simon Bonnell, Project Manager, Task Force Manager Finland, Nord Stream

The paper will provide an overview of the Nord Stream Pipeline system and the successful management of the munitions risk. Nord Stream is an offshore natural gas transmission system comprising of two 48" diameter pipelines with a planned total annual capacity of 55 billion m³. The 1220 km pipelines transport natural gas from Vyborg, Russia through the Baltic Sea to Greifswald, Germany.

The Baltic Sea is historically an area of strategic naval importance. The Gulf of Finland was heavily mined in World War I (WWI) and World War II (WWII). Over 170,000 mines have been laid and whilst the mine fields have been swept many tens of thousands remain on the seabed.

The German landfall is close to Peenemunde, the location of the development base for the German unmanned air projectiles "V1" and "V2" and hence a target for Allied air raids. In one extensive air raid in 1943 more than 1593 tons of high explosive bombs were dropped.

At the end of WWII the Germany stockpile of approximately 65,000 tonnes of chemical warfare agent (CWA) munitions were disposed by dumping in the Bornholm Basin and southeast of Gotland.

To ensure a safe route for the Nord Stream Pipelines over 200,000 seabed targets were located of which over 30,000 were visually inspected. Over 320 mines and 70 other munitions were identified and over 100 munitions were successfully cleared.

The paper will address the integrated risk based approach adopted to establish a safe route for the Nord Stream pipelines including the following topics: historical data sources, development of survey techniques, environmental impact assessments of underwater explosions, risk assessments, clearance activities and environmental monitoring. The approach incorporated a continuous process of critical review and improvement, and the lessons learnt over the 4 year programme will be discussed.

US Policy Relating Munitions in the Underwater Environment,

J. C. King, COL (R) US Army, Director for Munitions and Chemical Matters ODASA (ESOH) Pentagon

Munitions enter the underwater environment from live-fire training and testing, combat operations, accidents, and planned and unplanned disposals. Depending on their source, munitions, specifically unexploded ordnance (UXO) and discarded military munitions (DMM), in the underwater environment potentially pose differing explosive hazards and, to a lesser degree risks to human health and the environment. Current policy addresses these munitions in different ways; however, as a general rule munitions-related policies, which are based on applicable laws, are risk based. Funding to address munitions on operational ranges is based on sustaining use, protecting users and the public, monitoring to determine potential offsite impacts, and responding to munitions that land off range. Installations fund these activities using operations and management funds. The Services fund response actions, including risk management functions on former ranges on active and Base Realignment and Closure (BRAC) installations under the Defense Environmental Restoration Program's (DERP) Military Munitions Response Program, with DoD funding such actions for Formerly Used Defense Sites (FUDS). Although munitions that resulted from an act of war are generally ineligible for funding, they are addressed on a case-by-case basis. With exception of munitions determined to pose an imminent and substantial endangerment to the public, sea disposed munitions are ineligible for funding under any existing program. Munitions determined to pose an imminent hazard, regardless of source, are addressed as an emergency. Policy relating to munitions in the underwater environment is complex, evolving and will largely be a balance between relative risk and available funding.

Hawaii Undersea Military Munitions Assessment (HUMMA): Overview of Past and Future Programs

Margo Edwards, Technical Principal Investigator (PI) for the Hawaii Military Munitions Assessment

Since 2007, the University of Hawaii and Environet, Incorporated, an environmental consulting firm, have undertaken several studies of HI-05, a deep-water munitions disposal site off Pearl Harbor, Hawaii. Each study evaluated technical approaches for assessing chemical and conventional munitions. Study results have substantially improved the team's understanding of sea-disposal operations and increased each study's efficiency. Given the distribution of munitions in trails and the tendency for a specific munitions to dominate a trail, the team developed a survey strategy to evaluate the likelihood of finding munitions quickly. Sound Navigation and Ranging (SONAR) data and use of video and still cameras allowed the team to document the distribution and condition of individual munitions in deep water. Water, sediment, floral and faunal samples taken near munitions provided a small but expanding database of the effects of munitions on the environment and the environment on munitions. One question not addressed is what happens to munitions over time. The objective of future HUMMA studies will focus on developing, testing and evaluating techniques for monitoring and modeling munitions' deterioration.

In 2012, the team will undertake a study at HI-05 to confirm visually trails believed to contain chemical munitions. This study builds on previous studies by evaluating the pros and cons of using human-occupied vehicles and Remotely Operated Vehicles to deploy standoff and close-in sensors to identify and investigate munitions. Sensors for short, time-series studies of the environment adjacent to munitions will also be deployed to evaluate how these sensors perform. Time-lapse optical systems to collect images and supporting environmental data for munitions and their surroundings will be deployed. The data acquired will be incorporated into a data fusion system to provide integrated products that will assist U.S. Army decision makers.

Preliminary Investigation of Contamination from Underwater Munitions in Norway

Helle K Rosslund, Arnt Johnsen, Norwegian Defence Research Establishment (FFI)

Previous studies in Norway and several other countries have indicated occurrence of contamination from munitions in the aquatic environment. There is a considerable concern among several countries regarding the leakage of explosives from munitions to sediment and water, and the possible entering of these compounds into the food chain. There are uncertainty concerning the spreading of existing pollution and possible particles created from sudden or controlled detonations. The knowledge is generally low considering the significance of the traceable contamination of explosives in the aquatic environment.

In this preliminary investigation, munitions dumped or found at shallow water have been studied to gather information about possible contamination from ammunition in firing ranges at sea.

Norwegian clearance divers from Minedykkerkommandoen, have collected samples of water, sediment and biota close to single munition targets in shallow waters. The munitions were mainly remnants from the Second World War, with different corroding damage. Explosive residues was found in both sediment and water samples. The residues were also found in biota. Heavy metals were found at low concentrations except for the samples collected at one shipwreck and at site with lot of dumped hand weapon ammunition. Samples collected from water and sediment shortly after EOD operations also contained explosive residues.

Additional studies are necessary to reveal the hazard level of underwater munitions in the aquatic environment.

Fourth International Dialogue on Underwater Munitions

October
I-3
2012

Intercontinental
San Juan Resort &
Casino

ABSTRACTS

Overview of the Vieques Restoration Program to Address Underwater Munitions,

Dan W. Waddill, PE, PhD, Vieques Restoration Branch Head, Naval Facilities Engineering Command, NAVFAC Atlantic

The former Vieques Naval Training Range provided military training for the US Navy and North Atlantic Treaty Organization (NATO) operations. From the mid-1940s until 2003, more than 300,000 munitions items were fired during training operations, including naval, air-to-ground, and artillery fire. Between 2001 and 2003, the former range was transferred to federal and local agencies, and much of the land is currently managed as a National Wildlife Refuge. Since 2003, the Naval Facilities Engineering Command (NAVFAC) has implemented investigations and removal of unexploded ordnance and other munitions under the Munitions Response Program. Underwater areas have been investigated using a variety of technologies, including side-scan sonar, towed magnetometer, aerial magnetometer, remote operated vehicle, and instrument aided visual surveys. In addition, studies have been performed to assess potential effects of munitions constituents that may be released to the marine environment. Due to the presence of endangered species of coral and sea turtles, all underwater work is done in compliance with the US Endangered Species Act and in consultation with numerous stakeholders to determine the appropriate balance between munitions work and preservation of habitat. A Wide Area Assessment of potentially impacted offshore areas is being planned in order to delineate areas for remediation. In addition, studies are underway to evaluate potential underwater transport of munitions and interaction between the beaches and the surf zone. This presentation will provide an overview of underwater technologies that have been used at Vieques, challenges encountered, lessons learned, and path forward.

Development of a Blast Barge System for the Disposal of Underwater Unexploded Ordnances.

*Timothy W. Shelton, John Q. Ehrigott, Jr., and Ramon J. Moral
U.S. Army Engineer Research and Development Center*

The United States military and other NATO forces have been conducting bombing exercises for decades. A significant portion of these military exercises were conducted on territorial lands of the United States, particularly on the islands of Culebra and Vieques. As a result, underwater unexploded ordnance (UXO) are encountered frequently in these areas due to either discovery or washing ashore. Existing methodologies for disposing of these UXO are limited to explosive ordnance disposal or UXO diver recovery followed by transport to a land disposal area, or in-situ disposal by blow-in-place. Neither of these options provides a means of disposal that limits expense, handling time, or danger to the workers and marine environments. To provide a safer and more economical option for UXO disposal, the U.S. Army Corps of Engineers has developed a disposal methodology using an ordinary hopper barge outfitted with a steel blast box that allows for disposal at sea. The U.S. Army Engineering Research and Development Center (ERDC) has conducted scaled experiments to

investigate the shock attenuation for a bare explosive detonated in a sand backfill. Using data obtained from these experiments, ERDC designed and tested an instrumented scaled steel blast box filled with sand that would be placed in a hopper barge for use in disposal of UXO. Additionally, the ERDC has conducted numerical simulations to predict water shock produced from the UXO disposal event based on experimental measurements taken from the steel blast box. This paper provides a summary of the work completed to date.

Vieques as a Human Ecosystem: An Organizing Framework for Applied Science,

Gary Machlis, Science Advisor to the Director, National Park Service and Professor of Conservation, University of Idaho

Human ecology combines both biophysical and socioeconomic sciences to understand coupled natural-human systems (CHNs). One approach is the human ecosystem model which can provide an organizing framework for multi-disciplinary and interdisciplinary environmental science. Vieques can be considered as a human ecosystem and the human ecosystem model applied to understanding the island, its ecology, economy, and people. In this presentation, the roots of human ecology are briefly described, followed by a variable-by-variable application of the human ecosystem model to the island. The application of this approach to organizing science on Vieques is presented, as well as the need for expanded scientific work on the island.

P4. NGOs: AVOID HEX ON THE BEACH and other munitions constituents,

I. Ludwichowski, Nature and Biodiversity Conservation Union, Neumünster and Berlin/Germany, K. Detloff, Nature and Biodiversity Conservation Union, Neumünster and Berlin/Germany, P. Deimer, Society for the Conservation of Marine Mammals, Germany, H.-J. Schütte, Society for the Conservation of Marine Mammals, Germany, U. Karłowski, Dolphin Conservation Society, Munich/Germany, S. Koschinski, Marine Zoology, Nehmten/Germany

Underwater munitions are dangerous sources of pollution.

After having rested on the sea floor for 67 years, many munitions encasements in the Baltic and North Sea are now completely corroded and are releasing their toxic fill - a very real danger for beachgoers and the marine environment!

And there are many sources.

Overview of the Aquatic Ecotoxicology of the Explosives

Guilherme Lotufo, US Army Engineer Research and Development Center,

Gunther Rosen and Bill Wild, Space and Naval Warfare Systems Center - Pacific

To support assessment of risk associated with the presence of explosives in aquatic environments, toxicity data were derived for freshwater and marine fish and invertebrates. Existing scientific literature was reviewed to compile available aquatic toxicity data. Most studies involved the use of water or sediment concentrations that were well above those expected in the environment in order to derive toxicity benchmarks. For example, TNT and RDX caused decreased survival to most species between 1 and 10 mg/L. However, some fish and invertebrates survived exposure to concentrations RDX approaching maximum solubility. HMX caused no decreased survival to test species at maximum solubility. Because of efficient biotransformation, body residues of TNT were substantially lower than those predicted. Bioconcentration factors were 1-13, for TNT, <1 for HMX and <2 for RDX, with body residue only slightly exceeding water concentrations. Aqueous exposure is the dominant route of uptake for several explosives, with negligible dietary contribution. Elimination half-lives ranged from minutes to few hours, requiring constant exposure for bioaccumulation. When detected in the field, explosives have typically been at concentrations orders of magnitude lower than toxic benchmarks. A lack of adequate information on spatial and temporal scales of contamination precludes accurate evaluation of the environmental significance of the presence of explosives in aquatic systems. A laboratory experiment simulating real-world exposures and fate models indicate that the presence of munitions in aquatic environments is unlikely to result in sufficient exposure to cause biological effects to aquatic organisms. Field verification of this conclusion is necessary.

Investigative Challenges of Underwater Sites at Culebra, PR.

Kelly Enriquez, Geophysicist, US Army Corps of Engineers

Culebra, PR is a Formerly Used Defense Site that was used for training by the US Navy and Marines beginning in 1902 until 1975. The Navy used Flamenco Peninsula and nearby cays for extensive aerial bombardment and gunnery practice. Results from the recent remedial and

site investigations on land have shown that most military munitions are concentrated on Flamenco Peninsula and these cays. The investigation phase is now turning to the marine environment surrounding these areas.

The waters nearshore of Culebra offer a pristine environment for recreational snorkelers and divers. Flamenco Beach on the east side of Flamenco Peninsula is a popular tourist destination and is routinely listed as one of the most beautiful beaches in the world. The presence of hazardous military munitions with a potentially complete exposure pathway to beach-goers will be assessed. The marine remedial investigation will aim to determine the nature and extent of any contamination, as well as, evaluate where unacceptable risks exist.

Another important factor in the marine environment is the interaction between the endangered and threatened species and possible risks associated with explosive hazards. With the potential impact to the environment in mind, a three stage process was developed in order to complete the marine remedial investigations. A baseline study will first delineate the sensitive habitats with sonar and optical based systems. Next, geophysical survey plans will be developed based on these results and implemented using both magnetic and electromagnetic methods. The final phase will be intrusive investigations of selected geophysical anomalies. This presentation will explain the scoping and planning activities of the major components for this remedial investigation of the underwater environment.

Fourth International Dialogue on Underwater Munitions

October

1-3
2012

Intercontinental
San Juan Resort &
Casino

ABSTRACTS

A report on recent underwater remedial actions performed in Military Munitions Response Program,

Andrew Schwartz, Military Munitions Division, Environmental and Munitions Center of Expertise, U.S. Army Corps of Engineers

The number of underwater remedial actions performed in the FUDS program is increasing slowly year to year as USACE managers must address known or suspected immediate hazards to human health. Program-wide the U.S. Army Corps of Engineers has performed over half a dozen underwater remedial response projects in the Military Munitions Response Program since 2010. This presentation summarizes some of the more challenging project objectives for underwater munitions response undertaken by USACE project delivery teams, and how those objectives are developed. Remedial actions on Martha's Vineyard require USACE PDTs address immediate hazards identified on South Beach, as well as perform a remedial investigation over the larger Former Moving Target Machine Gun Range Formerly Used Defense Site. At the Port Of Seattle USACE met the challenge of completing a time critical removal action to avoid shutting down and losing a multi-billion dollar per year cruise ship industry. That site too is performing a remedial investigation over the larger FUDS area associated with the former Port Of Seattle. These and other sites with unique and challenging project objectives will be reviewed with emphasis on the technologies used by the project teams, which include various sonar systems, prototype shallow water metal detection systems, and various diver-deployed, ROV-deployed and towed magnetometer and time-domain electromagnetic induction metal detectors.

Sea-Disposed Munitions: A Practical Solution to Reduce the Risk of Exposure in Varied Environments,

Bunch, B.W.^a, Bailey, S.E.^a, Ruiz, C.E.^a, Chapman, R.S.^a, Sheehan, P.L.^b, Martin, W.A.^a,

^a *US Army Corps of Engineers, Engineer Research and Development Center, Vicksburg, MS 39180 USA*

^b *US Army Armament Research, Development, and Engineering Center, Picatinny, NJ*

Sea disposed munitions pose a risk to human health, safety, and are a potential threat to the environment. Current management options are limited and include removal, in-place detonation, or leave-in-place. Munitions subjected to ocean currents may not stay in place, making them difficult to monitor, remove or detonate after initial detection. Innovative capping technology has the potential to physically stabilize and isolate munitions, preventing movement and safeguarding human exposure and environmental risk. A multitude of materials with differing properties are available for geobag construction, allowing flexibility of design. This project evaluated the physical stabilization aspects of a cap, while examining the requirements to reduce munitions mobility over a range of energies. Geobags, as used in this study, were able to withstand flow conditions similar to or exceeding those that modeling indicated would be experienced at Ordnance Reef, HI. The geobag placement and

encapsulation proved successful under dry and wet conditions. The munition size and orientation dictate the geobag dimensions or number of geobags required to encapsulate a munition or a group of munitions. Ultimately the encapsulation and isolation of an underwater munition reduces the risk of exposure to humans and biota in the underwater environment. Placements of the geobags under controlled conditions in this study were easily manipulated. The next step in this research is to determine the best placement approach under dynamic conditions, such as a large scale flume or in a natural environment.

CMW and UXO Ocean Dumpsites, Gulf of Mexico

*William R. Bryant, Niall Slowey, and Michael A. Champ
Department of Oceanography, Texas A&M University*

In 1945, Headquarters of the 8th Naval District (New Orleans) designated four areas on the Texas-Louisiana Shelf and Slope in the Gulf of Mexico (GOM), (south of the mouth of the Mississippi River (currently referred to as Department of Defense (DOD) sea disposal site LA-01); south of Pensacola, Florida (DOD sea disposal site FL-01); south of Galveston, Texas (DOD sea disposal site TX-01); and east of Corpus Christi, Texas (TX-02)) as official munitions disposal areas. As these sites did not meet the minimum depth requirements (3,000 feet) imposed at the end of 1945, their use was discontinued and was replaced with a new site south of the mouth of the Mississippi River (DOD sea disposal site LA-02). Each of these disposal areas are about 81 square (9 x 9) nautical miles in size. In 2001, the U.S. Army issued a report detailing past chemical warfare material (CWM) disposal in U.S. coastal waters between World War I and 1970. The Department of Defense (DOD) reported that there were eight CWM disposal events in the GOM. The Fiscal Year 2009 Defense Environmental Programs Annual Report to Congress summarizes all munitions disposal in the GOM identified following an extensive archive research effort. This report identified six disposal sites in the GOM and additional disposals for which no location was provided in the documentation. A total net chemical agent weight of 193 tons is reported as being disposed in the GOM. The disposals do not fully correspond with the designated disposal sites and no documentation was found confirming disposal in several of the designated disposal sites. It is likely that the historical documentation is incomplete.

The July 1945 establishment of the four designated disposal areas discussed above was based on a minimum depth requirement of 150 fathoms (900 feet). Subsequently, a December 1945 memorandum from the Chief Naval Officer (1945) to all ships and stations stated, "It is deemed advisable, however, to require that chemical ammunition, except pyrotechnics, be dumped in waters having a minimum depth of 1000 fathoms." Subsequently the Chief of Staff of the New Orleans Naval District in a Memo (1946) stated that "Since none of the above areas meets the minimum depth requirements of 500 fathoms [3,000 feet], use of those areas for ammunition disposal will be discontinued and the area off South Pass (Miss. River), described below, established by authority of reference, will be used for the

Our Sponsors

Ministerstwo Środowiska



MINISTERSTWO
ŚRODOWISKA

MISSION:

Ministry of the Environment, through its input into national policies, fosters the environment both domestically and globally, and ensures the long-term, sustainable national development with respect of natural heritage and human rights to meet the needs of both the present and the future generations.

VISION:

Ministry of the Environment, as the state-of-the-art, professional institution which enjoys social trust, provides for rational management of natural resources and environmental education of the general public, and is open to cooperate in the field of the environment.

Główny Inspektorat Ochrony Środowiska



The origins of the work of the Inspection for Environmental Protection date back to September 1980, when pursuant to the new Act on environmental protection and development the Council of Ministers issued an ordinance on the National Inspection for Environmental Protection. These legal acts constituted the foundation for the work of the inspection and implemented a uniform system serving to control compliance with environmental protection regulations and examine the state of the environment across the country.



VRHabilis LLC is the predominant Service-Disabled Veteran Owned Business. This will be a result of our valuing the known qualities of veterans above other considerations. Utilizing Mass Customization for Individual Potential™, VRHabilis has created multiple business lines and independent business units capable of capitalizing on a multitude of government and private opportunities. By utilizing technology, adaptable organization and individual desire, VRHabilis works with equipment manufacturers and construction managers to develop cost-effective solutions to individual disabilities. These solutions are then fielded, adding service disabled veterans to the work force.



Kobelco consists of Kobe Steel, Ltd. (KSL), Kobelco Compressors America, Inc. (KCA), Kobelco Compressors Manufacturing of Indiana (KCM) and Kobelco Machinery Asia Pte, Ltd. (KMA).

Kobelco is a global, diversified industrial corporation with annual revenues in excess of \$20 billion (USD). Established in 1905, Kobelco is based in Tokyo, Japan, with manufacturing, sales and support locations worldwide. The Company operates in three main business sectors: Steel & Iron, Aluminum & Copper and Machinery. Kobelco's Compressor Division is a major business unit within the Machinery Sector.



aDeDe
EXPERTS IN EXPLOSIVES

aDeDe is a Belgian company specialized in locating all kinds of explosive remnants of war, both on land and underwater, advising the responsible authorities, and clearing the hazards. Originally established by military divers in 2000, aDeDe has been constantly growing since. It has developed as one of the world's leading companies in the field, particularly at sea.

aDeDe has gained a vast reputation and experience, cooperating with most of the world's leading enterprises in the dredging business, and offering a set of sustainable solutions to counter the risks related to unexploded ordnance: from historical and geophysical research to diving operations and on-board assistance.



Founded in 1899, NABU (NATURE AND BIODIVERSITY CONSERVATION UNION), is one of the oldest and largest environment associations in Germany. The association encompasses more than 450,000 members and sponsors, who commit themselves to the conservation of threatened habitats, flora and fauna, to climate protection and energy policy.

NABU's main objectives are the preservation of habitats and biodiversity, the promotion of sustainability in agriculture, forest management and water supply and distribution, as well as to enhance the significance of nature conservation in our society.



At least 50,000 tonnes of chemical munitions have been dumped in the Baltic Sea since the Second World War, many of them containing poisonous substances. Uncertainty still exists about the location of all dumping areas, the content and condition of the munitions or how they behave under Baltic Sea conditions. The CHEMSEA project seeks to close our knowledge gaps on this topic by mapping and characterizing these dumping sites, to develop guidelines in order to reduce potential threats to the environment and fishermen and to prepare a region-wide contingency plan to deal with cases of leakage.

Fourth International Dialogue on Underwater Munitions

October
1-3
2012

Intercontinental San Juan Resort & Casino

SPONSORS



ENVIRONET INC.

Established in 1995, Environet, Inc. is a Veteran-Owned, SBA certified HUBZone firm headquartered in Kamuela on the Island of Hawaii. With offices in Kamuela, Honolulu, Guam, and Colorado, Environet continues to grow across disciplines while delivering an array of services throughout the Pacific and U.S. mainland. We offer a full spectrum of environmental, munitions and explosives of concern (MEC), and construction services ranging from investigations, assessments, remediation, and risk avoidance to general contracting and construction management services. Our clients include a broad cross-section of Federal, State, and County agencies as well as private business sector clients who look to us for practical guidance and long-term stability. We have a team of optimally qualified professionals tailored to support the needs of clients such as the U.S. Navy, the U.S. Army Corps of Engineers, the U.S. Coast Guard, various State and local government agencies, and a number of private businesses and organizations.

Wentworth Environmental Services Inc.



Wentworth Environmental Inc. (WEI) is a Canadian owned and operated Munitions Response (MR) company. The technical background for our staff includes expertise in Engineering, Quality Assurance (QCP), Risk Mitigation, Working Dogs, Munitions and Explosives of Concern (MEC), Project Management, and Mine Action programs. Many of WES employees are former military service men and women who served in United Nations and NATO lead missions, who are experienced working in war zones. Their training, experience, skills and qualifications includes; Explosives Ordnance Disposal; Improved Explosives Disposal; Advance Improved Explosive Disposal; Chemical, Reactive and Energetic Disposal and Hazardous Management; Post Blast Investigation; Advance Combat Intelligence; Nuclear, Biological, Chemical Defence and Warfare, K9 Training and Handling, Mine Action Programs; Private Security, Historical Research and Investigation, Safety and Quality Management and Planning, and Civil, Marine and Mechanical Engineering.

Gesellschaft zum Schutz
der Meeressäuger e.V.

GSM



The GSM (Society for the Conservation of Marine Mammals) is a small charity working to secure the protection of whales, dolphins, seals and other marine mammals, as well as their habitats. Our main focus is on political conservation and education.

The society was founded in Hamburg, Germany, in 1978 and, in the main, work is carried out on a voluntary basis. The GSM is sponsored by the Loro Parque Fundación (LPF).



The Management Unit of the North Sea Mathematical Models and the Scheldt estuary, abbreviated to MUMM, is a department of the Royal Belgian Institute of Natural Sciences (RBINS), a federal scientific establishment that comes under the Federal Science Policy (previously known as OSTC).

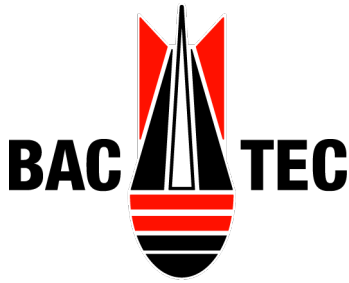
MUMM adopts a 'triple M' strategy: Modelling, Monitoring and Management.

Modelling: studying the ecosystems of the North Sea using mathematical modelling techniques, with a view to understanding how they function and to providing certain forecasting capabilities.

Monitoring: collecting marine information required to validate the models and make them operational, along with the various techniques used to assess the condition of the marine environment.

Management: representing Belgium in a number of inter-governmental conventions dealing with the protection of the marine environment, including the preparation of Belgian positions to be upheld and the implementation of decisions taken, under the authority of the Minister responsible for marine environmental policy.

MUMM comprises a team of around sixty people motivated by the need to improve knowledge of the North Sea and provide scientific marine services for those concerned.



PART OF THE DYNASAFE GROUP

The BACTEC (Battle Area Clearance, Training, Equipment and Consultancy) Group of companies is comprised of a number of leading Explosive Ordnance Disposal, (EOD (Bomb Disposal)), Mine Action companies operating worldwide from strategically located offices. The Group Head Quarters is located with BACTEC International Limited in the UK, with offices/branches located in Australia, Cambodia, Iraq, Lao PDR and Mozambique. BACTEC has been providing unexploded ordnance (UXO), landmine clearance and bomb disposal services globally since 1991 and to date has carried out Unexploded Ordnance disposal contracts in over 45 countries.



Global Green USA is the American affiliate of Green Cross International, founded by President Gorbachev, to foster a global value shift toward a sustainable and secure future. For nearly 20 years, Global Green USA has been a national leader in advocating for smart solutions to global warming including green building for affordable housing, schools, cities and communities that save money, improve health and create green jobs.



Shaken by the death of millions of dolphins in the tuna drift nets three times circumnavigator Rollo Gebhard founded in 1991 GRD. Since then joined more than 95% of the German tuna trade in the SAFE program for dolphin-safe tuna caught. Today SAFE is the most comprehensive dolphin conservation project in the world.

We work with global conservation projects for the protection of wild dolphins and the preservation of their habitats and conduct campaigns and actions for a comprehensive marine ecosystem protection.



The foundation Green Cross Switzerland was established in 1994. Its work is characterised by fast, direct, and effective help to self-help on site. Support is provided in a pragmatic manner, based on scientifically sound approaches, and involving all participants in designing and implementing a solution. A team of eight full and part-time employees is currently working for Green Cross Switzerland.

Green Cross Switzerland's projects are monitored by the Board of Trustees with regard to factual and cost objectives. Great importance is attached to education, mediation and scientific arguments in the search for solutions. Aiming at global prevention of ecological risks, such as the destruction of chemical weapons and disasters like Chernobyl, the organisation also closely collaborates with the Green Cross Parliamentary Group.

Fourth International Dialogue on Underwater Munitions

October

1-3
2012

Intercontinental San Juan Resort & Casino

SPONSORS

**Fourth
International
Dialogue on
Underwater
Munitions**

October
1-3
2012

Intercontinental
San Juan Resort &
Casino

SECTION

Thank you to our Sponsors

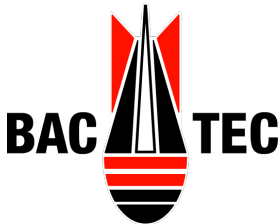


MINISTERSTWO
ŚRODOWISKA

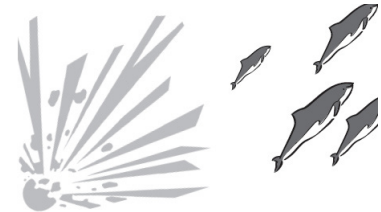


aDeDe
EXPERTS IN EXPLOSIVES

KOBELCO
KOBELCO STEEL GROUP



PART OF THE DYNASAFE GROUP



Wentworth Environmental

Making the world a cleaner place for a brighter future