

Multi-Agency Workshop
“Diving in Contaminated Water:
Past - Present – Future”

Report on Proceedings

Hosted By: NAVSEA – SUPSALV
Held On: July 25 and 26 2006
Held At: ROH Conference Room
2711 Jefferson Davis Hwy Suite 500
Arlington (Crystal City), VA 22202
Report
Prepared By: Phoenix International
6340 Columbia Park Road, Suite A
Landover, MD 20785

Executive Summary

Following the natural disaster created by hurricanes Katrina and Rita, Contaminated Water Diving (CWD) has once again moved to the forefront of US Navy Diving thinking. This workshop marked the beginning of a renewed effort to understand and manage CWD. Earlier efforts, the last being in the early 1980's, have raised many important questions but actual guidance remains disjointed and uncoordinated. Many workshop participants were involved in these earlier studies and their previous experience is likely to prove invaluable in producing meaningful output from the working group. Anke Wilhelm, German Exchange Engineer, was tasked with coordinating this project. She identified those subject matter experts who would be key to the success of this process and, by raising awareness of the problem and personally contacting those involved, put together a broad based and highly experienced team.

The workshop was designed to include presentations that provided a good baseline on the topics for discussion but allowed plenty of time for discussion and idea exchange. Even though the working lunches ran long there were no complaints, even when it came to paying the cheque. At the end of the workshop attendees were split into three Breakout Groups. Following energetic discussion, 21 action items were identified and a coordinator and deadline assigned to each action.

In his opening remarks on day two, Captain Wilkins discussed the need to improve CWD procedures, ultimately to protect the diver's long-term health. He described the aspiration to publish the USN's Guidance for Diving In Contaminated Waters as soon as practicable, - even if the guidance is incomplete. The idea being to get it out and gain feedback, to show that it is an important issue and this is what we currently do and do not know. If some form of guidance is not published there is the possibility that we could continue to overlook CWD. It was this thinking that led to the workshop. The US Navy is willing to take the lead on this topic, but invites the different diving communities to help develop the best equipment, procedures and pool of knowledge for the benefit of all divers. Captain Wilkins suggested that this is a 2 to 4 year process. Along the way useful material could, and should, be added to the guidance, ensuring it remains a useful and practicable, living document.

We must know more about; What we are sending divers into, the contaminants of concern, the potential acute and long-term effects, and how to protect the divers from adverse health affects?

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1. Purpose

Develop a Contaminated Water Diving (CWD) program that is scientifically based, realistically usable, and designed to protect all divers from potential adverse health effects related to diving in contaminated waters.

2. Background

Diving is an inherently hazardous activity and successful diving is accomplished by effectively managing those risks. Contaminated water has been identified as an important risk that must be managed.

The early '80s saw some initial research relating to CWD, but little came out of it. In August 2004 the U.S. Navy issued the *Guidance For Diving In Contaminated Waters* (SS521-AJ-PRO-010). Though recognized as incomplete and far from comprehensive it was issued to show that the Navy recognized CWD as of real concern, to raise the level of CWD awareness, and to invite input for improvement. Since hurricanes Katrina and Rita, in the Gulf of Mexico, in 2005 CWD has again come to the fore.

This workshop is a stage in the continuous improvement process. The U.S. Navy has accepted a lead role and, to ensure a positive result, invited representatives from the larger diving community to participate in defining and mitigating the CWD risk. Workshop outcomes and deliverables will be used to enhance the collective knowledge and understanding of diving in contaminated water.

3. Goals and Objectives

Bring the various diving communities together to begin discussing the current state of CWD guidance and the potential threats, hazards, and other issues associated with the problem. Presentations, open discussion, and breakout groups were planned to accomplish this goal. Long-term goals are to initiate and maintain an open dialogue on CWD, with the intent of producing a meaningful CWD program and data resource. Initial objectives include:

- Establishing current state of CDW. (What do we know and what do we need to know?)
 - Identifying available resources and those actions required to establish a scientific CWD data base line .
 - Reviewing existing CWD materials, programs, research, etc. to identify useful materials and missing information needing further investigation.
- Identifying CWD tool kit. What tools (equipment, procedures, etc.) already exist, what needs improving, what needs to be developed? (e.g. Personal

Protective Equipment (PPE), Decontamination, Training, Water Quality resources and profiles, etc.).

- Developing a comprehensive resource and guidelines to effectively support CWD activities.

4. Attending

Workshop attendees are listed in Table 1. Most attendees were present for the entire event, others were present as their schedules permitted, and a few were present for only small segments.

Table 1 - Workshop Attendees

Attendee	Representing
Dr. Shlomo Almog	Sheba Medical Center
Prof. Yona Amitai	Ministry of Health Jerusalem, Israel
Steve Butler	U.S. Department of Labor - OSHA
LCDR Dru Daubon	Naval Sea System Command
Dave Dinsmore	NOAA Diving Program
Mark Ehrnschwender	Phoenix International
Edward Gawarecki	Army Corps of Engineers, Buffalo District
Michael Glenn	Columbus County Sheriff's Office (Public Safety Divers)
Ph.D./LCDR MC USNR Patrick Hennessey	Navy Experimental Diving Unit
Prof. Barak Herut	Oceanographic & Limnological Research
Kevin Horn	FBI – Diving Operations
Alan Humphrey	U.S. Environmental Protection Agency (EPA) Environmental Response Team
Dr. Anwar Huq	Center of Marine Biotechnology, University of Maryland Biotechnology Institute
John Paul Johnston	Divers Institute of Technology
Michael Lang	Smithsonian Institution – (Scientific Diving Community)
Peter LeHardy	Phoenix International
Marianne Molchan	Molchan Marine Sciences
LT. Alex Moomaw	U.S. Coast Guard
Dr. / CAPT. John Murray	Naval Sea System Command
Phil Newsum	Association of Diving Contractors International, Inc.
MDV Fred Orns	U.S. NAVY
Dr. Paul Weathersby	Naval Medical Submarine Research Lab and Navy Experimental Diving Unit

Dr. Robert Whaley	U.S. NAVY
Anke Wilhelm	U.S. NAVY (German Exchange Engineer)
LT. Jim Pearson	U.S. NAVY (RN Exchange Officer)
CAPT Chris Murray	U.S. NAVY
CAPT. Jim Wilkins	U.S. NAVY

5. Presentations

A series of presentations on CWD (current status, programs, research, etc.) were planned to provide an information base line and topics for discussion. Below is a précis of each presentation along with links to the original power point presentation and any available abstracts and biographies.

5.1. Diving in Contaminated Water Way Ahead

Presenter and Facilitator: LCDR Dru Daubon, Naval Sea System Command, Supervisor of Diving, Acting.

Although the welcome and introductions went well, it was decided to postpone this presentation until later, if time permitted. Key points of the presentation directly related to the purpose of the workshop and the Navy's efforts past, present, and future in CWD were presented in brief. This presentation provides an overview of the U. S. Navy's contaminated water diving involvement.

Abstract: [Diving in Contaminated Water](#)

Presentation: [Diving in Contaminated Water.ppt](#)

5.2. Workshop Purpose and Goals

Presenter: Anke Wilhelm, Naval Sea System Command, Exchange Engineer

Beginning with an overview of CWD issues (e.g. awareness, contaminant identification, SOPs, training, testing, etc.) and moving to CWD's multi-disciplined – multi-layered nature. The presenter established why little has been accomplished in this area. There are two basic approaches to CWD; 100% protection from the environment and establishing acceptable risk criteria. Both approaches have associated problems and neither is currently possible. Developing a Operational Risk Management (ORM) procedure is the first step in solving the CWD puzzle. Key steps in the ORM are:

- Contaminant Identification – What contaminants are of concern, testing (equipment and how to test properly, monitoring to develop contaminant profile, contaminant database by water region, lakes, rivers, etc.

- Medical Considerations – preventative measures (immunization, screening), Medical documentation to establish links.
- Develop SOPs – site evaluation, diving, decontamination, and chamber procedures.
- Training – awareness, procedures, and equipment.

Abstract: [Workshop Purpose and Goals](#)

Presentation: Workshop Purpose and Goals.ppt

5.3. Contaminated Water Detection & Decontamination

Presenter: Patrick Hennessey, PhD / LCDR MC USNR

This presenter covered two topics of concern; the ability to get real time testing at the dive site and effective decontamination within the allowed timeframes.

5.3.1. Field Deploying the Real-Time Polymerase Chain Reaction (PCR) for the Primary Detection of Pathogenic Biologics and the Secondary Detection of Environmental Stressors in the Marine Environment

Effective water quality testing at dive sites is problematic for many reasons and to solve this problem the U.S. Navy NEDU has established water analysis goals and is testing equipment to meet them. Goals include, the same equipment for chemical and biological agents, broad and narrow focus, 3-4 hour reporting period, tests for more than one substance. The BioSeeq Field Deployable Handheld RT-PCR Thermocycler appears to meet the criteria with 4 units deployed for more than 3 years in Afghanistan and Iraq. This unit allows testing for specific pathogenic organisms or indicator organisms, petrochemical contaminants, PCB compounds, and heavy metals in fresh or salt water. NEDU has a unit on loan for testing and a unit on order. The unit is currently \$31,000 and has a 6-month backlog.

Discussion points: High cost, availability of base genes

5.3.2. Current Recommended Diver Decontamination Procedures, Their Weaknesses, and Possible Future Solutions to the Pollution

Guidance for decontamination is too general and does not allow for specific planning, supply, pre staging, etc. Procedures tend to spread contamination, not isolate it. No easy means to track contamination levels. Time for decontamination prior to decompression are essentially unattainable, leading to potential contamination of the

recompression chamber, thus contaminating the diver and presenting a potential fire hazard. Testing at NEDU shows 10-15 minutes decontamination time per contaminate and that tenders are at high risk of contamination. NEDU is working on a rapidly deployable decontamination system based on automated surgical hand scrubbing systems. The unit will be self-contained, no plumbing, pneumatically operated, less than 90 seconds head to toe and as effective as 10 minutes of mechanical hand scrubbing.

Discussion points: Current shortcomings of decontamination and containment

Presentation: [Contaminated Water Detection & Decontamination.ppt](#)

5.4. Environmental Monitoring at Marine Diving Sites of the Israeli Navy – Human Health Perspective

Presenter: Professor Barak Herut, Israel Oceanographic and Limnological Research, National Institute of Oceanography, Director General

Introduced the national monitoring program for Israel's coastal waters, started in the early 1980's and performs annual testing to track the status and trends of coastal waters. In 2000, a governmental inquiry led to monitoring at Israeli Navy diving sites, mainly ports and marinas, to prevent health risks attributed to marine pollution. Sediment (top 2 cm) and surface water are sampled and analyzed for a suite of pollutants as follow: heavy metals, PAH's, PCB's, chlorinated pesticides, volatile organic compounds, organotins and more. Over the years a water quality profile was developed.

Discussion points: What are the keys in establishing an appropriate monitoring program? Testing methods, frequency, parameters, and matrices. Monitoring limited to harbors not open sea. Once contaminant profile is established it becomes useful.

Abstract: [Environmental Monitoring](#) Bio: [Barak Herut](#)

Presentation: [IOLR Monitoring Program.ppt](#)

5.5. Proposed Guidelines for Diving in Polluted Water: Report of the Israeli Expert Committee

Presenters: Professor Yona Amitai, Head of the Clinical Toxicology and Pharmacology Lab., Sheba Medical Center, Tel-Hashomer, Israel
Dr. Shlomo Almog, Director Institute of Toxicology, Israel

Based on the same governmental inquiry a study on cancer rates among Israeli Navy divers showed no statistical increase in cancer rates compared to non divers. The expert committee was tasked with establishing an environmental standard for diving. Research showed over 20 navies had no CWD standards. The committee decided to use the U.S. EPA's drinking water standard and the U.S. Navy CWD Guidance as the basis for their model. They determined two routes of contamination dermal and oral.

As most studies on contaminant effects are based on laboratory animals various factors are added to extrapolate for human exposure effects. For example: animal to human x10, variability of human exposure x10, Duration x10, etc. This provided a scientifically valid but admittedly conservative model. Other recommendations included prevention (exercise, diet, minimum sun) and medical monitoring (regular medical examines, biological monitoring, and blood and urine testing within 4 hours of last dive).

Discussion Points: What about inhalation as a contaminant pathway? How do wetsuits contribute to dermal uptake, and does hydrostatic pressure affect dermal absorption? The model appears sound and it is the factors that need to be adjusted.

Abstract: [Executive Summary](#) Bio: [Yona Amitai](#)

Presentation: [Proposed Guidelines pitch](#)

5.6. Scientific Diving in Contaminated Waters: Risk Versus Scientific Benefit

Presenter: Dr. Michael A. Lang, Smithsonian Institute, Director, Smithsonian Scientific Diving Program

The Smithsonian has around 150 divers and nationally there are about 4200 scientific divers. This community does have diving standards American Academy of Underwater Sciences (AAUS) standards for scientific diving certification, University National Oceanographic Laboratory System (UNOLS) Amplifies AAUS standards for diving from research vessel platform, and NSF Office of Polar Programs (USAP) specific to diving in Antarctica. The presenter moved to the topic of risk with the following key points: the ultimate responsibility for safety rests with the individual diver. Estimating risk is a scientific event, accepting risk is a political activity and nothing is free from risk. CWD criteria need to be established, followed and need to use scientifically based causal (dose/response) relationships followed by sound contaminant assessment.

Discussion Points: The risk factors (1:100,000?) need to be determined scientifically. Anecdotal stories are insufficient. What are the real biological, chemical, or radiological threats? Do we know?

Presentation: [Scientific Diving in Contaminated Water.ppt](#)

5.7. Contaminated Water Risk Assessment: Prior Lessons Learned

Presenter: Dr. Paul Weathersby, NSML and NEDU, Senior Scientist

Whether or not we should dive in contaminated water is a question of Risk Assessment. To determine if it is worth it the need to Identify hazards, assess exposure, and establish dose-response limits and remember that risk depends on the audience. To make key points the presenter equated submarines to saturation dives in a contaminated environment and provided assessment examples. Returning to CWD the scope of the problem, the lack of existing assessments, and the need for lots of information was presented. Possible sources of information include standard Occupational Health Guides, Coast Guard's CHRIS, EPA data – Navy port Superfund data, National Science Academy (NAS), USACHPPM, and others. The need for diving specific risk assessment is real, but not going to be fast or easy.

Discussion Points: CAMEO is another info source. Is water exposure depth dependant?

Presentation: [Contaminated Water Risk Assessment Prior Lessons Learned.ppt](#)The Public Safety Divers Health Survey

Presenter: Michael Glenn, Columbus County Sheriff's Office, Detective, Dive Team Coordinator

Public Safety Divers (PSD) is a huge community with over 300,00 in the US. Most have only recreational diving certification and use their own equipment. This group responds to drowning victims, evidence recovery, vehicle extractions and hazard removal. No national standards, protocols, or CWD guidance. Typical equipment is SCUBA with 2nd stage regulators. Decontamination ranges from none to full, depending on unit and equipment available. The PSD Initiative was developed to obtain raw data on PSD units (e.g. what type of unit, funding, equipment, training and certification, PPE, decontamination procedures, etc.) and diver health and illness data. A questionnaire with 7 parts and 127 questions has been posted on the Internet www.psdhealthsurvey.org with links from other PSD sites and media and will be available for one year. This information will be used for a correlative study comparing illness with equipment used, decontamination procedures and dive site descriptions to aid in developing standards and establishing base line for other comparisons. This is the starting point for the PSD response to CWD and the need to ensure the long-term health of the divers.

Discussion Points: What is anticipated volunteer response rate? Sample groups showed about 60% return rate.

Survey: [PSD Survey.doc](#)

Bio: [Mike Glenn](#)

Presentation: [The PSD Health Initiative.ppt](#)

5.8. Testing Results for Contaminants in Inland Water

Presenter: Edward Gawariki; U.S. Army Corps of Engineers, Buffalo District, Mechanical Engineer, District Dive Coordinator

Building on the EPA's experiences with contaminated sites a case study was used to describe the testing and monitoring and the approach to the dive. Based on historic records of the river area, the area was tested for sediment and water contamination levels for PCBs, Pesticides, Semi-volatile Organic compounds, heavy metals, and Radiological Hazards. The most likely method of contamination for each was assessed (contact, inhalation, etc.) and equipment and decontamination decisions were based on the test results. Some information specific to PAH and PCB was presented and along with sources for information, how to get sediment sampling information was provided.

Discussion Points: What waters are sampled and what type of sampling is available? Can there be a master list made available? Is there a Point of Contact?

Bio: [Edward Gawarecki](#)

Presentation: [Inland Water Testing Results.ppt](#)

5.9. NOAA's Contaminated Water Diving Program: Past, Present, and Future

Presenter: Dave Dinsmore; National Oceanic Atmospheric Administration, Director Diving Program

The history of Agency and Inter-Agency efforts from the late '70s and early '80s showed that some incremental progress was made, but that the issue fell off the priority list and little in the way of change or improvement has occurred since. Key to the current effort is the need to review the earlier work and not spend time and effort reinventing the wheel. NOAA does not have CWD program and stopped issuing Vulcanized rubber dry suits several years ago. NOAA divers are advised to refrain from diving in any water of questionable quality. Funding request for CWD has been made for FY'08-'13, to establish work group to determine pollutant levels, minimum protection requirements, and effectiveness of COTS equipment.

Discussion points: Can these old documents be scanned? Need to involve Manufacturers.

Presentation: [NOAA CWD Program NOAA History.ppt](#) Bio: [Dave Dinsmore](#)

5.10. Contaminated Water Diving Operations

Presenter: Phil Newsum; Association of Diving Contractors International (ADC-I), Acting Executive Director

This overview of the association's consensus standards on CWD showed an emphasis on planning, site assessment, training and equipment. Minimizing exposure (dive time) and scheduling dives to eliminate decompression surfaced as a key concept. References to all applicable standards related to training, procedures

and requirements are spelled out. Training and protection for all team members is specified and considering them as exposed and requiring decontamination is specified. Contaminated water level and diver worn equipment tables are provided. In severe contamination situations ROV should be considered. Decontamination Procedures are described.

Discussion Points: If no sampling is performed recommend going to Level 1. From ADC-I perspective Surface Supplied Diving is strongly recommended for CWD. Where do you test upper, middle, or lower layer? Try for working depth, not always possible. Currently don't test sediment, but will be recommending it. Decontamination can take 20-25 minutes following a dive so all dives should be planned for No-D, there should be No in water D. Decontamination solution should be different % for equipment and divers.

Presentation: [Contaminated Water Diving OPS.ppt](#)

5.11. USEPA Diving Program, Contaminated Water Issues, and Technical

Presenter: Alan Humphrey; Environmental Protection Agency (EPA), Environmental Response Team (ERT), National Director

This overview of the EPA diving program and the ERT provided information on several fronts. The EPA experience in contaminated water covers chemical and biological pollutants and includes CWD, Specialized Hazmat and decontamination procedures, diver operated sampling devices and ROVs. A Diving Safety Management Program sets the organizational and managerial structure, technical framework, training, and diving protocols. The EPA Diving Safety Board is responsible for the Diving Safety Manual outlining the operating rules, guidelines, procedures and methods for EPA divers. ERT divers are trained in variable volume dry suits, full face masks, polluted water diving operations, and more that should prove useful in this process. The ERT may potentially fill vital CWD needs in the areas of sediment contamination, scientific and analytical support, and decontamination.

Discussion Points: National Homeland Security Center (EPA) was mentioned as possible resource for rapid analysis or decon resource. Chemical and biological concerns for decon Which first? Use chlorine 1st and degreaser 2nd. Lab Capabilities? Edison NJ full lab (Lockheed Martin), agreement with Aberdeen ARMY.

Abstract: [USEPA Diving Program Abstract.doc](#)

Bio: [Alan M. Humphrey](#)

6. Questionnaires

A questionnaire was sent to all attendees prior to the workshop to gain baseline information related to their community and the current status of CWD. The USN is in process of sending out a survey to the divers involved with Katrina and Rita dives and, as mentioned earlier, the Public Service Divers are in the process of surveying their community. Additionally, an action item is to survey a subset of the commercial diving community (to be developed). Though basically anecdotal, this will prove to be critical baseline data.

[CWD Workshop Questionnaire 06](#)

7. Breakout Groups and Action Items

The concept for the workshop was to ensure that it was not limited to presentations, but allowed plenty of time for discussion and, more importantly, identifying the next steps and required actions. Three breakout groups were discussed early in the process. Two had assigned topics – Inter-agency Collaboration and Contaminant Identification, the third was called the Wildcard group, allowing discussion on a topic

or as it turned out topics that came up during the workshop. The working lunches proved to be a great venue for familiarization, discussion, and thought.

After lunch on the last day the groups broke out and captured their discussion points and resulting action items. Action items required assigned responsibility and a due date. The resulting 21 defined action items follow:

CWD Multi-Agency Workshop Action Item List (Sheet 1 of 5)

Item	Group	Action	Responsibility	By
		Notes		
1	A	Establish Centralized database and unclassified web-page(s) for CWD and create a link for CWD workshop materials.	Ms Anke Wilhelm/ Lt Jim Pearson RN (NAVSEA OOC3	8/26/06
		1. Web-based information sharing, communication and annual meeting(s). 2. SUPSALV – Inter-agency Web Page		
2	A	Issue Multi-agency CWD Survey Questionnaire.	ADC (Mr Phil Newsum) for ADC Members. NOAA (Mr Dave Dinsmore) for Federal Agencies OOC3 (MDV Fred Orns) for Military Divers.	8/31/06
		1. Based on the Pre-CWD Workshop Questionnaire but including additional medical questions (developed by ADC).		
3	A	Establish NOAA database and web-page(s) for CWD.	Dave Dinsmore (NOAA)	10/31/06
		1. NOAA will implement a CWD at the NOAA Web Page. (Coordination required between SUPSALV and NOAA to ensure that information is not duplicated. It may be sufficient to have a link from NOAA website to SUPSALV website).		
4	A	Include CWD as an agenda item during Underwater Intervention 07.	ADC (Mr Phil Newsum) in liaison with OOC3.	1/30/07
		1. Identify key subject matter experts. 2. Investigate the possibility of establishing a board of expertise to advise the CWD Workshop (Board could include missing stakeholders such as: Dry suit manufacturers, Life Support Equipment Engineers, U.S. Geological Survey, National Park Service, U.S. Customs, U.S. Fish & Wildlife, Bureau of Mines, Minerals Management Service, Los Alamos National Labs, Diving Physicians, Diving Researchers, New York Police Department Dive Team, Commercial Diving Company Representative).		

CWD Multi-Agency Workshop Action Item List (Sheet 2 of 5)

Item	Group	Action	Responsibility	By
		Notes		
5	C	Review Dutch Study on diving mask performance and decide on any requirement for further facemask trials/development in the US.	NAVSEA OOC3 (Lt Jim Pearson/MDV Fred Orns)	3/31/07
		Dr Weathersby mentioned a newly published Dutch Study in Environmental Health Perspectives. It quantifies the amount of water swallowed in a swimming pool scenario using a mask and snorkel, full face mask, and a diving helmet .		
6	A	Collate and report results of Multi-agency CWD Survey Questionnaire.	ADC (Mr Phil Newsum) for ADC Members.	7/24/07 †
		Results of questionnaires to be collated and analyzed to identify any trends and issues arising from CWD. Results to be briefed during CWD Workshop 07.	NOAA (Mr Dave Dinsmore) for Federal Agencies OOC3 (MDV Fred Orns) for Military Divers.	
7	C	Produce new 'Guidance for Diving in Contaminated Waters' for the USN.	NAVSEA OOC3 (Lt Jim Pearson/MDV Fred Orns)	7/24/09 †
		1. Produce new guidelines based on inter-agency CWD work. 2. Guidelines to include Assessment, Equipment, Training and Medical aspects of CWD. 3. Draft Guidelines to be briefed at CWD Workshop 08 as a potential basis for an inter-agency publication.		
8	B	Review and evaluate Israeli Bio-monitoring program and provide program progress report.	Shlomo Almog (Sheba Medical Center)	7/24/07 †
		1. Review & evaluate Israeli Bio-monitoring program for such compounds as heavy metals, organic solvents, PAHs, PCBs, TBTs, organophosphates and carbonates (ACh-esterase activity in rbc's) etc. 2. Investigate the costs associated with conducting tests (ISO 15189, ISO 17025 labs), and what are sample submission requirements.	Dr. Herut (Israeli Oceanographic & Limnological Research) Dr. Hennessey (NEDU)	
9	B	Review and evaluate Israeli 'Diving in Polluted Water Model and Guidelines'.	Dr. Hennessey (NEDU)	7/24/07 †
10	A	NOAA to host CWD Workshop July 07	Dave Dinsmore (NOAA)	7/24/07 †

CWD Multi-Agency Workshop Action Item List (Sheet 3 of 5)

Item	Group	Action	Responsibility ₃	By
		Notes		
11	A	Investigate equipment needs & the development of operational standards.	Association of Diving Contractors (Mr Phil Newsum - ADC) -	7/24/07 †
		1. In parallel with USN research ADC to investigate suitable equipment and standards that could be adopted by commercial diving community. 2. Investigation to include Research, Development and Testing (RDTE) of CWD dive equipment-if appropriate.		
12	A	Commission a Critical Review Paper of status of CWD from existing CWD Literature.	OOC3 (Lt Jim Pearson)	7/24/07 †
		Subject to funding OOC3 will look at commissioning a critical study of existing CWD information. Any information should be assessed for accuracy and usefulness before publishing on CWD Website.		
13	A	Develop CWD Diver Training Curriculum.	DIT (Mr John Paul Johnston) & OOC3 (MDV Fred Orns)	7/24/07 †
		Identify current shortfalls in CWD diver training and suggest suitable curriculums for future use.		
14	A	Produce water Contaminant Guidelines	EPA (Mr Alan Humphrey)	7/24/07 †.
		Produce guidance for Contaminant Analysis and Identification, including establishment of a DataBase and Point of Contact list for the CWD Website.		
15		Produce a database of National Environmental Sediment and Water Data	OOC3 (Lt Jim Pearson) and EPA (Mr Alan Humphrey)	7/24/07
15	B	Identify testable markers of biological response for chemical contaminants.	Dr. Hennessey (NEDU)	7/24/07 †
		1. Testable markers of biological response (CBC, liver function tests (gamma-GT), ESR, creatinine clearance, urinalysis) for annual bio-monitoring of divers. 2. Investigate lab's capable of conducting immunofunction indicator tests, assemble cost/diver quotes. Assemble this data and present report. i.e., how to take samples, where to send samples, and where to gather and interpret results.		

CWD Multi-Agency Workshop Action Item List (Sheet 4 of 5)

Item	Group	Action	Responsibility	By
		Notes		
16	B	Identify organisms that cause acute illness.	Dr. Hennessey (NEDU)	7/24/07 †
		<ol style="list-style-type: none"> 1. Detect pathogens and identify them by using appropriate methods that cause acute illness (i.e., bacteria, virus, algae). Ultimate goal should be dip-stick type test so that it can be performed on site, immediately before as necessary. 2. Rank such organisms based on actual disease rates, case histories, literature reports etc. Provide prophylactics, treatments, and go/no go levels (cfu's) in seawater. 		
17	B	Provide a list of compounds that we should test for in the water column.	Dr. Hennessey (NEDU)	7/24/07 †
		<ol style="list-style-type: none"> 1. What compounds (max of 12-20) should we test for in the water column? 2. Create a list of compounds that we should test for and establish acceptable maximum levels if such compounds are present? 3. Are there deployable tests for those compounds? 4. How can samples be collected and stored for later analysis (in case where disease or acute reaction occurs)? 5. How often does testing need to be conducted? 		
18	B	Provide a list of compounds that we should test for in the sediment.	Dr. Herut (Israeli Oceanographic & Limnological Research)	7/24/07 †
		<ol style="list-style-type: none"> 1. What compounds (max of 12-20) should we test for in the sediment? 2. Create a list of compounds that we should test for and establish acceptable maximum levels if such compounds are present? 3. Are there deployable tests for those compounds? 4. How can samples be collected and stored for later analysis (in cases where disease or acute reaction occurs)? 5. How often does testing need to be conducted? 		

CWD Multi-Agency Workshop Action Item List (Sheet 5 of 5)

Item	Group	Action	Responsibility	By
		Notes		
19	C	Investigate the potential for utilizing PEL, TLV and REL system, used by NIOSH, for surface contamination incidents for use with underwater contaminants.	OOC3 (Lt Jim Pearson RN)	7/24/07 †
		How can we apply permissible exposure limits (PEL), Threshold Limit Values (TLV) and water quality to decide Recommended Exposure Limits (RELs) for divers.		
20	C	Investigate improving through life monitoring of Divers Exposed to Underwater Contamination.	OOCM (Captain John Murray)	7/24/07 †
		What methods could be employed to gain a better understanding of the medical risks posed to divers operating in CW and how can we identify related long-term effects. (This may involve extra environmental recording in Dive Logs, central databases, additional medical examinations, additional immunizations etc)?		
21	A	Develop a Pan Agency Consensus document on CWD Procedures and Equipment	All	CWD Workshop 08 (tbc)

Notes: 1. Group refers to breakout groups, as follows: A = Inter-Agency Collaboration Group Leader: Dr. Michael Lang, B = Contaminant Identification Group Leader:LCDR Pat Hennessey, C = Contaminant to Equipment Requirements & Diving Log Data (Wild Card) Group Leader: John Paul Johnston. 2. Actions are in date order. † Next CWD Workshop 07 ttbc.

3. Although only one nominated action item leader per action all members of the working group are encouraged to contribute, and offer assistance, to any action item they can.