ETV Stakeholder Meeting Summary
Baltimore, MD
August 16, 2007

I. Opening

Tom Stevens opened the meeting and thanked everyone for coming and contributing their expertise. The participants gave self-introductions. A list of meeting participants is attached.

Mr. Stevens stated that the objective of the meeting is to update the stakeholders on the progress of the protocol, including testing and pertinent legislation. He reminded the group that the last such meeting was four years ago, and there is much to update. He stated that another objective is to get input and feedback from the stakeholders, also encouraged questions from participants. He then outlined the day's agenda and read the NSF Anti-trust Statement.

Mr. Stevens provided a brief overview of the protocol. He stated that its goal is to include sufficient challenge water characteristics (challenge/test conditions); identification of ballast water conditions (due to their highly variable nature); use of the most challenging natural conditions at two salinities; and compilation of a matrix of core challenge conditions and supplemental parameters.

The verification factors included in the protocol are: biological performance, power requirements, predictability, temperature and energy efficiency, operation and maintenance requirements, byproduct and residual levels, and environmental acceptance. Mr. Stevens outlined the differences between verification and certification, which include differences in pass/fail criteria, audit requirements, retest frequency, review of technology changes, and use of a certification mark.

Ray Frederick described the ETV Program. He said that the program began in 1995 to verify performance of new environmental technology in a variety of areas. There are six active centers and they are run through co-operative agreements with independent agencies (NSF International in this case). He stated that the current agreement with NSF International is for five years, and while the agreement is currently near its end, an extension has been activated. He pointed out that a new RFP would be issued in the future. Questions about ETV or the RFP can be directed to Evelyn Hartzell of the ETV Program office.

KWNRL Beta Test Results – Ted Lemieux

Ted Lemieux provided a brief background on the beta test of the protocol at the Naval Research Laboratory – Key West (NRLKW). He stated that the intent was to test the Ballast Water Treatment protocol, not the particular technology. Testing began in 2004.

Mr. Lemieux acknowledged the sponsors (USCG; USCG R&D), Severn Trent (who provided the technology and time), and the staff at NRLKW for their efforts. He provided background information, including a description of the facility, and the test set-up. There were several steps leading up to the beta test, for which Mr. Lemieux also described the details (they began in January 2005). The results of these initial experiments were used in determining the final test set-up. Mr. Lemieux described some of the thought processes that went into designing the experiment, including details such as injecting the surrogate species into the challenge water. Answering the fundamental test set-up questions and finalizing the details of the testing took approximately two years. He reviewed the actual beta test schedule as it was performed and stated that a comprehensive report will be published in September 2007.

Mr. Lemieux provided a description of the equipment, including the function of the electrolytic chlorination process. To ensure that appropriate biological challenge conditions were met, a sufficient number of organisms in

the control output were required. The control that was used was dictated by the IMO G8 standard. Mr. Lemieux confirmed that all minimum levels for biological challenges were met during the testing. To achieve proper levels of organic content, decaffeinated iced tea was used for dissolved organic, and humic material was used for particulate. For inorganic content, ISO test dust was injected.

Mr. Lemieux explained the results of the test:

- Chlorination:
  - 14-19 ppm of Chlorine were injected;
  - 4-8 ppm total residual Chlorine was found;
  - After neutralization, dechlorination was found to be complete.

- Disinfection Byproducts:
  - The levels found in the discharge were below toxic levels by drinking water standards (used as a reference only).

- Biological Efficacy:
  - Zooplankton reduction was 99.1% for C3, 100% for C4-C6
  - Artemia reduction was 99.5%
  - Rotifer reduction was 100%
  - Ambient culturable bacteria – no reduction found (with exception of C3). [These results are being examined for potential sources of error.]

Mr. Lemieux explained that the total organic carbon challenge level was reduced to 12 mg/L from what was previously dictated by the protocol. He stated that the system reached the set point of 18 ppm chlorine and had a sufficient residual after the hold time. What was found was that the chlorine demand is highly dependent on organic content. Therefore, the group is looking for a recommendation on how to adjust the calibration curve appropriately.

Mr. Lemieux provided a description of the personnel requirements for the testing (10 people were involved in carrying out the testing). He described a typical day of testing as well as the additional O&M testing that was performed, and explained that overall, without automated data acquisition during the testing, 28 runs would have been very difficult.

A question was posed with regard to the potential bacterial contamination of samples. It was asked what contamination's impact on the protocol would be, especially with regard to ability to replicate the results. Mr. Lemieux explained that the lack of reduction seen was probably a lab error and that it is being investigated. As far as phytoplankton, he explained that a realistic enumeration method for viable organisms was needed and this is also being pursued.

It was then asked how phytoplankton viability was being measured and whether size was considered. Mr. Lemieux explained that the method suggested by ETV and/or the tech panel (from the method workshop in January 2004) was that the effluent would be filtered through plankton nets and sub-samples would be taken from the large draw to be analyzed. Overall, what was found was that samples must be concentrated to get the numbers into a range where the technique was valid. The MPN method was not providing believable numbers, so a direct count using SYTOX green as a viability indicator was undertaken. There was no grow-out period. Mr. Lemieux indicated that this is an area that needs more research, and recommended that automated methods should be a main area of research going forward to make better use of the biologists' expertise.

When asked to describe the O&M portion of the testing and its outcomes, Mr. Lemieux stated that the system was operated for this part of the testing at reduced chlorine level without organisms or surrogate species. This was done to test for mechanical failures. The overall impression from that testing was that the system was easy to operate, alarms/faults were easy to see (clear to operator), and manuals were sufficient. There were some issues

for dechlorination initially, but the components used operated well (as demonstrated by the total neutralization), and maintenance required was low. He explained that the test report details the man-hour requirements, details of safety, etc.

It was asked whether, if on-board (retrofit) sampling points differ from what was done at the test lab, that the difference was anticipated to change test results. Mr. Lemieux explained that the details of on-board testing have not been worked out. At this time, those are issues for which there are not answers. However, it is understood that on-board testing presents less than ideal conditions; therefore, the answer must be determined by what will work best considering the impact of the less than ideal conditions. Rich Everett added that the ETV effort has focused on land-based test procedures and facilities. And while shipboard testing of some sort is likely to be necessary, it is not known whether this will also be through ETV. An agreement has been established with NRLKW to take land-based testing and apply it shipboard, and to develop guidelines and protocols for standardized testing. The issues for sampling on-board have been recognized and the NRLKW is working on the next phase to tackle this.

Mr. Lemieux answered a question that asked whether testing could be done without surrogates. He explained that Key West had sufficient ambient organisms for the purpose of this testing, so it could have been done without adding the surrogates. That was not how it was performed because the protocol does require use of surrogate species. However, ambient species were also used in the analyses, and there are no known issues with doing so. What is apparent is that using both ambient species and surrogate species will probably be the best approach. Mr. Lemieux stressed that both have an important role in the testing. There is still an ongoing conversation regarding the meaning of the surrogate data. However, ambient species are needed to address efficacy questions.

Mr. Lemieux was asked to address the structure of the test tanks. He explained that the mock tanks used in testing had a similar construction to actual tanks. The difference is that there is a drain in the bottom of the mock tanks, which is flat and does not have the same structural elements. It was not clear how this affected testing. In terms of the size, there is some unresolved debate over what is appropriate. In between tests, the tanks were pressure washed. When asked how to sample for compliance testing, Mr. Lemieux explained that work is being done using computational methods to look at the effects of sampling location, geometries, etc. They are now concentrating on pipe sampling since the desire is to know what is being discharged.

When asked about future R&D plans for the Key West facility, Mr. Lemieux stated that there is still more to do; technical gaps that have been identified by the beta testing are still being addressed. Further, the NRLKW plans to continue working on other Coast Guard issues, integrating surrogate species results, and supporting more R&D efforts in the facility development. No vendor testing has been undertaken because of the follow-up issues that remain.

Mr. Stevens acknowledged the people involved in protocol development: Carlton Hunt and Deborah Tanis (Batelle), who were the primary contractors for NSF to develop the draft protocol. He also asked the tech panel to stand up for recognition.

Surrogate Species Study Outcome – Fred Dobbs

Fred Dobbs stated that a surrogate species is one meant to be representative of others. In the context of technology testing, they can also be thought of as a "challenge" organism, since the terms are functionally the same. By extension, in a public-health context, fecal-coliform bacteria are used to indicate whether pathogens might be present in water.

Dr. Dobbs explained the rationale for using surrogates. He stated that it helps to standardize technology testing. The inherent variation in natural populations led to a proposal that there be surrogate species to allow standardization. This would also allow for inter-site comparability. He shared the definition (a few species that would, if removed or killed by a treatment, provide assurance that a broad range of other organisms also would be removed or killed) and characteristics (inexpensive to culture at high densities; easily delivered into a testing

facility's plumbing; and readily detected, counted, and tested for viability after treatment) of an ideal surrogate species.

Dr. Dobbs outlined the timeline of project. He stated that the final report on the findings is near publication and recognized the team that worked on the project.

Dr. Dobbs presented an example list of surrogate species and explained that they are divided into functional groups: bacteria, protists, phytoplankton, and zooplankton. He listed the treatments/stressors used in the experiment, which included thermal, chlorine disinfection, chlorine dioxide, glutaraldehyde, UV, ozone, hydrogen peroxide, deoxygenation, SeaKleen®, and PeraCean Ocean™. Dr. Dobbs noted that it was not the objective of these experiments to test fully the efficacy of treatment stressors, but rather to guide selection of the most appropriate organism(s) for ETV testing.

Dr. Dobbs shared the experimental design and a brief synopsis of what the viability testing included. He then noted the logistical impossibility of conducting all of the testing at same location and at the same time. So a defined treatment scheme was used to maximize concordance between labs. Different labs also shared materials and lab equipment (i.e., colimmated beam) as well as use instructions. Dr. Dobbs presented some graphical data showing the outcome of the study. He explained that this information was used to create a database, which will be included in the final report (along with a user's manual). The hope is that the database will be a helpful tool in the future. There has been some discussion on how to expand the use of the database internationally.

Dr. Dobbs explained the rating system that was used to analyze the results and to answer the fundamental question of whether a list of 3-5 species surrogates could be produced and used to test ballast water treatment technology in a large-scale facility.

Dr. Dobbs stated that before final conclusions can be made, there are some pressing needs, which include the need for refinement of existing technologies to determine the viability of organisms and the need for calibration of surrogate species, (i.e., a process to determine how well they represent the effects of the treatment method on ambient organisms). He also stressed that ambient populations should be used side by side with surrogate species in testing. Then he outlined the questions that had been presented the previous day to the tech panel:

First Tier:

- Could we use a single surrogate species, or is there additional value in using multiple surrogates representative of major taxa?
- What are the appropriate uses of surrogate species in the context of testing ballast-water treatment technology? When and at what scale should they be used?
- Do we need to test treatment systems using both marine and freshwater surrogate species? Can marine surrogates accurately represent freshwater results?
- Are we finished with the search for surrogate species?

Second Tier:

- Will it be necessary to increase the incorporation of organisms' dormant or resting stages (e.g., spores, cysts, ephippia) into technology testing?
- How can the database be used to best advantage?
- What are the impediments to using surrogate species?
- Is there a role for caged surrogate species in ballast-water technology testing?

In response to a question from the stakeholders about phytoplankton counting, Dr. Dobbs stated that the sample was diluted to microtiter plates, then growth was evaluated as positive/negative. The results were obtained by counting test results at different dilutions; however, individual cells were not counted. Dr. Dobbs explained that since these were pure cultures, there were no additional complications from background contamination.

A stakeholder made an argument against using dinoflagellates. It was stated that there are 50-60 different taxa in that category, some with a wide range of size. One of the problems is that several organisms are well above 50 μm. It was counter-argued that the idea of using non-harmful dinoflagellates is better than using surrogate species for them.

Mr. Stevens stated that the benefit from use of surrogate species is that they provide a means of assuring a consistent evaluation from one location to another, and that the efficacy of the treatment technology will be challenged comparably from one location to another. In Mr. Stevens's opinion, when formalized and appropriate quality control measures are in place, this protocol will be a good tool in the evaluation of testing locations.

Tech Panel Meeting Outcome/Protocol Next Steps – Ted Lemieux

Mr. Lemieux provided an overview of the discussions that took place during the previous day's tech panel meeting. The overview's goal was to give the group a sense of what was discussed, where the tech panel thinks the protocol is in terms of progress, and a direction forward. He stated that he would follow his presentation with a brief conversation about what is going on in ETV versus IMO (international) and some additional updates on the test facilities.

Mr. Lemieux began by giving a description of the tech panel, stating that it is a conglomerate of researchers, government agencies (both regulatory and research/development), test facility developers, and system manufacturers. At the time of the meeting, the protocol had been successfully tested at the Naval Research Lab on a treatment system, which demonstrated that the protocol as written is achievable, but pointed out some necessary revisions. It also provided a rigorous, informative data set from the biological efficiency, O&M, and design installation points of view. The testing also helped the group to identify technical gaps in the protocol and showed where there are opportunities to streamline testing. Mr. Lemieux also explained that the research on surrogate species provided a suite of potential surrogates that could be used. That study, however, uncovered more questions, and the group will have to go back and determine appropriate concentrations and ways to integrate that aspect in the test facilities. Mr. Lemieux pointed out that, as Dr. Dobbs mentioned, the study did bring to light some additional questions.

The following is an outline of the remaining technological challenges that Mr. Lemieux pointed out to the stakeholders:

- The identification of methods for accurate and robust enumeration of live phytoplankton
- Land-based testing scale optimization
  - Time and Scale are significant technical and financial obstacles for future facilities.
- Facility standardization
  - Current protocol details requirements of facilities, but not how to achieve these requirements.

Mr. Lemieux explained that the tech panel voted to prioritize the list of questions generated by the surrogate study. This list was presented:

- Surrogate Issues:
  - Do we need surrogate species in ballast water technology?
  - What does treatment efficacy on surrogates mean for treatment efficacy on natural applications?
  - Is one surrogate enough?
- Can tank size be reduced?
- Can tank hold times be reduced?
- What are the panel's recommendations for standardized phytoplankton enumeration?
- What can be done to address facility validation and for inter-site comparability?
- Are there justifiable changes to be made to the ETV challenge water conditions?

The resulting discussion of these questions brought forth some conclusions. Mr. Lemieux explained that the tech panel did feel that species surrogates were necessary both for inter-facility comparability and to provide a minimum biological challenge from an organism resistance perspective; they also felt that only one species surrogate was not sufficient, but rather that more than likely three would be needed to represent different taxa and/or size classes. After considerable discussion, Mr. Lemieux stated that there was most agreed to reduce the minimum tank size to 200 m^3. Generally, the tech panel categorized the lessons learned into two categories: 1) Necessary revisions to finalize the protocol, and 2) Justifiable improvements (those not necessary, but helpful for ease of performance and facility requirements). Mr. Lemieux stated that the tech panel is generally well positioned to address the technological obstacles, which he listed as answering the question of identifying resources; phytoplankton enumeration; remaining surrogate species issues identified; and the question of tank hold times.

Mr. Stevens added that the ETV protocol is not a one-time document, but that rather, this work will lead to further revisions. In other words, the document will be constantly under revision and re-evaluation. Mr. Lemieux then began to explain the IMO G8 protocol. He described the protocol requirements, and noted the differences between ETV and IMO G8. He also noted that the IMO has no forum where issues with the guideline can be resolved. He stated that ETV is a verification of a vendor's claims related to the application of the technology, not an approval process. IMO G8 is a set of approval guidelines for governments to use to approve equipment. IMO G8 primarily looks at only one feature of the system: its biological efficacy. ETV, on the other hand, has a number of secondary verification factors in addition to biological efficacy. Mr. Lemieux confirmed that there are four active test facilities that test to ETV, and eight in the process of coming online.

During the following question and answer period, Mr. Lemieux responded to a statement about the need for someone to step up and start coordinating. While Mr. Lemieux concurred, he stated that coordination would be within the purview of an independent or federal agency. He stated that other countries are aware of ETV to varying degrees. In response to a question about the international presence of ETV, Mr. Lemieux responded that IMO G8 has been more internationally focused, and that ETV has not put its efforts there at this point. An opinion was stated that internationally, government involvement would be seen to a higher degree soon. It was pointed out that there is a federated body that meets annually to discuss these types of issues. It was also offered that the Globallast program is partnering with the Global Shipping Alliance, and that ship owners have an interest in quality control at test facilities because they are subject to penalties for failure. It was suggested that the ETV program could work with ship owners to empower them so that many facilities are pulled together to be able to do the needed testing. However, the facilities will need much technical assistance to test to that standard if it comes online internationally.

Mr. Lemieux responded to some questions regarding quality and consistency of testing facilities. He stated that the ETV program would be an avenue to normalize facilities, but this may take a while since there are significant differences in QA/QC issues between facilities. It is possible that this project (ETV) might be used as starting point to get to ballast water test facilities in different countries, and added that EPA has good QA/QC program components and that ANSI E4 is quality management system plan that is used in addition to EPA's procedures. EPA also has recognized the need to figure out how to standardize QA/QC issues globally.

Great Ships Initiative Test Site – Allegra Cangelosi

Allegra Cangelosi provided a brief introduction to the Great Ships Initiative (GSI) testing. She stated that the industry members from the Great Lakes region are interested and committed to testing having national/international value. As a result, the GSI, a collective industry-led response to the problem of ship-mediated introductions of aquatic invasive species in the Great Lakes, was created. She stated that a Scoping Report for the GSI has been published; the report incorporates business, science, and policy aspects of implementation. The report is accessible on the web at www.nemw.org/scopingreport.pdf.

Ms. Cangelosi stated that the objective of the GSI is to end ship-mediated introduction of aquatic invasive species into the Great Lakes, and that the GSI plans to do so by implementing elements of technology incubation, harbor

monitoring, installation assistance/financing, and post-installation monitoring/ assistance. She explained the incubation step (application of interested vendors, review of applications), which resulted in GSI offering their services. The testing available is at three scales - bench, pilot (shore based), and shipboard testing - and is currently active. The GSI also hopes to provide engineering and financial advice for companies in the future. The specific objectives of each scale are:

- Bench scale: evaluate eco-toxicity, dose effectiveness, and mechanism of action.
- Pilot (freshwater only): evaluate scale effects, ambient assemblages, and operational issues.
- Shipboard: evaluate performance for Canadian Lakers on dedicated freshwater-seawater loops including effects of multiple salinities, ship effects, and STEP applications.

Ms. Cangelosi stated that the goal of the GSI is to be completely transparent. She stated that international and domestic contributors are to look at first set of protocols, and trials began this summer. She explained the facilities involved in each level of testing, and the details of the test set-up and how the tests were run. The results of the initial testing were shared. Ms. Cangelosi stated that several rounds of testing had been completed. Also, since there are triplicate sample ports at the sample stations, the GSI was able to put one of each of the three kinds of pilots in. The results of the GSI study will be made publicly available.

Ms. Cangelosi stated that the results were relevant for conducting incubation studies with output as applicable as possible to regulatory processes (IMO/domestic), and for communicating the output to national/international agencies to help inform decisions. This testing will also help provide insight/input to other efforts and will allow for collaboration with other efforts globally.

Ms. Cangelosi shared a start-up timeline. She stated that the IMO-consistent facility construction, the preliminary scientific protocols, and the solicitation of the first treatment to be tested had all been completed. The goals for the summer included completion of standard operating procedures, ongoing facility calibration and vetting, and facility modifications. In the fall, the preliminary testing at the bench and pilot scale is expected to begin, along with the first full RFP issuance.

During the question and answer period following this presentation, Ms. Cangelosi explained that the GSI is trying to benefit from work done by ETV. She stated that the GSI has made a commitment to be consistent with ETV. The GSI is also planning a firewalled portion of the program, which is strictly for conducting testing consistent with ETV and/or compliance testing, a role that Ms. Cangelosi stated that the GSI is ready and willing to fill. In the future, the GSI is planning to run at capacity, which varies depending on the hold time; for a five-day hold, two technologies can be tested, while for a one-day hold, about 4-5 technologies can be tested. Right now, Ms. Cangelosi confirmed that the GSI is doing testing consistent with IMO and the ETV draft. However, since both are not prescriptive, additional operating details are needed. Therefore, to the greatest extent possible, the GSI is using standardized methods and relying on the best working method.

In response to a question, Ms. Cangelosi explained that the water of Lake Superior has well-characterized ambient communities, including phytoplankton, zooplankton, protists, and macro zooplankton. There is increasing evidence of the existence of zebra mussels. She stated that the GSI has also given consideration to seasonal variation as well.

A question was posed addressing the concerns about UV technology, which inactivates organisms through effects on the DNA (in essence, affecting the organism's ability to reproduce). Stain, therefore, does not show whether UV has been effective because organisms may still be alive; therefore, the only way it can be accurately tested is to see if subsequent generations occur. Ms. Cangelosi stated that it is important to realize that one size does not fit all, and stated that the GSI would like to use a grow-out method in conjunction with the staining that is being used.

Ms. Cangelosi addressed a question on how the site plans to address issues with multiple salinities since the set-up is appropriate for lake-specific issues, stating that there are plans to coordinate with a marine test facility. However, the GSI is freshwater specific, so that is the focus.

USCG Program Updates/International Developments – Bivan Patnaik & Richard Everett

Bivan Patnaik gave some background information on the current regulations. He stated that the Nonindigenous Aquatic Nuisance Prevention Control Act (NANPCA) of 1990 gave three management options to all vessels inbound from outside the Exclusive Economic Zone (EEZ) carrying ballast water:

- Exchange the ballast water 200 miles off-shore;
- Retain ballast water for the duration of the voyage; or
- Treat the ballast water with a Coast Guard-approved method.

He stated that this was revised as the National Invasive Species Act (NISA) in 1996. Following that, the National Ballast Water Information Clearinghouse was established in 1997. Regulations for National Voluntary Guidelines came out in 1999 and were finalized in 2001. In a report to Congress in 2002, participation in this voluntary program was too low to determine the program's effectiveness. Therefore, the voluntary program was converted to a required program.

The regulations in 2004 incorporated penalties for non-submission of ballast water reports (a felony offense). It made reporting and record-keeping mandatory. These regulations include the Great Lakes Ballast Water Management program, a national ballast water management program. The National Ballast Water Management program also added requirements that all vessels conduct best management practices and have a ballast water management (BWM) plan. As a result, between July 2004 and June 2005, there were 6000 BWM plan examinations.

Mr. Patnaik explained that a Ballast Water Discharge (BWD) standard is necessary because of the options available to shippers. The most predominant method is to conduct an exchange. However, because of safety and voyage constraints, the Coast Guard estimates that 60% of vessels coming into U. S. waters are not able to conduct exchange. For the Great Lakes, a large number of vessels cannot conduct exchange because they declare no ballast on board. The effectiveness of exchange is variable depending on the ship and the voyage. Therefore, since a way to approve ballast water treatment methods is clearly needed, Mr. Patnaik stated that the Coast Guard's position is that the best way to do so is to establish a BWD standard.

Mr. Patnaik stated that the NISA of 1996 established Coast Guard authority to approve ballast water treatment systems and the ability to implement a standard. He explained that the current rulemaking project for a new BWD standard would be a concentration-based standard (number of organisms per volume of ballast water). It would be used to approve ballast water treatment systems, and it would be enforceable (i.e., it would outline specific measurements of compliance). It's also important that it address a full range of organisms at all life stages and include those that are asexual, and those that do not require oxygen. In order for a BW treatment technology to be approved, it must meet BWD standards and engineering and operating requirements.

Mr. Patnaik explained that Executive Order 12866 requires a cost-benefit analysis for any new mandate. If a treatment is deemed significant (costs $100 million to the public), then a regulatory assessment is also required to be completed by the Coast Guard. This assessment would include the anticipated benefits, costs, and impacts on the economy, health, safety, and the environment, as well as the costs and benefits of possible regulatory alternatives. This analysis is not a part of the Draft Programmatic Environmental Impact Statement (DPEIS), which is required under the National Environmental Protection Act (NEPA). That analysis consists of purpose and need, range of alternatives, affected environment, and environmental consequences. Mr. Patnaik stated that there has been a series of poorly attended public meetings. The Department of Transportation's Volpe Center, in partnership of several other federal agencies, prepared a partially complete draft PEIS, but the work was ended prematurely by administrative difficulties. The Final Draft PEIS is not yet available for public review. As a

result, an expert panel workshop was assembled (consisting of NEPA experts and biologists from five cooperative agencies) to complete the DPEIS. It is expected to be published in fall 2007 in the Federal Register. B. Patnaik explained that a final comment period would be opened, and after that period, the document would be published. He stated that further information is available at http://www.uscg.mil/hq/g-m/mso/estandards.htm.

During the question and answer period, Mr. Patnaik explained that all of the evaluations of environmental and economic compliance requirements were not complete at this time. However, it is hoped that by the time the whole process is finished, this will also be complete. Mr. Patnaik answered a question regarding interim approval of designs if a standard exists before the legislation, stating that there is not currently an interim program, but it is being looked into. However, he stated that even that must go through various stages of approval. Dr. Everett reminded the stakeholders that the regulation is a federal action and requires following of policy. He stated that when it comes down the line to approve individual ballast systems, those are also federal actions and will require reviews at various stages.

Dr. Everett explained that IMO has created an international convention to address ballast water treatment. He provided an update on what had occurred at the IMO meeting in July, and stated that a summary of the meeting is available. The convention has regulations that direct what vessels must do to manage BW. He stated that D2 is a discharge standard. It expresses an allowable concentration (threshold) for organisms in BW discharge. The G8 guidelines, on the other hand, are procedures recommended to contracting countries for approving BW treatment in vessels that fly the flag of that country. Therefore, Dr. Everett explained that if vessels comply with G8, much testing activity could take place outside the U.S. At this point in time, very few other countries that have flagged vessels are doing anything. However, starting in 2009, new vessels will be required to come into compliance during the phase-in time based on size, etc. Existing vessels will be required to come into compliance, and all vessels under IMO G8 will be compliant by 2016. Regulation D5 directed the MEPC to hold a review of the available technology at least three years prior to 2009 to determine how many technologies will be available by the time the requirement comes into being. When the convention was adopted in 2004, no technology existed that could meet the regulation.

Dr. Everett explained that the last meeting of MEPC took place in July 2007. He also stated that the Ballast Water Convention was open for accession by states since May 2005. This convention would become effective after the accession of thirty states representing 35% of world merchant tonnage. Currently, Dr. Everett explained, only 11 states have acceded (3.42% of world tonnage).

Dr. Everett provided an update from the third meeting of GESAMP-BWWG. He stated that four proposals concerning BWM systems were submitted. The G9 guidelines were employed by GESAMP to run though approval procedures when applications were submitted. G9 is a two-step approval system for active substances that are acceptable from an environmental/public health/ship safety point of view. Following that, the BWM system goes through G8 guidelines. These guidelines include toxicity tests run on the treated effluent.

Dr. Everett explained that an application was under review for the PureBallast system. It is currently being tested against the G8 protocol. Concerns raised will be addressed by Norwegian administration before approval. PureBallast has undergone land-based testing and is now undergoing shipboard testing. The committee also agreed to approve the NK Ballast Water Treatment system (Korea), but did not approve the Mitsubishi Hybrid System (Japan), which was deemed to have too many unknowns.

The fourth meeting will take place in November 2007. Members are invited to submit proposals for approval. However, Dr. Everett explained that the technology developer cannot submit a proposal. Rather, the proposal must go through their state administration after the administration has evaluated it. He explained also that if an active substance is used or generated in a treatment, this must also be assessed by IMO. Only the results of land-based testing and residual toxicity are needed for final approval. It has been requested that BLG12 develop criteria to evaluate systems using the same active substances or preparations to determine when it is appropriate to apply the basic approval granted to one applicant to another applicant. This request is intended to address concerns about insufficiency and competition.

Dr. Everett explained that recent consideration has been given to human exposure scenarios as part of the risk assessment procedure for BWM systems. This will be further considered at the next meeting. The committee has also endorsed the need for an emission scenario document as part of the risk assessment. In the interim, manufacturers developing ballast water treatment systems that use physical processes that may produce chemical byproducts should use the relevant guidance and testing provisions included in G9 and G8 as part of the approval process.

Dr. Everett also noted that there is one remaining guideline to finalize, on ballast water sampling: G2. G2 was not considered because of time constraints. The target was extended to 2008, and this will be a key topic at BLG 12. The significant issue is that guidance is needed on how to take samples and/or how to analyze and interpret results.

The availability of ballast water treatment technologies, Dr. Everett noted, is under review by the D-5 group. There was no consensus that technology will be available in time. The concern is that if the convention does not enter into force, ships constructed after 2009 with ballast water capacities less than 5000 m^3 will not meet the standard when/if the convention comes online later. In that case, the convention will need amending, but as Dr. Everett pointed out, it cannot be amended until it is enforced. There was a discussion of the options concerning this problem; one option was agreement not to enforce the convention until a certain date.

In response to a question on why the U.S. has not ratified the convention, Dr. Everett explained that the President has not proposed to the Senate that it ratify the convention. However, he stated that the President would not make this proposal until he receives recommendation to do so. One reason this has not happened is that many are waiting to see how these guidelines, which determine how to comply with the convention, will look when they are finalized. Dr. Everett also explained that the U.S. has not brought any technologies forth for approval for active substances because the U.S. is not party to the convention. So while parts of the U.S. government can participate, no one has the authority to review applications and shepherd them through the IMO process.

USEPA Ballast Water Update – Juhi Driscoll

Juhi Driscoll provided an update on the Clean Water Act permitting for operational discharges from vessels. She stated that the CWA permitting previously excluded ballast water from requiring a permit; however, starting on September 30, 2008 EPA may have to issue permits for operational discharges.

Ms. Driscoll explained the history of the basics of CWA permits and referred the group to the website (www.epa.gov/owow/invasive_species/ballas_water.html) for additional information. The effluent limits are based on best available technology (BAT) and best professional judgment (BPJ), which allows some flexibility. There are also water quality-based limits, which are what is required by the state to meet its own water quality standard. The processing requires an application from the permittee, issuance of a proposed draft permit, a public comment period, and finally issuance of a final permit. Ms. Driscoll explained that statutory exclusions will be unaffected by the lawsuit that brought about this issue. This applies to vessels that operate as a means of transportation beyond the three-mile limit, and to vessels of the armed forces. As a result of the lawsuit, the regulatory exclusion applies to discharge deemed incidental to the normal operation of vessels from the obligation to obtain a NPDES permit (issued in 1973).

The court's decision was that the EPA exceeded statutory authority under the CWA. Therefore, in September 2006, the final order revoked the regulatory exclusions, effective on September 20, 2008. This revocation potentially affects all incidental discharges of vessels. The suit is currently under appeal, but the EPA must continue to take preparatory actions. The EPA formed a Vessel Vacatur task force to deliberate on the options for a revised permitting framework. They have also issued a notice in the Federal Register explaining and seeking public input (the period for public input closed on 8/6/2006). It is anticipated that there will be a stakeholder meeting in 2008. EPA is also coordinating with the USCG to assist in the development of water discharge rulemaking.

The implications of this change are not limited to larger vessels equipped with ballast tanks, but rather apply to all vessels that potentially discharge pollutants, and are not limited to ballast water. Some of the considerations that the EPA is currently looking at are:

- How to issue final permits by the implementation date
- How to define/categorize the universe of vessels
- How to inform affected vessel owners that a permit is needed
- How to define/categorize operational discharges and control technologies and best management practices
- How to determine technology requirements using BPJ factors

NOAA Activities – Melissa Pearson

Melissa Pearson explained the BWTDP (Ballast Water Technology Demonstration Program) is a partnership among NOAA, the U.S. Fish and Wildlife Service, and the U.S. Maritime Administration (MARAD). She provided some background information regarding the legislation that gave way to the program and the way the partnership operates, including its participation in competition for grants. She stated that the mission of the BWTDP is the development, demonstration, and ultimate use of treatment technologies to prevent ballast water introductions of aquatic invasive species to U.S. waters. The program involves the development of treatment technologies and the ability to test, evaluate, regulate, and use these technologies.

Ms. Pearson provided some additional information regarding NOAA's participation in grant competitions. She stated that there are two different categories: treatment technology demonstration projects and Research Development Testing and Evaluation (RDTE) facilities. There has been a competition for treatment technology demonstration projects each year from 1998 through 2007 (with two exceptions). Projects awarded funds ranged from basic research to commercial field tests. Under the RDTE facilities competition (held in 2006 and 2007), funding was provided to facilities including those doing research development testing and evaluation.

For treatment technology demonstration projects, Ms. Pearson outlined the programmatic priorities:

- Project necessity and chance for success
- Geographical distribution
- Commercialization potential
- Regulatory approval

Ms. Pearson showed a list of the funded technologies and the number of projects for each treatment category that were funded. She stated that meeting the BWTDP mission requires the development of treatment technologies as well as the ability to test, evaluate, regulate, and ultimately use the technology. She explained that the traditional competition addresses the development aspect, and the RDTE facility competition was formed to address the latter part of the mission. She also explained that RDTE facilities support ballast water technology development efforts through continuity of projects, standardization and quality control of experiments, independence, engagement of local and regional interests, ease of access to infrastructure, and the development and use of standardized methods for testing. The RDTE programmatic priorities are:

- National integration
- Local involvement
- Geographical considerations
- Freedom of apparent conflict of interest

The 2006 RDTE award went to the Northeast-Midwest Institute for the GSI facility located in Superior, WI. Additionally, two start-up grants were awarded. As an update on the 2007 award, the grant process is in progress,

but no official awards have been offered. (Note: Since the August meeting, an award in the 2007 competition was made to Battelle Memorial Institute for an RDTE facility to be located in Sequim, WA.)

Ms. Pearson stated that the goal is to provide viable technologies by the time they are required. She stated that when the goal is achieved, the program would end. Currently, the NOAA is undergoing a program assessment to determine their path forward.

Closing

Mr. Stevens thanked everyone again for coming. He stated that a meeting summary would be provided to participants who signed in. The meeting was adjourned.

ATTENDEES

ETV Ballast Water Technology Stakeholder Meeting
August 16, 2007

Participant	Organization
Ray Frederick	US EPA - Office of Research and Development
Evelyn Hartzell	US EPA – ETV Program
Jessica Barkas	US EPA – Office of Wastewater Management
Richard Everett	US Coast Guard
Bivan Patnaik	US Coast Guard
Gail Roderick	US Coast Guard R&D Center
Penny Herring	US Coast Guard R&D Center
Edward Lemieux	Naval Research Lab – Key West
Tim Wier	Naval Research Lab – Key West
Jonathan Grant	NRL/Battenkill Technologies
Dorn Carlson	NOAA
Melissa Pearson	NOAA
Michelle Harmon	NOAA – Invasive Species Program
Sujit Ghosh	MARAD
Carolyn Junemann	MARAD
Terri Sutherland	Fisheries and Oceans Canada
Chris Wiley	Transport Canada/Fisheries & Oceans Canada
Gordon Smith	Naval Sea Systems Command
Stephan Verosto	Naval Surface Warfare Center – Carderock Division
Frank Hamons	Maryland Port Administration
John Vasina	Maryland Port Authority
Allegra Cangelosi	Northeast Midwest Institute
Fred Dobbs	Old Dominion University
Russ Herwig	University of Washington
Brian Howes	University of Massachusetts, Dartmouth
Enrique J. LaMotta	University of New Orleans
Andrew Rogerson	Nova Southeastern University
Lucie Maranda	University of Rhode Island
Tom Waite	Florida Institute of Technology
Nick Welschmeyer	Moss Landing Marine Labs
Mario Tamburi	Aliance for Coastal Technologies
Dave Wright	University of Maryland
Victoria Lord	University of Maryland – Center of Marine Biotechnology
Christopher Grim	University of Maryland – Center of Marine Biotechnology
Nur A. Hasan	University of Maryland – Center of Marine Biotechnology

Anwar Huq	University of Maryland – Center of Marine Biotechnology
Marty Pagliughi	ABB Inc.
Eyal Yavin	Amiad Filtration
Ismail Gobulukoglu	Aquafine Corporation
Carlton Hunt	Battelle
Michael Blanton	Battelle – PNNL
Andrea Copping	Battelle – PNNL
Bob Gec	Degussa Corporation
Tina Hansbro	Dow
Fred Singleton	Dow
Greg Loraine	Dynaflow Inc.
Larry Russell	Exostop
Kent Peterson	Fluid Imaging Technologies
Ivan Caplan	G.I.A. Associates, Inc.
Jon Stewart	International Maritime Technology Consultant
Josh Ziembiec	ITT – WWW (Wedeco Division)
Howard Davis	ITT – WWW
Dick Fredericks	Maritime Solutions, Inc.
Chris Constantine	Maritime Solutions, Inc.
Paul Jackson	NSF International
Marcus Allhands	Orival, Inc.
Reuven Schwartz	Orival, Inc.
Steve Carpenter	Scienco/FAST
Rudy Matousek	Severn Trent DeNora
Robert Weddle	Siemens Water Technologies
Jennifer Gerardi	Trojan Technologies
Linda Sealey	Trojan Technologies