U.S. Public Health Service
Engineer Officers

Post-Deployment Lessons Learned Report
U.S. Navy Humanitarian Assistance Missions

September 30, 2009

USNS Comfort Partnership for the Americas – 2007
USS Peleliu Pacific Partnership – 2007
USNS Mercy Pacific Partnership – 2008
USS Boxer Continuing Promise – 2008
USS Kearsarge Continuing Promise – 2008

Report developed under the guidance of the Engineer Professional Advisory Committee (EPAC) Emergency Preparedness Subcommittee:

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Abbreviations:

AH	Auxiliary Hospital (USN ship classification)
CBMU	Construction Battalion Maintenance Unit – Seabees
CDC	Centers for Disease Control and Prevention
EHO	Environmental Health Officer
EPA	U.S. Environmental Protection Agency
EPAC	Engineer Professional Advisory Committee
FDA	Food and Drug Administration
FDPMU	Forward Deployed Preventive Medicine Unit
HHS	Department of Health and Human Services
IDP	Internally Displaced Persons
IHS	Indian Health Service
LCAC	Landing Craft, Air-Cushioned (USN ship classification)
LCU	Landing Craft, Utility (USN ship classification)
LHA	Amphibious Assault Ships, Tarawa-class (USN ship classification)
LHD	Amphibious Assault Ships, Wasp-class (USN ship classification)
MEDCAP	Medical Civil-Assistance Program
NGO	Non-Governmental Organization
NKO	Navy Knowledge Online
NPS	National Park Service
OFRD	Office of Force Readiness and Deployment
OIC	Officer-In-Charge
PDSS	Pre-Deployment Site Survey
PHS	U.S. Public Health Service
PM	Preventive Medicine
SITREP	Situation Report
SME	Subject Matter Experts
T	USN classification of ships under the Military Sealift Command
USN	U.S. Navy
USNS	United States Navy Ship (USN non-commissioned/civilian manned ships)
USS	United States Ship (USN commissioned ships)

Cover Photos:

The U.S. and PHS flags at sea, USNS Comfort, PHS Engineer on Pacific Partnership mission, PHS Engineer on the Continuing Promise mission, and host country children (L to R)

TABLE OF CONTENTS

1 Introduction

1.1 Background

Over the past several years, the U.S. Public Health Service (PHS) Commissioned Corps Officers (Officers) have become part of the U.S. military's increased involvement with international humanitarian assistance missions; which have included the 2004 Tsunami, 2005 Earthquake relief efforts, and 2006 USNS Mercy Pacific Partnership. Continuing in this collaborative effort in 2007 and 2008, a total of 20 PHS Engineer Officers participated in four U.S. Navy (USN) humanitarian assistance missions in Latin America and the Caribbean and the Pacific region. The missions brought together host-country and partner nation uniformed services medical personnel and NGOs to provide medical, dental, construction, public health infrastructure, and other humanitarian-assistance programs both ashore and afloat.

This post-deployment report summarizes and prioritizes the PHS Engineer Officers' (PHS Engineers) lessons learned from the 2007 and 2008 deployments. This report provides greater focus to the lessons learned than the previous report titled *Post-Deployment Report Lessons Learned: USNS Comfort Partnership for the Americas, USS Peleliu Pacific Partnership, Summer – Fall 2007* (dated May 20, 2008); which also included the PHS Engineers accomplishments and experiences. It is hoped that the narrower focus on lessons learned contained in this report will be used to assist initiating priority follow-on actions that will foster more effective and successful future humanitarian assistance missions.

1.2 USN Missions

The Partnership for the Americas (2007) and Continuing Promise (2008) missions conducted training and humanitarian assistance operations in Latin America and the Caribbean including the host-countries of Belize, Guatemala, Panama, Nicaragua, El Salvador, Peru, Ecuador, Colombia, Haiti, Trinidad and Tobago, Guyana, and Suriname.

The Pacific Partnership (2007 and 2008) humanitarian assistance missions were conducted in Southeast Asia and Oceania including the host-countries of the Philippines, Vietnam, Papua New Guinea, Solomon Islands, and the Marshall Islands.

The missions and respective USN ship are listed in the table below:

Table 1. USN Missions – 2007 and 2008

USN Ship	Mission
2007 Missions	
USNS Comfort	Partnership for the Americas
USS Peleliu	Pacific Partnership
2008 Missions	
USS Boxer	Continuing Promise
USS Kearsarge	Continuing Promise
USNS Mercy	Pacific Partnership

The USN ship classifications deployed for each mission are listed in the table below:

Table 2. USN Ship Classifications

USN Ship	Ship Classification
USNS Comfort	T-AH-20
USS Peleliu	LHA-5
USS Boxer	LHD-4
USS Kearsarge	LHD-3
USNS Mercy	T-AH-19

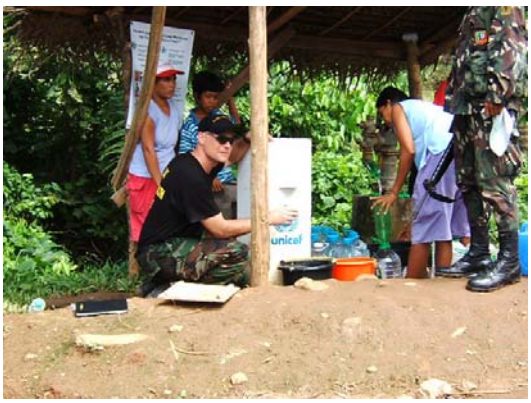
The missions ranged from three to four months with the PHS Engineers part of sequential deployment teams typically for

one-month tours each. In addition to PHS Environmental Health Officers (EHOs), the other PHS Officers on each team were staffed primarily with clinical personnel. The PHS Officers were shipmates to a crew that included personnel from the U.S. Navy, Army, Air Force, and Coast Guard; the U.S. Navy Seabees (construction battalions); and various NGOs.

A total of 10 PHS Engineers deployed during each year on or in support of the missions; an asterisk (*) indicates that the PHS Engineer deployed as part of the USN Pre-Deployment Site Survey (PDSS) team. The PHS Engineers on each mission are listed by rank in the table below:

Table 3. USN Missions – 2007

PHS Engineer	Agency
USNS Comfort	
CAPT C. Brady	IHS
CAPT P. Rapp	IHS
CDR L. Hanley	EPA
USS Peleliu	
CDR S. Anderson*	IHS
CDR S. Bosiljevac	NPS
CDR D. DeVoney	EPA
LCDR E. Dieser	CDC
LCDR M. MarcAurele*	IHS
LCDR A. Sallach	EPA
LT N. Hassan	FDA



Sampling well and sand filter at an IDP camp on 2007 Pacific Partnership mission

Table 4. USNS Mercy – 2008

PHS Engineer	Agency
USNS Mercy	
CDR S. Chau	EPA
CDR K. Esplin	EPA
LCDR D. Ausdemore	IHS
LCDR S. Brum*	IHS
LCDR A. Sallach	EPA
USS Boxer	
CDR A. Smith	EPA
LCDR M. Copeland	EPA
USS Kearsarge	
CDR S. Helgeson	IHS
CDR K. Leseman	IHS
LCDR D. Hugh	IHS

1.3 Purpose

The primary purpose of this report is to document the lessons learned from the 2007 and 2008 missions, and to identify several of these with a high priority for follow-on action. The priorities were based primarily on which of the solutions and actions were achievable, had an outcome controlled in part by PHS, and could offer a significant impact on future operations. In addition, this report could also be amended and expanded in order to include lessons learned from future missions (PHS Engineers are serving in the 2009 missions).

A critical related item, which is not directly addressed in this report, is the task to identify the proper lead (e.g. EPAC subcommittee, OFRD, PHS Chief Engineer) to best carryout the suggested actions. Implementation of the recommendations will hopefully increase the effectiveness of the PHS Engineers, strengthen the partnership between the PHS and USN, and lead to more successful health diplomacy and humanitarian assistance missions in the future.

The PHS Engineers performed many significant accomplishments during each of the missions, which included identifying significant water quality issues to assisting with rapid needs assessment surveys. Although there are numerous highlights and accomplishments on each mission, this report does not serve to document those.

This report is an effort by the PHS Engineer Professional Advisory Committee (EPAC) Emergency Preparedness subcommittee and the PHS Office of Force Readiness and Deployment (OFRD).

Water well inspection on the 2008 Continuing Promise mission

1.4 Scope and Methodology

Information for this report was collected from the majority of PHS Engineers on each of the five deployments in 2007 and 2008 and summarized in the attached table with columns identifying the prevalence to each mission. The information was primarily collected from a combination of questionnaires and after-action reports.

The responses were complied in the attached table with data fields including:

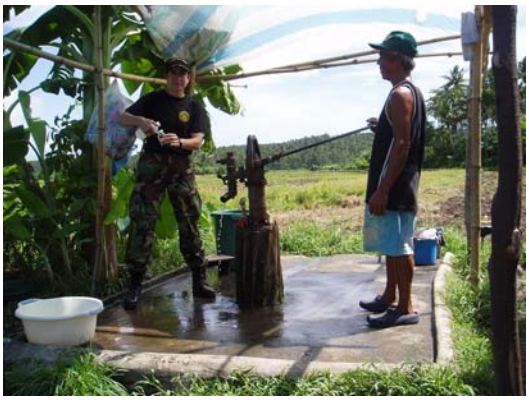
- Observations and conditions;
- Insights and issues;
- Lessons learned – potential solutions and actions with indications for category, improve/sustain/create, and priority level.

This report does not represent a comprehensive review of the PHS deployments on the 2007 and 2008 USN humanitarian missions, but is based upon experiences and issues brought out as responses to the questionnaires and PHS Engineer after-action reports.

This report was developed from March to September 2009.

2 Lessons Learned

2.1 Introduction



Well water quality sampling at an IDP camp on the 2007 Pacific Partnership mission

The high priority pre-deployment, deployment, and post-deployment observations and conditions include the following:

Pre-deployment:
1. Limited access to mission-specific deployment information such as the PDSS; and
2. Limited involvement of PHS Engineers on the development of the PDSS.

Deployment:
1. Minimal projects planned to address public health infrastructure needs;
2. Mission metrics with limited focus on public health infrastructure; and
3. Need to enhance communication and utilization of PHS Engineer skillsets.

Post-deployment:
1. No formalized de-briefing or reporting; and
2. Delayed processing of travel activities.

For each of these, a brief description of the corresponding insights and issues are provided along with the potential solutions and actions that define the lessons learned.

2.2 Pre-deployment

Reviewing design drawings on the 2007 Partnership for the Americas mission

The high priority pre-deployment lessons learned are as follows:

2.2.1 Limited access to mission-specific deployment information

Insights and issues:
There is limited access to mission-specific deployment information such as the PDSS. General information is available for the mission; e.g. general packing list. However, PHS Engineers are not provided with anticipated activities or projects in the host-country, which makes preparation challenging; i.e. required technical references. In addition, there is no central location for deployment information; e.g. PDSS, country-specific data, and after-action reports.

Potential solutions and actions:
Potential solutions and actions include:
A. Establish a deployment folder on the OFRD website with updates and information concerning pre- and post-

deployment; e.g. PDSS and lessons learned documents.

B. PHS OIC should encourage officers to email questions and post mission-related information in a deployment folder on the OFRD website.
C. PHS OIC should hold a conference call for questions and discussion about the mission. Invite any PHS officers that participated on the PDSS site assessments.
D. Team mission OIC (e.g. USN PREVMED OIC) should hold a conference call to discuss overall mission and planned activities and resources.

2.2.2 Limited involvement of PHS Engineers on the PDSS

Insights and issues:

Typically, the USN has one or two pre-deployment mission activities to determine and confirm the tasks and logistics in the specific host country before the ship arrives. They occur approximately six months and one month prior to the mission. The outcomes from the USN assessments are documented in the PDSS, which becomes the primary action plan with identified sites, activities, and priorities for the mission.

The PHS Engineers' role in early planning activities for the PDSS can be a critical component to the mission. However, generally, there is limited involvement of PHS Engineers on the development of the PDSS, and as a likely consequence, there is often limited identification of high-impact public health infrastructure deficiencies and needs. Activities listed on the PDSS are typically of a low-level impact with marginal sustainability for the overall health of the community; e.g. repair drainage at medical center compound.

As indicated in Tables 3 and 4, several PHS Engineers have been included with the USN advanced teams and assisted in evaluating public health needs. Generally, that pre-mission involvement by the PHS Engineers along with the USN's shared vision has resulted in a greater overall emphasis on measurable public health activities. However, a potential challenge of placing PHS Engineers on PDSS teams is that it would require additional commitments and support from the PHS agencies in addition to on-going agency mission activities and other deployments.

Although it is not necessary for a PHS Engineer to be on the PDSS team to have critical public health infrastructure needs identified, it is important that the PDSS team have personnel that can; i.e. those that can conduct a rapid needs reconnaissance to identify such critical items for sustainable drinking water supply and excreta disposal systems.

Even though this insight is similar to the deployment issue of minimal projects planned to address public health infrastructure needs indicated below, it is listed separately in order to underscore the importance of the initial stage in the overall process of identifying and establishing projects to meet these needs. Having a PHS Engineer, or another qualified individual, at the initial site reconnaissance stage to collect data and perform analysis will increase the likelihood of developing these needs into priority projects.

Potential solutions and actions:

Potential solutions and actions include:

A. Place PHS Engineers on the PDSS teams that are conducted six and one-months prior to mission.
B. Develop needs assessment forms with specific public health infrastructure categories that could be used during the reconnaissance for the PDSS (see typical activities in section 4).
C. Considerations for USN may include having USN personnel that participated on the PDSS also be on the actual humanitarian mission.

2.3 Deployment

PHS Engineer with host-country staff on the 2008 Pacific Partnership mission

The high priority deployment lessons learned are as follows:

2.3.1 Minimal projects planned to address public health infrastructure needs

Insights and issues:

There are a limited number of projects planned to address public health infrastructure needs in the host-country. Generally, PHS Engineers received limited direction from the PDSS and often set work priorities based on site evaluation after arriving in the host-country. For example, water and sanitation related issues were usually listed on the PDSS, however little or no specific related action items were contained in the PDSS and therefore minimal projects were planned to address these. Most PHS Engineers are subject matter experts (SME) in public health infrastructure facilities evaluation, design, construction and operation from PHS agency work. Public health infrastructure deficiencies listed on the PDSS could be a planned activity for PREVMED and/or Seabees. In addition, sustainable public health infrastructure projects identified in the PDSS would require corresponding mutual support from the USN in order to ensure adequate planning and resources during the mission.

Potential solutions and actions:

Potential solutions and actions include:

A. On the PDSS place greater emphasis on listing and planning for specific public health infrastructure criteria and projects as well as input on required materials and supplies for in-country or on-ship.
B. Consideration given to community size for effective outcomes from PHS Engineer involvement; e.g. working with small communities may lend itself better than with very large community system.
C. During mission, along with OIC, assign a PHS Engineer or EHO for the duration of the mission as the liaison between PHS and USN public health/preventive medicine to assist in coordinating the environmental public health mission, objectives, and metrics component of the PREVMED mission.
D. See example metrics in section 4, which provide a broad overview of potential projects.

2.3.2 Mission metrics should reflect greater focus on public health infrastructure

Insights and issues:

The relative success of the mission was in part measured by the USN metrics; however often the metrics did not adequately reflect public health infrastructure activities performed in the field. The USN's emphasis on metrics for the mission were often on patient encounters and were not always applicable measures or indicators that demonstrated impact of the public health infrastructure activities. The PREVMED metrics included such measures as number of environmental health assessments performed, number of people trained, number of patient encounters, and number of prescriptions filled. In addition, the Seabee construction metrics typically measured the number of playgrounds or structures built or renovated.

Potential solutions and actions:
Potential solutions and actions include:

A. PHS and USN develop agreed upon metrics for the public health infrastructure that is consistent with actual field activities and recognizes priorities of USN. Public health infrastructure metrics should communicate population served or impacted. For example, water or sanitation project for source water protection or disinfection impact on the community; i.e. a low cost project which could result in high health impacts.
B. See example metrics in section 4.

2.3.3 Communication and utilization of PHS Engineer skillsets

Insights and issues:
Generally, the skillsets of the PHS Engineers were not well communicated to the USN or fully utilized. The PHS Engineers provide a comprehensive approach to public health, are subject matter experts, most have professional engineering licensure, are well suited for humanitarian deployment missions with knowledge and skills concerning general public health for underserved populations, have a wide variety of expertise from the different PHS agencies, and are able to adopt to a wide range of duties.

The skills of the PHS Engineers should be clearly communicated in order to differentiate between typical USN reference of engineering for all enlisted or officers working in an engineering-type command, such as Seabees.

Even though the PHS Engineer on ship is typically a SME, a potential challenge would be that a specific activity on the PDSS or newly identified in the host-country may not be within the expertise of the PHS Engineer.

Potential solutions and actions:
Potential solutions and actions include:

A. Accurately communicate PHS Engineer skill sets; which will enable better matches and service to host-country by promoting the unique professional skills, knowledge and abilities.
B. To provide greatest impact to the mission, match PHS Engineer's primary skill set and strengths with host-country needs identified in PDSS.
C. As needed, the PHS Engineer on the mission could consult with other PHS Engineers who are SME on a particular issue or need in order to identify potential solutions and approaches to the host-country issue.

2.4 Post-deployment

Technical assistance for the construction of a new water source on the 2007 Pacific Partnership mission

The high priority post-deployment lessons learned are as follows:

2.4.1 No formalized de-briefing or reporting

Insights and issues:
After the mission, there is no formalized de-briefing or reporting for returned PHS Officers. Some PHS Engineers developed their own after action reports. In addition, there is a wide variation for the distribution of these reports; e.g. reports are provided to

OFRD, other PHS Engineers, OIC, and/or USN.

Potential solutions and actions:
Potential solutions and actions include:

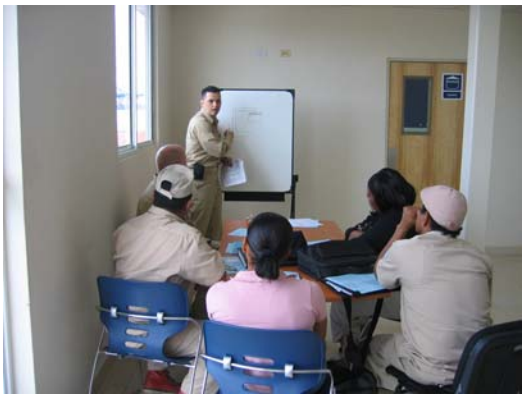
A. Develop standardized after action reports (AAR) for returned PHS Officers and formalized distribution list. Set schedule to enhance detail and usefulness.

2.4.2 Delayed processing of travel activities

Insights and issues:
The processing of travel vouchers and release from the OFRD GovTrip account back to the PHS Officer's agency was delayed for up to two months after officer returned to duty station. The delay in timely processing and release of GovTrip account impacted the ability of the PHS Officer to travel after return to duty station.

Potential solutions and actions:
Potential solutions and actions include:

A. PHS Officer initiate travel voucher, OFRD process voucher and release GovTrip account within one week of PHS Officer's return to duty station.



Trainings at the ministry of public health staff on the 2007 Partnership for the Americas mission

3 PHS Engineer Lessons Learned Table

Lessons Learned Analysis Summary Report

PHS Engineer Deployments: USN Humanitarian Assistance Missions

EPAC Emergency Prepardeness Sub-Committee

Partnership for the Americas (2007), Pacific Partnership (2007), Continuing Promise (2008), and Pacific Partnership (2008)
USNS Comfort, USS Peleliu, USS Boxer, USS Kearsarge, and USNS Mercy

Item No.	Observations and Conditions	Insights and Issues	Lessons Learned: Potential Solutions and Actions	Lessons Learned: Category	Lessons Learned: Improve, Sustain OR Create	Lessons Learned: Priority Level	Prevalence to Missions: Comfort: 2007	Peleliu: 2007	Boxer: 2008	Kearsarge: 2008	Mercy: 2008
1. Pre-deployment											
1.1	Limited access to deployment information; communication primarily by email only. In addition, insufficient information provided to prepare for deployment and/or information was not timely.	No central location for deployment information; e.g. PDSS, country-specific, and AAR	Establish a deployment folder on OFRD or USPHS Engineer website with updates and information concerning pre- and post-deployment; e.g. PDSS and lessons learned documents. In addition, PHS OIC could encourage officers to email questions and post mission-related information in a deployment folder on the OFRD website. PHS OIC should hold a conference call to allow for questions and discussion about the mission and PHS officers that participated on the site assessments for the PDSS available for conference calls with PHS team	Communication	Improve	High	■	■	■	■	
1.2	Limited involvement of PHS Engineers on the PDSS	Limited public health infrastructure deficiencies and needs identified on PDSS; those identified with low-level impact on overall health of the community; e.g. repair drainage at clinic compound vs. install disinfection system for community water system. PDSS did not focus on identifying public health infrastructure deficiencies that could be addressed by PREVMED and/or Seabees. Consult with USN as to priorities of the missions.	Place PHS Engineers on the PDSS teams that are conducted six and one-months prior to mission. Would allow to develop specific public health infrastructure criteria and projects as well as input on required materials and supplies for in-country or on-ship. In addition, consideration should be given to community size for effective outcomes from PHS Engineer involvement; e.g. working with small communities may lend itself better than with very large community system.	Planning	Improve	High	■	■	■	■	■
1.3	Limited advance notice of mission from OFRD to PHS officers	Challenge for PHS officers to complete all arrangements and requirements prior to deployment; e.g. immunizations, work, family	OFRD to identify, select, and notify PHS officer at least three weeks in advance	Communication	Improve	Medium	■	■			
1.4	Some PHS officers on own initiative conducted conference calls to discuss upcoming missions	PHS officers gained knowledge and insight by discussing and sharing information concerning mission topics; travel, mission assignments, uniforms, etc.	OFRD or OIC to sponsor conference call for team set to deploy to review and discuss critical mission issues and topics; considering including PHS officers currently on ship or just returned	Communication	Improve	Medium	■	■		■	
1.5	Limited information to PHS Engineers concerning applicable references and technologies for developing countries	PHS Engineers had to reseach on own applicable references and literature regarding appropriate guidelines and technologies for host-country. Defining the role and expectations of PREVMED and the PHS Engineer would aid in planning for required technical resources	Provide PHS Engineers a technical library or reference listing for international humanitarian and developing country public health infrastructure work. Post on PHS Engineers and/or OFRD website.	Training	Improve	Medium	■	■		■	■

1.6	Request for engineers for deployment did not specify what type of engineer. Nor was it ever explained what the engineer would be called on to do.	The skillset most useful are drinking water, wastewater, sanitary landfills, and industrial safety and hygiene.	List of tasks engineers may be called on to do. Provide some information on how to go about these tasks on-line. OFRD will not have resources to bring engineers to any such hands-on training.	Communication	Improve	Medium					
1.7	Limited pre-deployment trainings provided to PHS officers; some provided on-ship by USN	PHS officers need critical trainings and information for effective humanitarian missions in host countries. In addition, the USN required specific on-line trainings to be completed, which many of the PHS officers did on-ship; trainings included trafficking in persons, State Department information on host countries, etc.	OFRD, USN, and/or PHS Engineers to provide the following trainings and information on: host country security and safety; international travel; technicial standards (e.g. The Sphere Project); technical options appropriate for host country; USN protocol; USN MEDCAP, DENCAP, PREVMED; USN ship orientation; and required USN trainings.	Training	Improve	Medium					
1.8	PREVMED is a misnomer. It should be called the Public Health team. This would more accurately describe the team.	PREVMED Team was divided into four directorates: Environmental Health, Industrial Hygiene/Occupational Health, Entomology, and Preventive Medicine. PREVMED is an organizational element used aboard Navy vessel that is responsible for general health and well being of crew members. PrevMed is responsible for, among other duties, ensuring the drinking water is safe and food handling is done properly aboard ship	Rename team to Public Health Team.	Communication	Improve	Low					
2. Deployment											
2.1	Minimal projects are planned to address public health infrastructure needs; limited coordination and priority setting for these activities in host-country	PHS Engineers received limited direction from the PDSS and often set work priorities based on site evaluation after arriving in host country. Water and sanitation issues were usually listed on the PDSS, however little or no actionable data was contained in the PDSS and therefore minimal projects were planned to address sanitation. Most PHS Engineers are SME in public health infrastructure facilities evaluation, design, construction and operation from PHS agency work. For example, water and sanitation facility projects could have been planned to address deficiency situations identified in the field. See additional information in document.	Prior to mission, place PHS Engineer on PDSS teams. In addition, during mission, along with OIC, assign a PHS Engineer or EHO for the duration of the mission as the liasion between PHS and USN public health/preventive medicine to assit in coordinating the environmental public health mission, objectives, and metrics. Considerations for USN may include having USN personnel on PDSS to also be on actual mission. In addition, consider PHS taking the lead or co-lead for the planning of the public health infrastructure component of the PREVMED mission	Planning	Improve	High					
2.2	Mission "success" metrics should reflect public health infrastructure focus; metrics used were not always an appropriate measure of field activities	USN emphasis on metrics for the mission (e.g. patient encounters) were not always applicable measures or indicators that demonstrated impact of the public health infrastructure activities. Prev-Med metrics included such measures as number of environmental health assessments performed, number of people trained, number of patient encounters, number of prescriptions filled. In addition, Seabee construction metrics typically measured the number of playgrounds or structures built or renovated. See additional information in document.	PHS and USN develop agreed upon metrics for the public health infrastructure that is consistent with actual field activties and recognizes priorities of USN. Public health infrastructure metrics should communicate population served or impacted. For example, water or sanitation project for source water protection or disinfection impact on the community; low cost project which resulted in high health impact.	Policies/procedures	Improve	High					
2.3	PHS Engineers provided a comprehensive approach to public health, were subject matter experts, and most had professional engineering licensure	PHS Engineers were well suited for humanitarain deployment missions with knowledge and skills concerning general public health for underserved populations, a wide variety of experience and expertise from the different PHS agencies, and adoptability for a wide range of duties. PHS Engineers should be clearly communicated in order to differentiate typical USN reference of engineering for all enlisted or officers working in an engineering-type command, such as Seabees. A challenge will be that a PHS Engineer on the mission may have limited experience for one of many PDSS identified issues or a new need identified by the host-country	To provide greatest impact to the mission, match PHS Engineer's primary skill set and strengths with host-country needs identified in PDSS. PHS Engineers continue to develop a wide-range of public health infrastructure knowledge and skills. Accurately communicating PHS Engineer skill sets will enable better matches and service to host-country by promoting the unique professional skills, knowledge and abilities. As needed, the PHS Engineer on the mission could consult with other PHS Engineers who are SME on a particular issue or need in order to identify potentional solutions and approaches to the host-country issue.	Policies/procedures	Improve	High					

2.4	PDSS indicated activities and resources that were not readily available from the mission or PHS team	Some PDSS activities could not be accomplished during time mission was in host-country or from available expertise and/or resources	Activities and work identified in PDSS should be thoroughtly reviewed and corresponding resources, supplies, and expertise should be incorporated in the mission and be on ship	Planning	Improve	Medium					
2.5	PHS Engineers teamed well with USN Seabee units	PHS Engineers were a valued resource working with USN Seabee units to construct improvements in structures and water/sanitation facilities	PHS Engineers should be teamed with USN Seabee units for construction and improvements of specific public health infrastructure facilities; e.g. water source construction and protection, water treatment, and sanitation facilities	Planning	Sustain	Medium					
2.6	Need to work closely with other USN components to maximize effectiveness.	A) PHS engineers are assigned to the Navy PREVMED unit, in the medical directorate. The Joint Engineer Force (JEF) is organized outside of the medical directorate and frequently operates completely independent of the medical mission. B) US Navy Maritime Civil Affairs Team (MCAT) and Advanced Coordinating Element (ACE) are valuable resources to utilize to in linking up with local decision makers, health professionals, engineers and utility professionals.	1) Embedding PHS Engineers with Joint Engineer Force maximizes engineer productivity, provides unique skill set to JEF engineers, and provides opportunity to greatly magnify mission impact on population health for relatively low cost by focusing resources on construction of new or improved water facilities. In this capacity the PHS engineer can also act as a liaison between the JEF and Preventive Medicine Directorate, feeding information both ways, reporting any relevant Prev Med (engineering) metrics, and leveraging additional Prev. Med specialties into JEF projects where appropriate (Env. Health, Industrial Hygiene, Safety, etc.) 1) PHS engineers should quickly meet and develop working relationships with both MCAT and ACE leaders.	Organization	Improve	Medium					
2.7	PHS Engineers conducted surveys and assessments of host-country facilities with no indication of potential future benefit from document. In some cases, assessments of facilities may be duplication of previously known information by host-country and serves limited purpose.	PHS Engineers devoted considerable time in some host countries on reporting facility needs and deficiencies that had not been previously identified in PDSS; however follow-up was uncertain by either host-country or USN	Coordinate follow-up on identifed needs and deficiencies from surveys by future missions to site and/or other diplomatic exchanges. In addition, as part of planning for the PDSS, consider small-scale public health infrastructure projects that may be applicable to site in host-country and incorporate them as specific tasks and activities for mission. Projects could include source water protection, water treatment both for community and individual (filtration and disinfection systems), and sanitation projects (excreta disposal and solid waste). Develop list of potential small-scale projects and technologies specific for host-country.	Organization	Improve	Medium					
2.8	In some countries, there were only three to five days ashore with daily travel required from and to ship.	PHS teams actually had limited time in host-country which deterred effectiveness of completing activities	Plan PHS teams in host-country for a two-week period and stationed for several days on shore as warranted by USN force protection evaluation. Longer durations in host-country and on shore will increase opportunities of completing sustained public health infrastructure projects. (Generally, there were longer times ashore in 2008 missions, but misions did not allow teams to remain overnight).	Planning	Improve	Medium					
2.9	A variety of ships were used for the missions with specific opportunities and constraints.	Some missions utilized navy auxiliary hospital ships (e.g. USNS Comfort) while others utilized grey hull ships (e.g. USS Peleliu). On the auxiliary hospital ships, the majority of the personnel and supplies had to be transported to shore using local host country vessels and loaded by exterior ladders or doors. The grey hulls, such as the LHA/LHD, had the capabilities to efficiently transport personnel and supplies ship-to-shore with a LCU.	Utilize the grey hull ships for greater efficiency of transporting personnel and supplies to shore.	Planning	Improve	Medium					

2.10	Force protection limited PHS Engineers ability and range in host-country	On numerous occassions, PHS Engineers were limited to area around host-country health clinic and had no permission to conduct activities in nearby community public health infrastructure facilities; e.g. water and sanitation systems	Arrange area of force protection to allow PHS Engineers to conduct activities throughout the community in order to evaluate and work on public health infrastructure facilities	Planning	Improve	Medium					
2.11	Separate work space was non-existant.	Computer access for email and internet was severely limited and hampered overall productivity. Work was completed in berthing areas on a shared computer. The ability to print was almost non-existent.	A work space, computer with internet access, and printer should be allocated for use by the PHS engineer. Workspace issues could be addressed if embedded with JEF engineers.	Organization	Improve	Medium					
2.12	In some cases limited equipment, supplies, and technical references specific for public health infrastructure facilities work. PHS Engineers and ship should be equipped with with tools, references and equipment to maximize their effectiveness.	On own initiative, some PHS Engineers brought items for mission. Some ships had no or limited testing equipment and technical references. Some ships had some Prev Med tools and resources, such as a laboratory to perform bacteriological analysis, but common equipment and field gear had to be provided personally.	Develop standardized engineering go-kit. PHS Engineers deploy with go-kit to assist with common field engineering tasks for USN humanitarian missions. Components of the kit should be fully enclosed in a backpack. See additional information in document. In addition, on larger scale, coordinate between USN and PHS Engineers to ensure that correct and adequate equipment and resources are aboard ship to conduct activities outlined in PDSS and other typical internationa public health infrastructure activities.	Organization	Improve	Medium					
2.13	Enhancements or clarification to the PHS uniform policy could improve safety, convenience, and build espirit-de-corps.	A. Uniforms are frequently separated from the officer during ship board laundering and anti malaria chemical treatment. BDU trousers must be easily identifiable to the officer.	1) Name tapes should be authorized and required for BDU pants. Precedence: Navy and Army authorize and require nametapes on back right rear pocket on BDU pants.	Policies/procedures	Improve	Medium					
		B. Field work environment is typically extreme heat and sunlight.	1) BDU jungle hat should be authorized and prescribed for deployments where excessive sun/ heat conditions exist. The jungle hat provides maximum ultraviolet protection to the officer.	Safety	Improve	Medium					
			2) Cotton black PHS tee shirt was not condusive to extreme heat environment. Recommend breathable fabric such as polypropylene.								
		C. Ready identification of PHS officers from Navy officers was a challenge, especially from the perspecitive of the public, enlisted and other services embarked on-board. The round, subdued, PHS shoulder patch worn on the BDU uniform is redundant to the PHS nametape.	1) Subdued, round PHS shoulder patch should be replaced with unique unit patch identifying the officer as part of the Office of the Surgeon General. Rationale: Officers on deployment are called up and deployed through the Office of Surgeon General (OSG)/ Office of Force Readiness and Deployment. The “OSG” unit patch would provide improved identification of the officer as representing the Surgeon General, a functional unit within the PHS, and improve officer es-pirit de corps. The round OSG patch could be worn on the BDU in subdued form, and also on the Navy Coveralls (front, left best pocket) in color form.	Visibility	Improve	Medium					
2.14	No formalized reports for daily situation reports, site assessments, and rapid needs assessments (for emergency/disaster situations)	PHS Engineers, in coordination with USN, developed own reports for daily situation reporting, site assessments of public health infrastructure facilities, and rapid needs assessments of communities affected by disasters. Reports were used by PHS, USN, host-country, and NGOs.	Develop standardized reports for daily situation reports, site assessments, and rapid needs assessment; which will enhance overall communication and delivery of service between PHS, USN, host-country, and NGO.	Communication	Improve	Medium					
2.15	No standard guidance provided on collection or management of daily or mission data.	It is critical to capture and exchange information that will be useful to the OIC, and follow-on PHS officers and engineers	Standard after action report format developed which communicates summary of duties accomplishment, impacts and lessons learned organized and delivered by country.	Communication	Improve	Medium					

3. Post-deployment												
3.1	No formalized de-briefing or reporting for returned PHS team	PHS Engineers developed own after action reports. Variation in distributions of reports; e.g. reports provided to OFRD, OIC, and/or USN	Develop standardized after action reports (AAR) for returned PHS officers and formalized distribution list. Set schedule to enhance detail and usefulness	Communication	Improve	High						
3.2	Processing of travel voucher and release of Govt trip account back to local control was delayed for up to two months after officer returned to duty station.	Delay in timely processing and release of gov trip account impacted the ability of officer to travel for regular duty after return to duty station.	Officer initiate, OFRD process Travel voucher and release Gov trip account within one week of officers return to duty station	Policies/procedures	Improve	High						
3.3	Special pays (sea pay, hostile fire pay, familiy separation allowance) earned on the mission were not received for up to 4 months after officers returned to their duty stations.	USN and other uniformed service members on-board received special pays typically the month after earned. Memos were generated for officers while on board by the USN to communicate to OFRD the authorization and eligibility of PHS officers for special pays.	OFRD process and trasnmit to OCCO requests for special pays within one week of receipt from the USN to assure the timely receipt of pay to the PHS officers.	Policies/procedures	Improve	Medium						
3.4	Limited knowledge of host-country specific travel regulations, and in some cases, PHS officers traveled individually on return flights	PHS officers were unaware of host-country specific customs requirements and travelled alone; which could be a concern in countries with elevated force protection risks	Provide information to PHS officers on specific host-country travel regulations (customs) and have PHS officers on international flights travel as a team or unit	Communication	Improve	Low						
4. Other: disater relief												
4.1	Emergency/disaster relief assistance required flexibility, evolved daily, and was initially focused on simply transporting much needed food, water and other relief supplies to remote sections of the country, but later involved rapid needs assessments of affected areas. *Note: the USS Kearsarge was utilized for diaster relief in Haiti during the mission	A) Initially, Prev Med and almost no role in the relief operations, however, as the mission evolved it became clear that Prev Med personnel were a critical component in the releif operation because those personnel had the knowledge, skills and ability to perform a Rapid Needs Asssessment (RNA) of communities affected by the storm and feed that infromation for further action by the United Nations or other follow-on NGO's. Rapid Needs Assessment teams did not start until 1-2 weeks into the relief mission. This delay caused all other assessments, passing of critical infrastructure condition information, and medical missions to be delayed the same time frame.	1) The Prev-Med team developed a standardized RNA form/ tool and deployed it with much success to capture critical, timely and actionable information on a communities A) population profile, B) health and nutrition, C) food supply, D) water supply, E) sanitation threats, and F) vector threats. 2) RNA in post disaster situations need to start much earlier (within first week) in the mission to have maximum effect. 3) Visiting isolated communities first with a 2-person Rapid Needs Assessment Team, consisting of an Environmental Health Officer and Medical Doctor, followed by a focused engineering damage assessment team embedded with a medical mission worked well. 4) GPS mapping of damaged facilities resulted in critical and timely information to pass on for subsequent action; an estimated total length of damaged piping was determined using GPS at pipe ends and used for cost estimate. Need mapping software covering local area/ county to readily produce maps and site plans.	Planning Leadership Organization Equipment	Sustain Improve Sustain Improve	Medium Medium Medium Medium						

4 Example Metrics

Example Metrics – Public Health Infrastructure	
Metrics	**Unit of measure**
Drinking water supply	
Sanitary survey/needs assessment	System user population
Water source (quality/quantity) technical assistance/construction	Sources/system user population
Water storage technical assistance/construction	Facilities/system user population
Water distribution technical assistance/construction	Facilities/system user population
Water treatment technical assistance/construction	Facilities/system user population
Individual home storage/treatment technical assistance/installation	Home/population
Institutional building (i.e. school, medical center) source/storage/treatment technical assistance/installation	Institutional building/population
System management and operation	User population
Excreta disposal	
Sanitary survey/needs assessment	System user population
Sewer collection technical assistance/construction	Facilities/system user population
Sewer treatment technical assistance/construction	Facilities/system user population
Sewer disposal technical assistance/construction	Facilities/system user population
Individual home disposal technical assistance/installation	Home/population
Institutional building (i.e. school, medical center) collection/treatment/disposal technical assistance/installation	Institutional building/population
System management and operation	User population
Solid waste management	
Sanitary survey/needs assessment	System user population
Disposal facility (bins/pits) technical assistance/construction	Facilities/system user population
Individual home disposal technical assistance/installation	Home/population
System management and operation	User population
Waste management at medical centers	
Survey/needs assessment	System user population
Disposal facility (bins/pits/incinerator) technical assistance/construction	Facilities/system user population
System management and operation	User population
Wastewater management (i.e. standing water)	
Survey/needs assessment	System user population
Disposal facility technical assistance/construction	Facility/system user population
System management and operation	User population
Hygiene promotion	
Survey/needs assessment	System user population
Program development assistance/implementation	User population

5 Recommended Additional Individual Packing Items

In addition to required packing items for deployment, consider the engineer-specific items indicated below:

Personal Protective Equipment (PPE)
- Safety/work sunglasses
- Gloves
- Ear plugs
- Hard hat

Electrical/electronic equipment
- Digital camera w/extra batteries
- Laptop computer
- Thumb drive/data stick (1-2 GB)
- Compact disks (CD)
- Handheld GPS unit

Stationery
- Field note book
- Engineer paper
- Pens/pencils/markers
- Calculator (solar powered)
- Aluminum case for paper/forms

Equipment/other items
- Flash light
- Swiss army knife/Leatherman
- Tape measure (100 ft, fiberglass)
- Folding tape (6 ft)
- Compass
- Hand level
- Chlorine residual test kit
- Test strips for pH/Nitrates/Chlorine
- Volt/ammeter
- Maps of host country

References
Consider technical references and information (i.e. survey forms) on CD and/or thumb drive/data stick

Primary

1. Davis, J. and Lambert, R. (2002). *Engineering in Emergencies*, Second Edition, ITDG Publishing.

2. California Conference of Directors of Environmental Health (CCDEH). (2004). *Disaster Field Manual for Environmental Health Specialist*.

Supplemental

1. Engineering-discipline specific; i.e. solid waste, institutional buildings, medical centers, etc.

2. Salvato, J. (1992). *Environmental Engineering and Sanitation*, Fourth Edition, John Wiley Publication.

3. World Health Organization (WHO). (1997). *Guidelines for drinking-water quality*, Volume 3, Second Edition.

4. American Water Works Association (AWWA):
   - *AWWA Wastewater Operator Field Guide*.
   - *AWWA Water Operator Field Guide*.

5. California State University, Sacramento, College of Engineering and Computer Science, Office of Water Programs:
   - *Small Water System Operation and Maintenance*.
   - *Small Wastewater System Operation and Maintenance*.