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**Compilation and Determination of Potential Occupational  
Exposures in the Work Place – U.S. Coast Guard  
(Marine Safety Unit, Air Station Unit) Galveston, Texas**

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**Compilation and Determination of Potential Occupational  
Exposures in the Work Place – U.S. Coast Guard  
(Marine Safety Unit, Air Station Unit) Galveston, Texas**

***by***

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**Capstone**

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Publication No. \_\_\_\_\_

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The University of Texas Medical Branch, 2011

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This study documented potential occupational hazards found in the workplace of the U.S. Coast Guard Air Station Unit and Marine Safety Unit in Galveston, Texas. Hazards were categorized into the following physical health effects: (a) hearing loss, (b) ergonomic hazards, and (c) chemical hazards. Other workplace factors were evaluated to determine potential occupational exposure effects, including ventilation, sound protection, lighting, safety issues, and health problems. This study also assessed whether crew members used proper personal protective equipment such as hearing protection, gloves, boots, shoes, overalls, and cap or hairnet to prevent occupational health hazards.

Data collection methods for this study included on-site observation and a gap analysis. A gap analysis was used to help identify potential hazards. A representative sample of 10 Air Station Unit crew members and 10 Marine Safety Unit crew members was interviewed. Study results will aid in recognition of and reduction in unwanted

occupational hazardous exposures. The study identified potential workplace hazards such as waste material, spills, pollutants, and high decibel noise that crew members may be exposed to at work. In addition, the study characterized waste material and hazardous noise exposure into the following categories: (a) inhalation, (b) dermal, and (c) ingestion. These findings may assist staff to take appropriate and timely steps to reduce and control unwanted exposures.

## ***Table of Contents***

List of Tables .....	vii
List of Figures .....	viii
List of Abbreviations.....	ix
Section 1 Specific Aims.....	1
Section 2 Background & Significance.....	2
Section 3 Methods.....	10
Section 4 Results.....	14
Description of ASU Operation.....	17
Aviation Maintenance Technician (AMT).....	17
Avionic Electrical Technician (AET).....	18
Aviation Survival Technician (AST).....	19
Description of MSU Operation.....	20
Marine Science Technician (MST).....	20
Section 5 Discussion.....	26
Appendix A Gap Analysis Questionnaire.....	30
Bibliography .....	32

## ***List of Tables***

Table 1:	List of Potential Hazards in the Air Station Unit.....	14
Table 2:	Occupational Environmental Health Survey at ASU.....	21
Table 3:	Hazards Found During the Health and Work Life Center Inspection.....	23

## ***List of Figures***

Figure 1:	Reported Fatal Occupational Injuries, 1992-1997 .....	3
Figure 2:	Reported Fatal Occupational Injuries from Harmful Substances .....	4
Figure 3:	Reported Nonfatal Injuries and Illnesses .....	5
Figure 4:	CDC-issued Guidelines for Noise Exposure.....	7
Figure 5:	Ergonomic Injury from Poor Posture.....	8
Figure 6:	Hazmat Placard; PPE Usage .....	12
Figure 7:	Improper Storage of Chemicals .....	15
Figure 8:	Inoperable Priming Room Exhaust Fan .....	16
Figure 9:	Paint Booth.....	17
Figure 10:	AMT Workplace and Details .....	18
Figure 11:	AET Workplace .....	19
Figure 12:	MST Personnel in Workplace .....	21



### ***List of Abbreviations***

ASU	Air Station Unit
AMT	Aviation Maintenance Technician
AST	Aviation Survival Technician
AET	Avionic Electrical Technician
ATON	Aids to Navigation
BLS	Bureau of Labor Statistics
CDC	Center Disease Control
CNS	Central Nervous System
DASHO	Designated Agency Safety and Health Official
DHHS	Department of Homeland Security
EPA	Environmental Protection Agency
H-65	Helicopter-65
LOD	Level of Detail
LOE	Level of Exposure
MLE	Maritime Law Enforcement
MSAL	Medical Surveillance Action Level
MSDS	Material Safety Data Sheet
MSU	Marine Station Unit
OEL	Occupational Exposure Limit
OMSEP	Occupational Medical Surveillance and Evaluation Program
ORM	Operational Risk Management
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
RAC	Risk Assessment Code
SAR	Search and Rescue
SFO	Senior Flight Officer
USCG	United States Coast Guard

## **SECTION 1: SPECIFIC AIMS**

Occupational exposure is a serious problem because a hazard often is associated with a condition or activity that, if left uncontrolled, can result in an injury, illness or death. Safety and health can add value to one's job and life. Workplace injuries and illnesses can be prevented by assessing workplace operations, establishing proper job procedures, and ensuring that all employees are trained properly.

The specific aims are to identify the following potential workplace hazards: (a) hearing loss: for the USCG, a primary source of hazardous noise exposure is being in a workplace with high performance hydraulic equipment, such as the helicopter (H- 65 Charlie), found in the Air Station Unit; (b) ergonomic hazards: the Air Station Unit workplace is unique and demanding; and (c) chemical hazards: chemical spills typically have a greater capacity to impact human health when released.

To address these specific aims a gap analysis was conducted, which focused on the following areas: potential distraction in the workplace; worksite issues that affect the ability to communicate or carry out a task; workplace issues that need improvement, such as noise/equipment/systems design; near misses or occupational illnesses that need treatment; human errors that diminish understanding of the mission and lead to accidents or injuries; any issues affecting hearing; history of fitness issues; and injuries or illnesses.

Findings were shared with the Air Station Safety Unit Officer and the Senior Flight Surgeon so that steps can be taken to eliminate or reduce to acceptable risk levels. These findings will be used: (a) to educate USAF Flight Surgeons of individualized occupational health examinations needed; (b) to inform USCG crew members assigned to an Air Station of optimal occupational surveillance; and (c) to detect, reduce, and control unwanted occupational exposures. The USCG Senior Flight Officer (medic) is currently stationed at the Galveston/Ellington Field Health Medical Clinic and offers on-site occupational health exams, clinical services, and case management.

## **SECTION 2: BACKGROUND & SIGNIFICANCE**

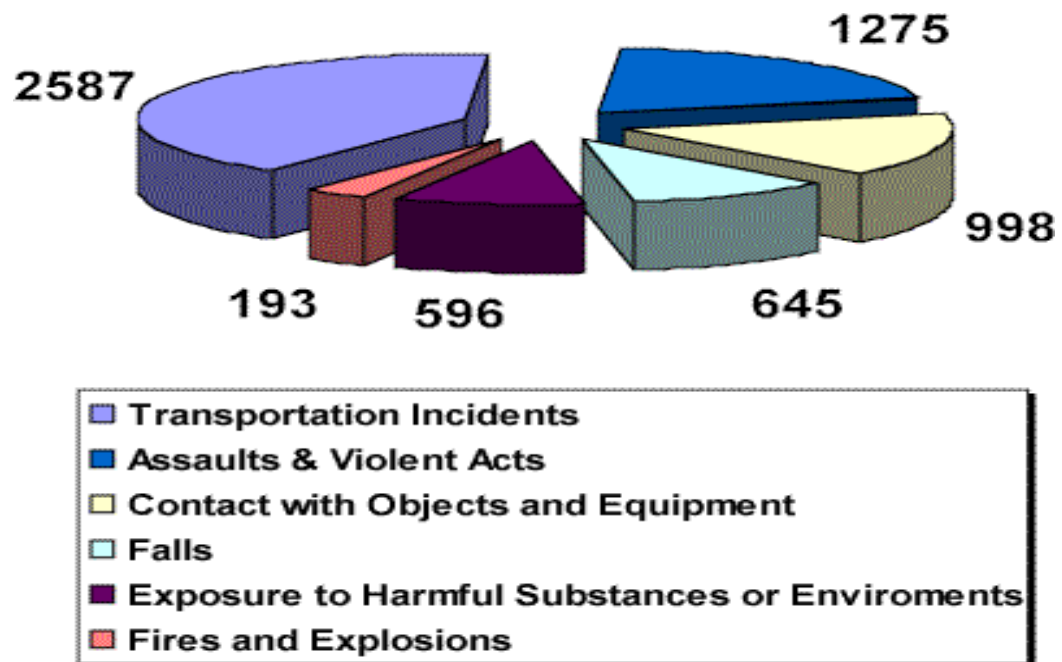
An occupational illness (or disease) is defined by Occupational Safety and Health Administration (OSHA) as, "any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to factors associated with employment" (OSHA, n.d.). Compared to traumatic fatalities and musculoskeletal injuries, occupational diseases are less commonly reported according to data from the U.S. Bureau of Labor Statistics (BLS) (U.S. BLS, 2003).

Of the approximately 126 million working Americans the average annual number of work-related fatalities in the United States between 1992-1997 was 6,294 deaths, including 596 deaths caused by exposure to harmful substances or environments (Figure 1). Figure 2 details the fatalities caused by exposure to harmful substances or environments.

The census of fatal occupational injuries is a part of the BLS Occupational Safety and Health statistics program compiled for the United States each calendar year. The data set contains information about each workplace, worker characteristics, equipment being used, and the circumstances of the fatal event. The primary regulatory agency for occupational safety and health is the Occupational Safety and Health Administration (OSHA).

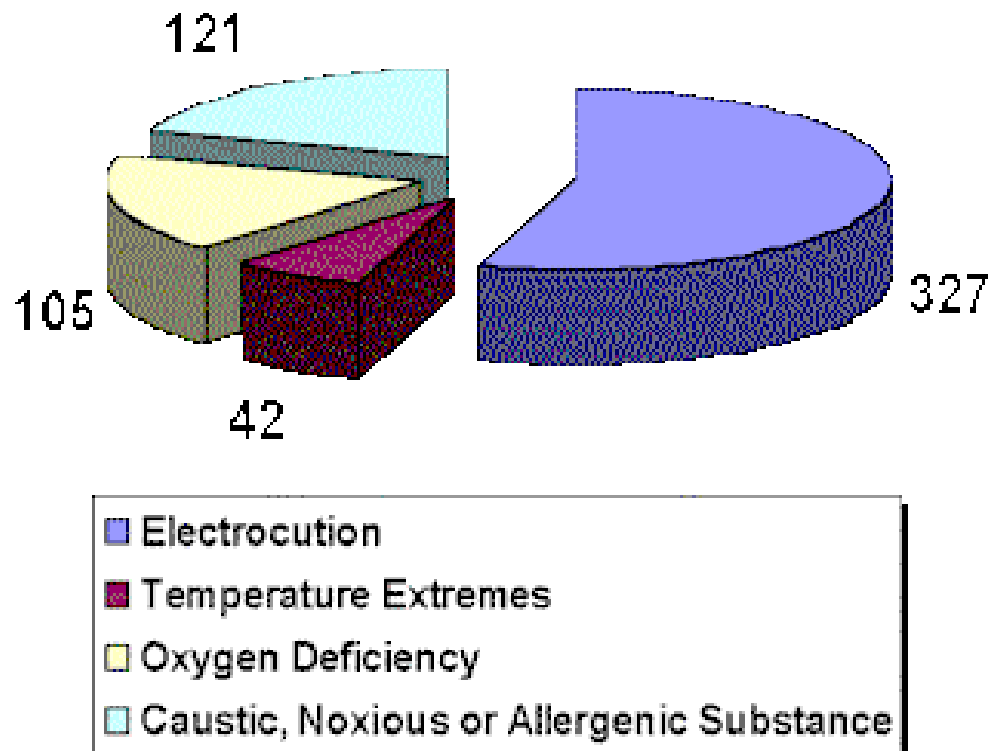
**Figure 1: Reported Fatal Occupational Injuries, 1992-1997**

**Average Annual Number of Fatal Occupational Injuries**



*Source: U.S. Bureau of Labor Statistics (BLS), 1998*

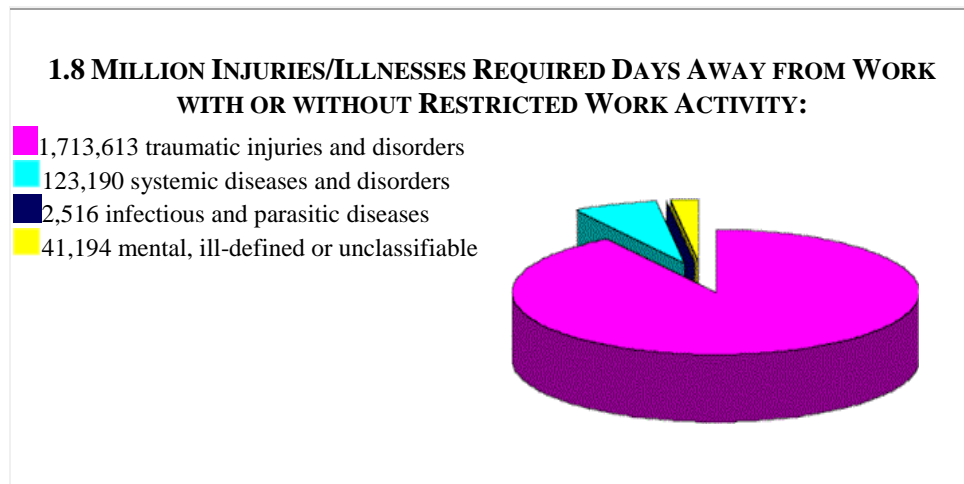
**Figure 2: Reported Fatal Occupational Injuries from Harmful Substances, 1992-97**  
**Average Annual Fatalities from Exposure to Harmful Substances or Environments**



*Source: U.S. Bureau of Labor Statistics, 1997*

Chemical hazards are harmful substances that may be encountered anywhere in the workplace. For each chemical in use, a chemical inventory is required by OSHA. Information must include chemical properties, as well as toxicity feature exposures at levels thought to be safe for occasional and daily exposures. Figure 3 (below) shows specific systemic disease reported involving days away from work.

**Figure 3: Reported Nonfatal Injuries and Illnesses, 1996**



*Source: U.S. Bureau of Labor Statistics, 1997*

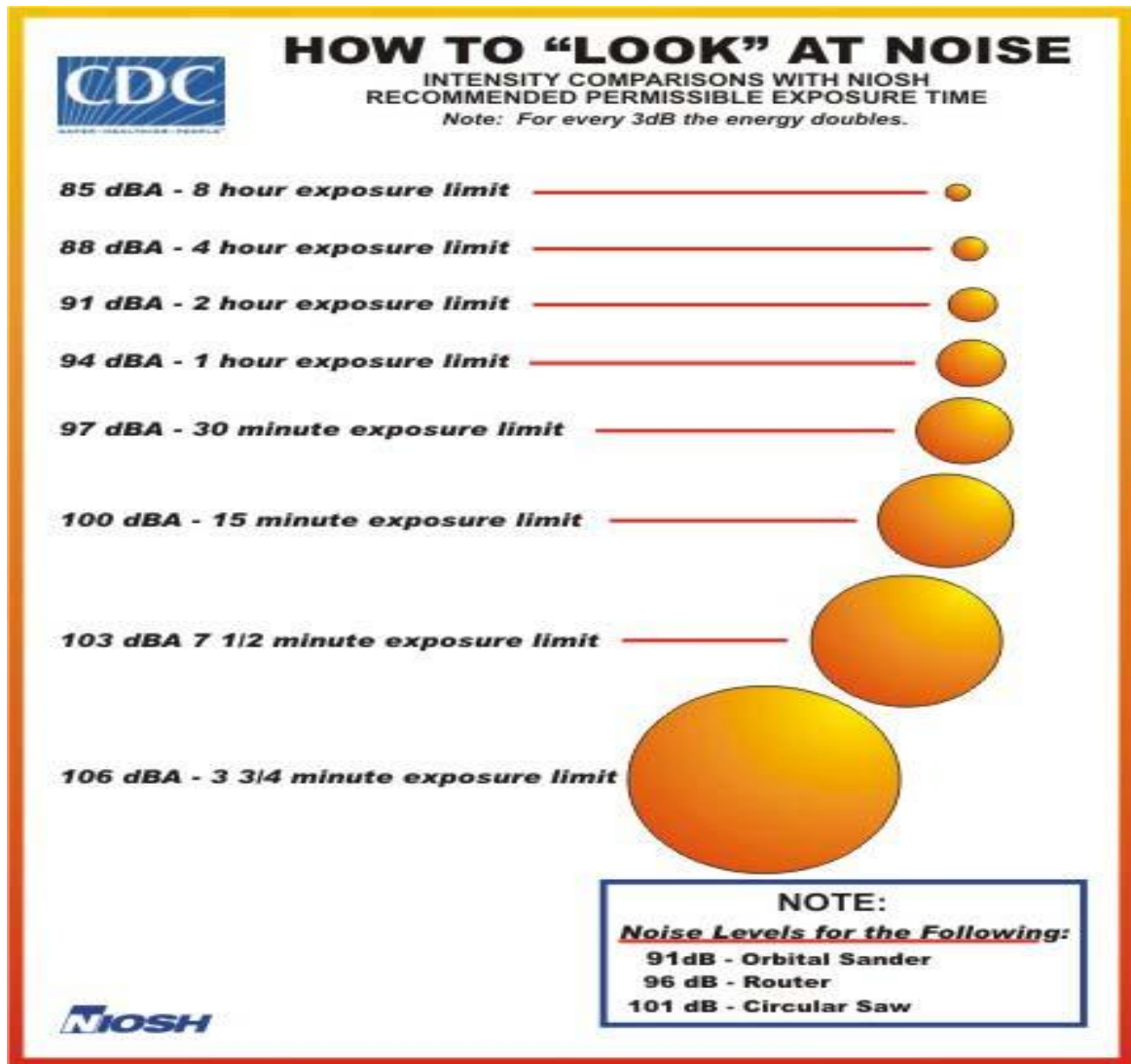
The goal of the study is to identify potential exposures that may harm USCG crew members and to describe the exposure effects on humans. The USCG is one of five branches of the US Armed Forces; it provides seagoing service including Search and Rescue (SAR), Maritime Law Enforcement (MLE), Aids to Navigation (ATON), Ice Breaking, Environmental Protection, Port Security and Military Readiness (United States Coast Guard Missions, n.d.). Because the USCG aims to prevent mishaps and reduce losses in its operations, maintenance of mission readiness is paramount. To safeguard USCG crew members' health and welfare, personnel must understand Operational Risk Management (ORM) terms. Although risk assessment and management apply to all USCG activities, some areas may require supplemental tools and techniques. ORM is a continuous, systematic process of identifying and controlling risks in all activities, and includes detecting hazards, assessing risks, and implementing risk controls to support effective decision-making based on those risks. Identifying hazards and describing causes of potential exposure will help clarify risk, provide safeguard controls, and reduce incidences of illness or injury (DHHS/USCG, 2009).

The impact of excessive noise exposure can potentially cause hearing loss of military personnel. Hearing loss has always been a concern since World War II. Hearing loss is one of the costliest disabilities in the war on terror. The amount paid to veterans with tinnitus increased from \$150 million in 2000 to \$418 million in 2005. Nearly 70,000 of the more than 1.3 million troops who have served in the two current war zones, Iraq and Afghanistan, have been diagnosed with permanent hearing loss (Hearing Loss Rises Among U.S. Soldiers in Iraq, 2006). Hearing loss from exposure to high decibel sounds is permanent and irreversible; noise-induced hearing loss can be prevented by using proper hearing protection. Permanent hearing loss may be caused by safety lapses, such as the absence of response protocols for excessive noise doses, absence of noise frequency monitors, high duration of noise exposure, and usage of unsuitable hearing protection. When needed, personnel are enrolled in Hearing Conservation Program (HCP). Its responsibility is to inform, evaluate, and reassure members of regulatory standards for permissible noise level exposure (Zoroya, 2008).

HCP guidelines require hearing protection to be worn whenever average noise levels exceed 90 decibels during normal job duties. If noise levels exceed 85 decibels during normal job duties, employees are required to enroll in the HCP. Hearing loss due to excessive noise is permanent and irreversible. However, noise-induced hearing loss can be prevented by wearing proper hearing protection (McIlwain et al., 2008).

The USCG Hearing Conservation Program determines whether noise-induced occupational hazards exist and the degree to which they affect personnel. The USCG's safety standards dictate that all personnel and employed civilians exposed to hazardous noise levels will be issued ear plugs and complete the HCP. USCG complies with the guidelines for noise exposure issued by the CDC (see Figure 4, below).

Figure 4: CDC-issued Guidelines for Noise Exposure



Source: National Institute for Occupational Safety and Health (NIOSH), 2009

Ergonomic hazards represent another potential workplace hazard. Ergonomic injuries include strains, sprains, and other problems. These types of injuries may be caused by repeated motions, extreme physical exertion (lifting heavy objects), or awkward body positioning (twisting one's body to reach an object). Ergonomic injuries frequently seen in the military include back, shoulder, neck, and knee strains and sprains



(Ergonomics, 2000). Most importantly, from an occupational perspective the potential ergonomic hazards in the Air Station Unit and the Marine Safety Unit can cause serious physical injury due to the nature of the job, i.e., lifting, squeezing, holding tools weighing more than 10 pounds, poor posture from continuously bending at the waist, knee, and stretching out to reach an object with an awkward hand position. Figure 5 (below) is a photograph of poor posture from continuous bending at the waist.

**Figure 5: Ergonomic Injury from Poor Posture.**



*Source: U.S. Coast Guard Air Station Unit; Guzman Yvette, April 2011*

Moreover, potential chemical hazards in the workplace can cause serious physical injury. These chemicals may be corrosive, explosive, flammable, combustible, or undergo oxidation. In certain situations these hazardous chemicals may become unstable and highly reactive. Chemical hazards can lead to serious physical injury due to the nature of the chemical materials used in the USCG Air Station Unit (i.e., corrosive, explosive, flammable/combustible, oxidizer, organic peroxide), which then can become unstable and reactive. Acute skin reactions, respiratory, and eye irritation can cause temporary or permanent health problems. Hazardous materials can affect health, air, water, and soil among other things. When exposure to or contamination from hazards has

occurred, adherence to established safety procedures becomes critical. Further, the anticipation of attenuating occupational health exposures will ensure better surveillance and lead to improved outcomes. When determining the presence of occupational health exposures, prevention of hazardous exposure can only be achieved by assessing occupational risk and addressing timeliness of precautionary measures. These steps, in turn, will alleviate disease and promote optimal work performance.

The USCG complies with regulations of the Occupational Safety and Health Administration (OSHA), where applicable, and fulfills the terms that apply with the Designated Agency Safety & Health Official (DASHO). Furthermore, the Commandant Instruction M5100.47, Safety and Environmental Health Manual (DHHS/USCG, 2008) incorporates federal safety and health standards and establishes the safety and health program for the USCG. The USCG has the responsibility to furnish its members with a workplace that is free from safety and health hazards. At a minimum, annual workplace inspections are required to ensure that potential hazardous conditions are eliminated.

Occupational safety, health training, equipment education, and proper use personal protective equipment (PPE) will be required and maintained to assure a danger-free workplace. All work-related mishaps experienced by members, including injuries or occupational illnesses, should be reported to the supervisor and Safety Unit Officer. (Allen [USCG 1790], n.d.).

### SECTION 3: METHODS

Data collection methods for this study included a literature research, on-site observation and a gap analysis. This project investigated USCG personnel's occupational exposures and potential risk factors. The target population came from the USCG Air Station Unit (ASU) and Marine Safety Unit (MSU) in Galveston, Texas. Potential problem areas, or "gap analyses," investigated were: (a) ventilation, (b) sound protection, (c) lighting, (d) occupational chemical exposures, (e) safety issues, and (f) health problems. Specific areas of ASU operations were assessed, including: (a) Aviation Maintenance Technician (AMT), (b) Aviation Survival Technician (AST), (c) Avionic Electrical Technician (AET). A job analysis was conducted on various chemicals to which workers are exposed and other potential factors, e.g., ergonomic problems, were also assessed to quantify exposure levels.

In September 2009, the *Medical Manual: COMDTINST M6000.1* was published (DHHS/USCG, 2009). This document asserts that standard operating procedures/protocols (SOPs) ought to exist to ensure uniform quality care for all patients. The USCG *Medical Manual: COMDTINST M6000.1D* was consulted to determine whether exposures might affect mission safety or completion, and advice was sought from the installation Air Station Safety Officer when appropriate (DHHS/USCG, 2009). Further, the manual series lists controls used to substitute for less hazardous material or mitigate exposure outcomes (DHHS/USCG, 2009). That is, the manual provides guidance in minimizing exposure through operating instructions and precautionary guidelines for various job functions.

These precautions ensure that Air Station Unit and Marine Station Unit do not exceed Occupational Safety Health Assessment (OSHA) standards for occupational illnesses and injuries or standards for Hearing Conservation Program. The Unit Safety Officer referred all work-related ailments to the Senior Flight Officer (a medic) for an occupational health assessment. A gap analysis questionnaire was used to collect

additional personnel feedback, to identify any potential hazards concerns, address medical issues, evaluate risk factors in humans, and demarcate life-saving equipment such as shower irrigation stations and fire extinguishers.

A gap analysis is utilized in the military as an operational requirement to identify and collect gaps, or loop holes, for all military installation during war-time and base operational missions during peace-time. This requirement is accomplished semiannually; it reviews personnel and their environmental risks related to their workplace, i.e., while working are employees wearing/ not wearing protective gear? Are there high-stress work norms where employees work very long hours with little breaks? Are there unsafe storage areas for dangerous/toxic chemicals? And are there any exposures to toxic materials or unsafe equipment or work facilities? Using this information, performance enhancement proposals are made.

Findings from my study were shared with the Air Station Unit Safety Officer and Senior Flight Surgeon so that steps could be taken to protect crew members exposed to occupational waste material or noise pollution. Thus, this study investigated the USCG HCP to determine whether noise-induced occupational hazards existed, and the degree to which they affected personnel. A central research questions was: does the USCG at the Galveston support an HCP? Further, does the USCG's Standard Operating Procedure Protocol manual mandate the usage of hearing protection when average noise levels exceed 90 decibels in an eight-hour workday? In their workplace practice the Maintenance Technicians, Avionic Electrical Technicians, and the Aviation Survival Technicians ensure that aviators are safe. They all need to be familiar with their duties, such as inspect service, maintain, troubleshoot, and repair cargo aerial delivery systems. High-risk potential ergonomic injuries were observed at the ASU when a worker's hand came into contact with a heavy tool, rope, hoses, and mechanical belts (see Figure 6 below).

**Figure 6: Hazmat Placard; PPE Usage**



*Source: U.S. Coast Guard Air Station Unit; Guzman Yvette, April 2011*

These hazards can occur very quickly; vibration can cause damage to nerve endings due to overexertion (sprains and strains) or repetitive motion. Slips and trips from slippery floors, poor housekeeping, or uneven floor surfaces are conditions that can also cause fatigue that result in safety-critical failure. Crew members were interviewed and they were all aware where to locate the MSDS (material safety data sheet) and/or OSHA1910.1000 (toxic and hazardous substances sheet) for chemical hazard information. The MSDS is a checklist that gives a description of hazardous occupational chemicals to which a person may be exposed. The checklist is also categorized into physical health effects, such as: (a) inhalation hazards (chemical/toxic/flammable): a chemical that exposes a person by absorption through inhalation, the skin, or through the blood stream that causes illness, disease, or death; (b) dermal hazards (chemical/corrosive): a chemical that when it comes into contact with skin or other material it causes damage to the material; and (c) ingestion hazard (chemical): solvent soiled rags, wiping cloths can cause conditions that results in illness, disease, or death. (OSHA, 2002).

In summary, this study documented that many waste and noise hazards may attenuate the health and wellness of USCG crew members. Gaps found by the Health, Safety and Work – Life Service Center Inspectors were relayed to the Air Station Unit Safety Officer. The assessment of occupational exposure risk harm was disseminated to service members with actual and potential exposures highlighted.

## SECTION 4: RESULTS

A general working knowledge of the program was accomplished through on-site observations during workday visits totaling 50 hours. Of these 50 hours, 35 hours were spent in the Air Station Unit and 15 hours were spent in the Marine Safety Unit. During these visits a total of 20 USCG personnel were interviewed. Ten personnel each were selected from the Air Station Unit and the Marine Safety Unit in their relevant duty sections.

Various chemical materials were identified that are known to release air pollutants, which in turn may cause health problems. The routes of chemical exposure included lungs via inhalation, dermis via contact and ingestion, and mucus membranes via eyes, nose, and mouth. Without proper controls, non-use of personal protective equipment (PPE), or lack of risk awareness of the chemicals identified may inflict long-term health effect. Some chemicals identified were located in the hanger where USCG helicopters are located. Other chemical items included cleaners, degreasers, and solder applications (see Table 1, below). Figure 7 is a photograph of chemicals listed in Table 1 that were used in the hanger deck; these chemicals were not properly stored or labeled.

**Table 1: List of Potential Hazards in the Air Station Unit**

<b>Chemical Exposures</b>	<b>Possible Hazards</b>	<b>Controls</b>
CPC (corrosion preventive compound, e.g., WD-40)	Dermal	Nitrile rubber gloves and safety goggles
Fluid film aerosol (rust and corrosion protection)	Inhalation and dermal	Safety goggles, respirator masks, and gloves
Electro-Wash CZ (with cirozane) – electronic cleanser	Inhalation and dermal hazard; may cause irritation to respiratory tract, eyes, and CNS	Respiratory mask, safety goggles, and gloves
Ardrox – corrosion preventive compound	Inhalation and dermal	Same as above

**Continuation Table 1: List of Potential Hazards in the Air Station Unit**

Rust-Oleum (gloss protective enamel)	Inhalation and dermal	Same as above
Isopropyl alcohol	Inhalation and dermal	Same as above
Thixoflex Gray – sealing compound cover	Inhalation hazard; highly flammable	Respiratory mask, safety goggles, and gloves
Cor-Ban 27L (corrosion inhibiting compound)	Inhalation and dermal	Same as Electro-Wash CZ
Purox – lubricate engine; prevents engine corrosion	Inhalation and dermal	Same as above
Fiberglass – epoxy adhesion	Inhalation hazard; may induce allergic reaction, asthma	Respirator mask, safety goggles, gloves
Lubricating fluid	Inhalation and dermal	Same as Electro-Wash CZ
Hydraulic fluid (benzene)	Inhalation hazard; highly flammable	Respiratory mask, safety goggles, and gloves

**Figure 7: Improper Storage of Chemicals**



*Source: U.S. Coast Guard Air Station Unit; Guzman Yvette, April 2011*



A complete assessment of Air Station Unit practices, hazards, and controls was performed. During interviews with USCG crew members, it was revealed to the Air Station Unit Safety Officer that the exhaust vacuum in the priming room was inoperable and that the paint room was poorly ventilated (Figures 8 and 9, below). The chemicals found in these areas cause respiratory irritation and breathing problems, cardiovascular disease due to elevated blood pressure, and mucus membrane inflammation. The gap analysis disclosed that the main spray painter and primer for the helicopter have exposure risks to the upper respiratory system, skin, and eyes. Paint and primer exposure may also cause nervous system damage, while extreme overexposure may result in unconsciousness and death. It was recommended that the Aviation Maintenance priming and painting booth be relocated to an area with proper ventilation. Until exhaust fans and filters are repaired, paint and primer should be discontinued in those areas. The at-risk crew members should be enrolled in the respirator-fitted program to provide proper respirator sensitizer monitoring.

**Figure 8: Inoperable Priming Room Exhaust Fan**



*Source: U.S. Coast Guard Air Station Unit; Guzman Yvette, April 2011*

**Figure 9: Paint Booth**



*Source: U.S. Coast Guard Air Station Unit; Guzman Yvette, April 2011*

## **DESCRIPTION OF ASU OPERATION**

### **Aviation Maintenance Technician (AMT)**

Workplace: Helicopter (“hilo” MH 65 Charlie) Fuel Systems Repair (Figure 10).

- a) Personnel are responsible for inspecting, testing, repairing, and installing aircraft refueling hydraulic systems. The processes performed are: (a)

repairing components of the aircraft, (b) rebuilding components of the aircraft, (c) testing components of the aircraft, (d) aircraft inspection, and (e) leak checks on aircraft hydraulic systems.

- b) Potential exposures during these processes are: chemical exposure from lubricating oil, hydraulic fuel, calibrating hydraulic fluid, and sealing compound (Thixoflex Gray). Personnel use rubber gloves and eye shields (goggles) when working with the chemicals.
- c) Potential noise exposure is a concern when working with hydraulic equipment. Personnel wear appropriate hearing protection when working with hazardous noise equipment. Use of double hearing protection while working on the flight line is recommended.
- d) High-risk potential ergonomic injuries may result from use of high-impact vibrating tools, e.g., intensely squeezing these high-impact tools with an awkward hand posture and tools that weigh more than 10 pounds.

**Figure 10: AMT Workplace and Duties**



*Source: U.S. Coast Guard Air Station Unit; Guzman Yvette, April 2011*

### **Avionic Electrical Technician (AET)**

Workplace: Aircraft hangar (see Figure 11, below).

- a) Personnel may be exposed to Cor-Ban 27L (corrosion-inhibiting compound), which was substituted for Mastonox. Personnel are exposed to anti-corrosive compounds. Environmental Protection Agency (EPA) filed an occupational health hazard encounter, which caused this chemical to be removed. Personnel are also exposed to heat stress during summer months.

**Figure 11: AET Workplace**



*Source: U.S. Coast Guard Air Station Unit; Guzman Yvette, April 2011*

### **Aviation Survival Technician (AST)**

Workplace: Aircraft, seacraft, open airspace, open water

- a) Assigned duty: Provide basic life support, survival and rescue.
- b) Personnel perform push-ups, sit-ups, and swimming exercises, including direct harness rescue and free-fall. Over time, physical exposures of the job result in potential ergonomic stress such as chronic muscle skeletal injuries, lower back pain, and shoulder pain.

## **DESCRIPTION OF MSU OPERATION**

### **Marine Science Technician (MST)**

Workplace: International oil cargo (see Figure 12, below).

- a) Personnel have duties resembling those of fire marshalls as they execute Port State Control International Law. MSTs ensure safety compliance on international oil cargos, including environmental safety. Major duties are environmental compliance and maintenance of medical or hazmat emergency response equipment.
- b) Coast Guard MSTs are exposed to hazardous levels of noise when inspecting operating engine rooms, endure potential low oxygenation in confined areas, and may suffer heat stress.
- c) Other potential exposures of chemical inhalation are carbon monoxide (colorless, also very poisonous), hydrogen sulfide (flammable gas), and benzene in hydraulic oil (colorless, highly flammable liquid, carcinogen) (see Table 2, below).
- d) All international oil cargo is inspected by industrial hygiene surveyors prior to MST personnel ensuring environmental safety and oil cargo compliance safety. Industrial hygiene surveys various types of environmental compliance sampling, including atmosphere safety, e.g., hydrogen sulfide, carbon monoxide.
- e) Recorded levels on the vessel were “L.O.D. [Level of Detail] 1 ppm” and benzene “L.O.E. [Level of Exposure] 0.1 ppm,” which were permissible. Personnel perform various maintenance inspections, including the electrohydraulic steering gear component and engine room. Engine room work includes routine diagnosis, periodic fluid checks, filter changes, purifier room inspection, incinerator viewing, inert gas system checks, emergency generator inspection, and paint booth viewing.

**Figure 12: MST Personnel in Workplace**



*Source: U.S. Coast Guard Air Station Unit; Guzman Yvette, April 2011*

**Table 2: Occupational Environmental Health Survey at ASU**

Units	No. crew members	Sources of Exposure	Control Measurements	Health Exposure
AMT	27	• Noise	•Hearing Protection	No
AMT	27	• Sanding Operations	•Air Purifying Respirator	No
AMT	27	• Priming Operations	•Vacuum Sander •Oxygen-Supplied Respirator •Paint Booth Ventilation System •Safety Goggles •Gloves	Yes (lungs, eyes, skin)
AET	25	• Painting Operations • Wipe down Op's	•Same as Priming •Paint Booth Ventilation System •Safety Goggles •Gloves	Yes (lungs, eyes, skin)
AST	16	• Harness free-fall • Environment	•Harness vest •Gloves •Goggles •Hearing Protection	No

Exposures of these occupational operations may occur via inhalation, skin contact, or eye contact depending on the chemical. Overexposure may cause irritation to the skin, eyes, and upper respiratory system, and could attenuate the central nervous system. Extreme exposures may result in death.

When this researcher entered the primer room and paint booth, headache, light headedness, nausea, and eye irritation symptoms were reported. The symptoms felt were likely associated with the vapors and fumes found in the inadequately ventilated room. Although crew members did not report feelings of sickness, this may have been due to repeated exposure and an inability to discern baseline levels of clean air quality.

An off-site USCG inspection group stationed in New Orleans provides a medical monitoring program for exposures to occupational health hazards for USCG at Galveston. Team participants include: Safety and Environmental Health Officer, Marine Safety/Occupational Technician, Shore Safety Specialist, and Safety and Environmental Health Specialist. Team members collect chemical samples, gather exposure data, and formulate an official risk assessment to allow USCG at Galveston to provide remediation. The risk assessment is coded and ranked from 1 – 4: Risk Assessment Code (RAC) 1 – imminent danger to personnel and property requiring immediate remedial action; RAC 2 – serious hazard to personnel or property, or serious discrepancies of internal control requiring remedial action; RAC 3 – less serious hazard to personnel or property, or less serious internal control requiring remedial action; and RAC 4 – best work practice (Galveston County Health District, 2009).

The USCG Air Station Unit at Galveston had their annual Health, Safety and Work – Life Service Center inspection on January 25, 2011. Specific gaps identified were assigned an RAC and findings were described (Table 3, below). Results from this inspection demonstrate the importance of recognizing and addressing possible hazardous exposures within the work area and dwelling community. The purpose of an RAC is to recognize potential combinations of workplace hazards so that threat levels to personnel

or property can be quantified. To determine potential exposure routes of hazardous chemicals, one must envision physiological effects: (a) inhalation hazards, (b) dermal hazards, or (c) ingestion hazards. From my experience at Air Station Unit, identification of workplace hazards and their effects was best accomplished through hazmat placards (USCG, 1992) and the MSDS (material safety data sheet). One third of Air Station Unit crew members were interviewed; all interviewees knew where to find information about the chemical product being handled and comprehension of proper equipment use. Furthermore, the importance of personal protective equipment was an integral part of their overall mission.

**Table 3: Hazards Found during the Health, Safety, and Work Life Service Center Inspection**

<b>Location</b>	<b>Discrepancy/Recommendation</b>	<b>RAC</b>
Hanger deck – aircraft work stand	<b>Dis:</b> Broken wheels on work stand. <b>Rec:</b> Provide inspection and maintenance before work is performed on aircraft.	RAC: 2
Hanger deck – flammable storage locker	<b>Dis:</b> Too many ignition sources present in the flammable storage cabinet located on the hanger deck. <b>Rec:</b> Gasoline containers should be stored and transferred outside to the hanger deck.	RAC: 2
Administration: COMDTINST M6000.1C, Chapter 12. – A 5.a	<b>Dis:</b> Occupational Medical Surveillance and Evaluation Programs (OMSEP) database needs to be updated. <b>Rec:</b> Ensure personnel are receiving their required OMSEP physicals and that proper forms are filled out at the time of the examination.	RAC: 3
Administration: COMDTINST M6000.1C, Chapter 12. – A 2.c	<b>Dis:</b> Enroll personnel in the appropriate OMSEP program. <b>Rec:</b> Ensure personnel considered occupationally exposed for medical monitoring exposed for medical monitoring	RAC: 3



	purposes are enrolled in the OMSEP program.	
Administration: COMDTINST M6000.1C, Chapter 12. – B 2.b	<b>Dis:</b> OMSEP are not being conducted annually <b>Rec:</b> Ensure periodic OMSEP examinations are conducted annually.	RAC: 3
Administration: COMDTINST M6000.1C, Chapter 12. – A 2.a	<b>Dis:</b> Personnel are not being placed on the OMSEP program when exceeding 50% medical Surveillance Action Level (MSAL) for 30 or more days. <b>Rec:</b> Ensure that personnel are placed on the OMSEP program when they meet or exceed MSAL criteria.	RAC: 3
Administration: COMDTINST M6000.1B, Chapter 12. – C.7.b	<b>Dis:</b> Personnel are not being placed in the OMSEP program when exposed to noise. <b>Rec:</b> Identify and enroll personnel that are occupationally exposed to noise in the OMSEP program.	RAC: 3
Administration: COMDTINST M51000.47, Chapter 4. – D.1.d. (2) COMDTINST M6000.1 C, Chapter 12 – A.2.b	<b>Dis:</b> Personnel are not being placed in the OMSEP program if an industrial hygiene survey determines occupational exposure. <b>Rec:</b> Place personnel on OMSEP if an industrial hygienist survey determines they are occupationally exposed of if in a designated occupation.	RAC: 3
Storage Locker	<b>Dis:</b> Floors, aisles, and passageways are not in a clean and sanitary condition. <b>Rec:</b> Conduct general housekeeping. Maintain aisles, passageways, and floors in a clean and sanitary condition.	RAC: 3
DC Shop	<b>Dis:</b> Machinery is not safely secure. <b>Rec:</b> Anchor stationary machinery to the floor to prevent movement.	RAC: 3
Engine maintenance – weapons cleaning area	<b>Dis:</b> Container is not properly disposed. <b>Rec:</b> Solvent soaked waste, rags must be disposed of in airtight metal containers.	RAC: 3

The gaps found in the Air Station Unit and the Marine Safety Unit workplace may cause potential health exposures that may ultimately require health intervention: (a) potential noise exposure concern when working with high performance hydraulic equipment (see Figure 10); (b) potential low ventilation system in the priming room and paint booth associated with the risk of health exposure from vapor and fume inhalation as a result of inadequate ventilation, (see Figures 8 and 9); (c) potential inhalation, skin, and eye irritation from the priming room and paint booth; (d) potential ergonomic injury from awkward hand posture, poor posture, and bending at the waist, (see Figures 10, 11, and 12); and (e) potential low oxygenation in confined areas associated with heat stress, (see Figure 9). Moreover, on January 25<sup>th</sup>, 2011 there several gaps reported by the Health, Safety and Work – Life Service Center inspection team, i.e., personnel were not being placed in the Operational Medical Surveillance and Evaluation Programs (OMSEP) database as required to ensure that personnel are considered occupationally exposed for medical monitoring (see Table 3).

No gaps were seen when attempts were made to locate “material safety data sheets.” These sheets are required to be in the workplace and provide composition of and information for hazardous ingredients. Furthermore, no gap was observed regarding personnel compliance with personal protective equipment (PPE) guidelines.

## **SECTION 5: DISCUSSION**

This research documented potential occupational hazards of the USCG Air Station Unit and Marine Safety Unit, in Galveston, Texas. Data were collected via observation and interview. Site visit observations yielded potential chemical exposures and those chemicals' effects on workers' health. Workers were also assessed for compliance with personal protective equipment.

USCG crew members have access to regular medical care. The Senior Flight Surgeon Officer (SFO) at Galveston/Ellington Field is entrusted with diagnosing medical issues and concerns of USCG personnel, thereby acting as a safety net. Having a safety net is especially important to meet health promotion and wellness objectives. Further, the purpose of any safety effort should be to eliminate risk. If this is not possible one must attempt to remove workers, families, and communities from impending risk. For example, noise-induced hearing loss has existed since World War II. To mitigate this risk, military personnel have been instructed to visit health care providers and military protocols have been adjusted to better protect troops from permanent hearing loss. Thus, hearing loss risk from excessive noise was assuaged through work place modifications such as quieting noisy machines or installing a lockable sound barrier that only allows machines to be operated from quiet zones (Noise and Hearing Loss Prevention, n.d.).

Personnel and individuals must recognize when hazardous exposure exceeds allowable occupational exposure limits (OELs). In this manner, hazardous exposure can be minimized through designation of areas as "hazardous waste" or "hazardous noise." Air Station Unit aviation maintenance paint and priming rooms were identified as sources of potential occupational exposure due to inhalation and dermal hazards.

A detailed assessment of the work practices was used to evaluate possible hazards and control measures. Interaction occurred in crew members' operational areas, e.g., AMT's paint booth, priming equipment room. In the paint booth, crew members perform touch-up painting and general maintenance operations on the "hilo." These tasks are

completed daily or as needed. Personnel may come into contact with and absorb toluene, which is a liquid that smells like paint thinner. Chemically, it is a mono-substituted benzene derivative (OSHA, n.d.). The paint booth had poor exhaust performance, which could subject personnel to paint fumes. In addition, the paint booth did not have a robust control environment, i.e., exhaust fans and filters were operating improperly and did not compliment the paint booth. Thus, although its ventilation system is functional, there exists potential exposure to heat stress during periods of extreme heat (i.e., summer months). In sum, the paint booth may facilitate possible exposure to paint, its control booth environment is inadequate, lighting is suboptimal, heat stress may occur, and its space is too small for those with paint hypersensitivities.

When this researcher entered the primer room and paint booth, headache, light headedness, nausea, and eye irritation symptoms were reported. The symptoms felt were likely associated with the vapors and fumes found in the inadequately ventilated room. Although crew members did not report feelings of sickness, this may have been due to repeated exposure and an inability to discern baseline levels of clean air quality. Air Station Unit aviation maintenance paint and priming rooms were identified as sources of potential occupational exposure due to inhalation and dermal hazards.

**As an U.S. Air Force FSO, my experience has shown that facilitating medical monitoring program guidelines is best established through quarterly visits while accompanied by an Industrial Hygienist. Visits accomplish observation, worker interviews regarding responsibility areas, and evaluation of existing environmental risk and prevention programs. Unfortunately, quarterly inspection does not occur in USCG. USCG is more concerned with workplace risk factors than consistency of approach; consequently, a gap exists in health and safety protocols.**

Study limitations are that USCG hazard exposures may be complex, poorly documented, and vary in intensity and duration. For example, multiple discrepancies were discovered because personnel were not enrolled in appropriate Occupational Medical Surveillance Evaluation Programs (OMSEPs) (see Table 3). Health concerns

associated with priming and paint booth areas were conveyed to the Unit Safety Officer. Subsequently, counter-measures for managing risk as well as health education on risk levels for potential occupational exposure were identified. The Unit Safety Officer posited that job functions were to identify hazards such as waste material and noise exposures and to promote solutions for waste mitigation and noise conservation. The USCG has a “Health Safety Work Life Unit” that assesses all the units and mandates appropriate noise levels. The Unit Safety Officer reported that earplugs and earmuffs are issued to all personnel. Further, earplugs are located at all hanger entrances and door to the hangar deck. Placards are posted at all noise-sensitive areas. Inside the hangar deck there is a noise meter that indicates whenever noise levels exceed 85 dB, with average noise level in the hangar at 70 dB. All ASU personnel were enrolled in the Hearing Conservation Program.

Unfortunately, exposure levels were not obtained with this study. My center of attention will be to educate the lay public on the need to understand the importance of implementing a healthy workplace, and to think about protection when handling unknown substances found in the environment.

In conclusion, results identified potential occupational exposures for USCG personnel. Moreover, these findings may assist staff to take appropriate and timely steps to reduce and control unwanted exposures. Unfortunately, exposure levels are not the only major health threat facing USCG personnel and Galveston residents. Indeed, everyone should protect themselves when handling unknown substances found in the environment. The public health message remains the same: protect yourself when exposed to potential environmental toxins such as lead or heavy metals. Prolonged and unprotected exposure to such material may have health effects which can be avoided by (1) following the recommendations to reduce exposure; (2) wearing a protective mask to avoid inhaling dusts and wearing gloves and protective clothing to avoid skin exposure; (3) blocking dust and contaminated items from entering the home; and (4) always washing and cleaning-up prior to eating (Galveston County Health District, 2009).

By following USCG's mission to identify all potential exposures, it is hoped that safety, health, and wellness can be afforded to both USCG crew members and the greater Galveston community.

## APPENDIX A

### GAP Analysis Questionnaire

Coast Guard Unit Safety Personnel will be asked a few routine health surveillance questions.

Unit: \_\_\_\_\_ Workplace/Aircraft: \_\_\_\_\_ Rating/ Position: \_\_\_\_\_

1. Task/ Mission:

a. What are potential distractions of the workplace that affect your duty performance?

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2. Information Management:

a. Are there aspects of the workplace that diminish your ability to communicate or manage all of the information displayed in your duty area?

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3. Workplace:

a. What issues related to design of your specific “workplace” do you feel could be improved? (noise/position/equipment/systems design)

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4. Vigilance:

a. Is there anything that diminishes your “combat edge” throughout the duration of your work shift?

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5. Cognitive:

a. Is there anything that may diminish your understanding of the missions that you are undertaking?

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6. Hearing Perception:

a. Are there any issues that might affect your hearing while performing your duties?

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7. Physiologic Performance:

a. Is your fitness an issue while performing your assigned duties?

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8. Selection, screening or occupational standards:

a. Do you have any recommendations for screening criteria of individuals selected for our job? Recommendations for changes to the technical training?

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9. Rank Comments:

a. Rank what you would like to see changed at your workplace that would enhance your duty performance.

1. 

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2. 

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3. 

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4. 

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5. 

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If you are willing to be contacted about this, please include your name/phone/e-mail:

Name/rank: 

---

Phone: 

---

E-mail: 

---



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## CURRICULUM VITAE

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**Goes by:** Evey

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<b>BS:</b>	InterAmerican University of Puerto Rico, Caguas P.R.	1983
<b>MD:</b>	School of Medicine San Juan Bautista, Bayamon Puerto Rico	1989
<b>PGY-1:</b>	Flushing Hospital Medical Center, Flushing New York	1991
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Medical Director Pediatric Clinic, Luke Air Force Base, AZ	1997 -
1999	
EDIS Medical Director, 48 <sup>th</sup> Medical Group, USAFE RAF Lakenheath, UK	1999 -
2002	
Pediatric Medical Element Leader, Keesler Air Force Base, MS	2002 -
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IMA, HQ AFRC consultant for Line of Duty-Misconduct Determination LOD	
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Army Humanitarian MEDRETE, Grenada	
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IMA, HQ USCENTCOM Medical Counter Measure consultant for Theater Security	
Cooperative Plan Pandemic Influenza for Central Asia, J5 Branch, Tampa FL	2006 –
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Squadron Medical Element (SME), Flight Medicine Flight Commander, Al Udeid, Qatar	
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Interim AMDS Squadron CC, Interim SGP, 6 <sup>th</sup> Medical Group, Mac Dill, Tampa FL	
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Compilation and Determination of Potential Occupational Exposures in the Work Place  
– U.S. Coast Guard (Marine Safety Unit, Air Station Unit) Galveston; April 2011- UTMB

Environmental Insult: Regulating Mercury in the Environment: Sources and Health Effects; Dec 7, 2010-UTMB

Policy Intervention Discussion: STD Policy Intervention (CDC, STD Prevention Guidelines, 1997);

Oct 25, 2010-UTMB

Communicable Disease Discussion: Low-Level Environmental Lead Exposure & Children's Intellectual Function: An International Pooled Analysis (Environmental Health Perspective; Brogan & Partners);

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Communicable Disease Discussion: Household Interventions for Prevention of Domestic Lead Exposure in Children (Cochrane Collaboration; John Wiley & Sons, Ltd., 2009); Nov 15, 2010-UTMB

Smallpox Vaccination; April 21, 2011-UTMB

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