Nuclear Submarine Fire: Describing Personnel Accountability Inconsistencies between Kings Bay and the Navy

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2

CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: Thomas P Middleton Jr.

Abstract

Land based firefighting on a marine vessel is unarguably one of the most challenging disciplines faced in firefighting. A Trident Nuclear Submarine further complicates firefighting efforts based on the size and contents. The problem was that Kings Bay Fire Department (KBFD) and the United States Navy (USN) have an inconsistent personnel accountability framework during a nuclear submarine fire. The purpose of this research project was to identify the inconsistencies within the operational plan of KBFD and the USN during a nuclear submarine fire. This study utilized the descriptive research method, utilizing email questionnaires, government documents and manuals. The research questions were: What is the KBFD personnel accountability process during a nuclear submarine fire? What is the USN personnel accountability process during a nuclear submarine fire? What are the specific differences between the KBFD and USN personnel accountability processes during a nuclear submarine fire? What are the similarities of the KBFD and USN personnel accountability processes during a nuclear submarine fire? Questionnaires were emailed to KBFD fire officers and USN senior personnel. The questionnaire responses provided insight into land and sea based firefighting principles and the current status of accountability integration at Kings Bay Naval Base. The research conducted revealed that differing mentalities in firefighting and managing accountability presented extraordinary obstacles for the integration of firefighting crews during a nuclear submarine fire. The author recommended additional coordinated training and planning to ensure integration of personnel from each organization to improve personnel accountability during a nuclear submarine fire.

Table of Contents

Appendixes

Nuclear Submarine Fire: Describing Personnel Accountability Inconsistencies between Kings Bay and the Navy

Introduction

Management of incident command during a major shipboard fire on a nuclear submarine can easily overwhelm the most seasoned fire officer without the appropriate Personnel Accountability System (PAS). These large vessels contain elements that a small military base may have such as housing, offices, bulk fuel and oil storage, food storage and preparation, heavy industrial units, workshops, leisure facilities, weapons storage, weapons systems, and other ancillary areas. In 2014, The National Fire Protection Association (NFPA) developed NFPA 1561, *Standard on Emergency Services Incident Management System* which stated that the incident commander should initiate an accountability system that includes functional and geographical assignments at the beginning of operations and should be maintained throughout operations (National Fire Protection Association [NFPA], 2014, 8.5).

The supervisory responsibilities of an incident commander are vital to ensure the successful scene management and accountability of personnel on the fire ground. According to NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program,* the incident commander must maintain knowledge of the location and function of all companies or crews at the scene of the incident (National Fire Protection Association [NFPA], 2013, 8.4.4). A major submarine fire requires a coordinated response that integrates the United States Navy (USN) military firefighters and federal civilian firefighters to mitigate this potentially catastrophic event. To provide for interoperability and compatibility among federal, state, local, and tribal capabilities, the National Incident Management System (NIMS) includes a set of core concepts, principles, and terminology (NFPA, 2014). Homeland Security Presidential Directive-5 (HSPD-

5) identified these as the Incident Command System (ICS) which included multi-agency coordination systems; training; identification and management of resources, including systems for classifying types of resources; qualification and certification; and the collection, tracking, and reporting of incident information and incident resources (NFPA, 2014).

The problem is that the Kings Bay Fire Department (KBFD) and the United States Navy (USN) have an inconsistent personnel accountability framework in the event of a nuclear submarine fire. Prior to ships forces personnel reaching the staging area, an accountability officer has no way of tracking the location of the personnel. The ships force personnel who are on the vessel before KBFD firefighters' arrival must be tracked. The individual responsible for managing ships forces accountability must forward the name and position of the personnel to the overall emergency accountability officer. Assistant Chief Anthony Tripolone (personal communication, January 1, 2017), remarked that the KBFD accountability officer would coordinate with the ships force representative at the vessel's entry point to obtain the accountability officer's list of names of the ships force personnel currently fighting the fire and their location in the submarine. The critical component is for the ships force representative to make an initial contact with the KBFD accountability officer to provide the initial ships force accountability. Without this information, accountability cannot be initiated for personnel onboard the vessel.

Without the ability to track all personnel on scene, the safety of firefighters during a nuclear submarine fire incident could be detrimental. An effective operational plan for KBFD and the USN during a nuclear submarine fire is critical to ensure the safety of all personnel. The purpose of this research study is to identify any inconsistencies within the current operational plan of KBFD and the USN in response to a nuclear submarine fire. A descriptive research methodology

was utilized to answer the following questions: What is the KBFD personnel accountability process during a nuclear submarine fire? What is the USN personnel accountability process during a nuclear submarine fire? What are the specific differences between the KBFD and the USN personnel accountability processes during a nuclear submarine fire? What are the similarities of the KBFD and the USN personnel accountability processes during a nuclear submarine fire?

Background and Significance

The Naval Submarine Base Kings Bay (SUBASE) is located in a small town in southeastern Georgia. The SUBASE covers approximately 30 square miles/16,000 acres of land and has a population of 9,500 during a typical business day and 3,000 around the clock submarine support operations provided by tenant organizations and submarine support commands. All fire station facilities are staffed by trained and experienced professional fire-fighters and fire officers.

The Kings Bay Fire Department (KBFD) provides fire and emergency services for SUBASE, tenant commands, home ported and visiting U.S. and allied maritime vessels. Naval Submarine Base Kings Bay is homeport for eight of the Navy's Ohio-class ballistic-missile submarines. The Trident, an Ohio-class submarine, is the largest vessel in the Navy's submarine fleet which measures 560 feet in length and deploys a crew of 155 personnel. Kings Bay Naval Base is the only naval base in the Atlantic fleet capable of supporting the Trident II (D-5) missile.

In 2012, a major shipboard fire onboard the USS Miami submarine caused an estimated 500 million dollars of damage to the vessel. The effort took nearly 100 firefighters and more than 10 hours to extinguish the blaze. Firefighters from the Department of Defense (DoD), Navy, and multiple civilian mutual aid fire departments responded to combat and extinguish the

fire (Thompson, 2016). After multiple organizations responded to the massive fire incident, management determined that a need existed for a unified command structure.

A unified command structure, an integrated personnel accountability system, was necessary to account for all personnel on the scene. This structure was identified as critical for personnel when responding and combatting a submarine fire. The Commander noted in *The Final Command* Investigation into the *Fire that Occurred Onboard USS Miami (SSN 755) at the Portsmouth Naval Shipyard on 23 MAY 2012* that The Portsmouth Naval Shipyard (PNSY) Executive Officer had oversight responsibility for the PNSY Fire Department, but failed to describe the specific lines of authority and accountability for oversight of the District 8 PNSY Fire Department operational proficiency (Naval Sea Systems Command, 2013). No documented record of communication existed that Commander, PNSY, established the expected mission requirements for Fire and Emergency Services for PNSY. A declassified document stated that the lack of coordination and the lack of an integrated accountability structure contributed to delays in combatting and ultimately extinguishing the fire.

This research project was directly related to the executive development course at the National Fire Academy. Specifically, the evaluation of an integrated personnel accountability system utilized during a nuclear submarine fire was intricately involved with the concept of development at an executive level. Within the fire department, health and safety programs were implemented to reduce personnel injuries and fatalities. The most important aspect of incident command is the establishment of an accountability system that accounts for all personnel on scene. Maintaining accountability of all personnel at an emergency scene is necessary to prevent injuries or fatalities. The research problem for this action research project directly addresses the

main operational goal of the United States Fire Administration (USFA) which is to reduce loss of life and property.

Literature Review

The literature review focused on the acquisition of information related to the research questions. Data was gathered through email questionnaires, peer-reviewed journals and articles, government documents, and applied research projects. The National Fire Protection Association (NFPA) provided the framework for developing an accountability process that would encompass multiple organizations. However, the accountability process during a nuclear submarine fire differs from the process during a multi-story structure fire. The plethora of dangers firefighters encounter increase due to the vessel containing a nuclear reactor, bulk fuel storage, weapons, weapons systems, and a limited means of ingress and egress. Fire attack on this type of vessel is difficult because a lack of fire mains or standpipes within the structure exist; therefore, no significant water supply is available. A large amount of hose is required to combat the initial fire attack. The submarine is a multi-story, balloon constructed, metal structure that provides only three means of egress over the entire length of the vessel and acts as a chimney through these means of egress when combating a fire. Because the vessel is 560 feet in length with four levels and has limited means of egress, accountability of all personnel on scene is very challenging; therefore, the most important aspect of any response plan should be the safety of the personnel.

The first research question, what is the Kings Bay Fire Department personnel accountability process during a nuclear submarine fire, was explored by utilizing the Kings Bay Fire Department Major Submarine Fire Standard Operating Procedure (SOP), emailing questionnaires to subject matter experts, and reviewing the pertinent literature that focused on the research question to explore the need for the development of specific aspects of the

accountability system as it relates to the framework of the Incident Command System (ICS). Fire departments have accountability systems in place to account for all personnel on scene and the job being performed. The incident commander has the responsibility for initiating an accountability system that includes functional and geographical assignments at the time the operation begins and continues throughout the entire scene (NFPA, 2014).

The Kings Bay Personnel Accountability System (PAS) is based on the concepts found in NFPA 1500 and NFPA 1561, with the Incident Command System (ICS) being the framework for operations at structure fires. The recommendations by NFPA 1500 and 1561 are guidelines that can significantly reduce the risk of firefighter injury or death. Kings Bay Fire Department utilizes an accountability system known as the Passport system. This system employs a series of small Velcro nameplates that are attached to the helmet of each firefighter. At the beginning of each shift, one of the nameplates is placed on a card assigned to each apparatus. The crew on each apparatus places a nameplate on that card or passport. When the crew on the apparatus responds to the scene, the passport is transferred from the company officer to the accountability officer at that time and the assignment is provided by the incident commander. If the incident commander divides the crew, the nameplate can be removed and placed on another passport to complete a team. According to Brunacini (2002) this accountability system allows for a flexible solution for fast-and-dirty, offensive front-end operations, while still tracking firefighters. The initial attack wave is successful in extinguishing a fire the majority of the time, but when fires break out in larger structures, the accountability system is quickly burdened. A system that could handle larger structure fires would require a wave of new resources to enhance operations.

For an accountability system to function properly during a nuclear submarine fire, tactics and strategies must be developed with the integration of multiple departments to ensure all personnel on scene are accounted for during a fire. KBFD developed an extensive Submarine Fire Response Plan that covered the facets of response for a major fire onboard a Trident nuclear submarine. One of the key components of that plan was the development of an integrated Personnel Accountability System (PAS). According to Fire Chief Freddie Thompson (personal communication, November 21, 2016), the integrated accountability system is critical in preparation for response to a major submarine fire.

In 2004, The National Fallen Firefighters Foundation (NFFF) developed a blueprint with 16 initiatives for reducing firefighter deaths and injuries. Initiative 2, *The enhancement of the personal accountability for health and safety throughout the fire service*, was comprehensive (Rubin, 2009). According to Rubin (2009), accounting for firefighters and their crew/team is necessary to provide for the safety and well-being of personnel. Rubin stated that the command teams which are led by a single, well-supported incident commander must always be able to answer the four mission critical questions from entry to exit of all personnel in the Immediately Dangerous to Life or Health (IDHL) zones:

1. Who (by name) are the members operating in the hazard zone?
2. Where (exactly or as close as achievable) are the members operating at in the hazard zone?
3. What activities are the members and/or companies engaged in at all times? Remember the ripple effect of removing operating companies at an incident and then adjust your IAP accordingly.

4. Know the conditions of the environment and the building. Is it likely to collapse? Is the container likely to explode? Again, mission critical factors must be considered when placing your personnel in danger (Rubin, 2009).

The accountability process developed by KBFD accounts for all of these factors and meets the suggestions developed as part of Initiative 2. In a study conducted by Rosario (2008), the researcher sent surveys to multiple departments within the United States. The results of the surveys indicated the greater majority of organizations were utilizing a Personnel Accountability Tag (PAT) system, a Passport system, or a personally modified version of either system (Rosario, 2008). With a majority of organizations utilizing similar means of accountability, the researcher determined that less coordination would be needed. Despite this determination, the differences in the USN approach in response to a shipboard fire underlined several complications that needed to be resolved to enact an integrated accountability system.

The integration with the ships forces personnel was the next step in preparing an integrated accountability system. However, the similarities of accountability measures of mutual aid responders drove the development more than the integration with ships forces. During a major shipboard fire on a Trident submarine, mutual aid support would be requested from six separate departments. Of these six departments, all six departments maintained an incident command structure and accountability system consistent with KBFD. The six departments utilized the Passport Accountability system (PAS); therefore, the integration from that aspect would be seamless.

The magnitude of a nuclear submarine fire emergency and the number of personnel on scene needed would dictate that a larger accountability system would be necessary in addition to an effective staging area for manpower. Mutual aid responders understood the basic concept of

the passport system utilized by the KBFD; however, training would be needed for mutual aid responders to identify the precise duty assignments for personnel. The structure of the accountably system must indicate which teams would be assigned a certain hose line and level of the vessel to ensure accountability. Due to the ships forces not maintaining a verifiable accountability or muster sheet for personnel boarding the vessel, there was no way of knowing how many personnel were on the vessel prior to a fire. As a result, management of accountability of personnel on the vessel prior to fire department arrival was not possible. Without an exact number of personnel on a vessel, the definition of accountability in the context of the Incident Command System (ICS) and incident management could not be met.

To develop an effective accountability structure, KBFD designed additional blank name tags to be given to each of the ships force personnel upon arrival at staging. These name tags would be added to numbered passports to form integrated fire attack teams that would be given an assignment by the incident commander. The problem was that before ships forces personnel reached the staging area, an accountability officer had no way of tracking them. Without the ability to track all personnel on scene, the intention of integrated accountability could not be accomplished. It became apparent that ships force personnel already on the vessel before KBFD firefighters' arrival had to be tracked, and the individual managing ships forces accountability would need to forward the names and positions of personnel to the overall emergency accountability officer.

The KBFD accountability officer stated that the KBFD accountability officer teams up with a ships force representative at the vessels entry point for the accountability officer to obtain a list of names of ships force currently involved in fighting the fire and their location in the submarine (A. Tripolone, personal communication, January 3, 2017). The key component of this situation

is the ships force representative making initial contact with the KBFD accountability officer and providing the initial ships force accountability. Without that information, accountability cannot be initiated for personnel onboard the vessel.

The second research question, what is the United States Navy personnel accountability process during a nuclear submarine fire, was answered utilizing email questionnaires responses that were provided to subject matter experts in the U.S. Navy, and a review of the literature and government documents related to the research question. Email questionnaires were emailed to members of the USN submarine force. *The Industrial Ship Safety Manual for Fire Prevention and Response* was published by direction of Commander, Naval Sea Systems Command. The manual is a 14-chapter publication that outlines fire prevention and response instructions in shipyards and onboard a submarine and provides guidance on strategies to combat a fire (NAVSEA, 2014). Due to the sensitive material within this manual, it can only be distributed and authorized for use by the Department of Defense and U.S. Department of Defense contractors for official use only. The inability to utilize this information severely limited the author's capability to fully answer the second research question due to the lack of reference literature and the limited the amount of fact-based information regarding accountability onboard a submarine before the arrival of the KBFD. The manual provides specific direction for responders when responding to a fire and gives specific direction in all facets of the Incident Command Structure and Unified Command. The manual encompasses industrial workers, USN personnel, federal firefighters, and any personnel conducting industrial work in a shipyard or responding to a reported fire onboard a submarine. The manual is seen as a vast improvement towards improving shipboard fire safety during industrial work. The manual was developed and reviewed by industrial and fire safety experts in conjunction with the USN. The manual provides

information on accountability within the command and control section. However, the information contained within that section is vague and does not give a complete description of the accountability process to be used, or with whom the ultimate responsibility lies with accounting for all personnel on scene. Although a lack of obtainable information exists, combatting shipboard fires and the challenges that result appear to be similar to most other shipboard firefighting efforts. Some challenges that may be encountered even though the vessel may be docked or tied alongside the pier include:

1. Interfacing with the ship's crew
2. Communications issues
3. Hazmat
4. Coordinating multiple agencies arriving on scene
5. Search and rescue
6. Limited access, narrow access routes and confined spaces inside the vessel
7. Unprotected deck openings
8. Moving equipment
9. Electric shock hazards
10. Confusing interior arrangement
11. Ventilation and vessel stability

The incident complexity may vary, but in most cases, success is determined by the department's level of preparation, training, and general knowledge associated with the marine environment (Morton, 2008)

Accountability for military personnel onboard a submarine while at sea presents a different perspective than shore-based firefighting. While underway, the vessel does not utilize an

accurate accountability system but utilizes a whole crew response. A complete crew response is when ships force is assigned to different tasks based on the watch station and the relative watch station cycle (R. Langley, personal communication, January 3, 2017). A fire at sea could have dire consequences for the vessel and entire crew. The vessel may not allow for surfacing to extinguish the fire and ventilate the structure. The crew must have the mindset that combatting the casualty (fire) is the number one priority even before personal safety (R. Langley, personal communication, January 3, 2017). Personal safety is extremely important, but extinguishing the fire must be the main priority. Without a rapid and coordinated response from personnel, the entire crew could be lost.

The man in charge of each hose team initiates fire attack from multiple locations. Each hose team consists of four personnel. The man in charge receives orders from the commanding officer on the vessel who assumes the role of Incident Commander (IC). During fire attack, IC would be established, and the location of the incident command post would be deemed Damage Control Central (DC). From this location, the IC can develop an incident action plan, initiate and maintain accountability as well as deploy additional resources if necessary. Once fire attack begins and the incident command post is established, a staging area is established for replenishment of fire attack crews. After the staging area has been established, the accountability of personnel onboard the vessel begins (R. Langley, personal communication, January 3, 2017).

The hose team consists of four crew members: two personnel operating the hose line, one phone talker and a man in charge of the crew. The phone talker serves as the only method of communication with the Incident Command Post (ICP). Members on the hose team do not have a portable radio or other means of communication. The man in charge serves as the crew lead for the personnel on the hose team. The role of the man in charge is similar to that of a company

level officer. This member determines the actions to be taken while combatting the fire and receives additional instructions from the incident commander through the phone talker. The phone talker is the conduit through which the man in charge receives orders from the incident commander and advises him of current fire conditions.

Following fire extinguishment, the Incident Commander initiates dedicated searches for injured personnel and searches of all berthing areas to ensure all personnel are informed of the casualty (fire). The ability to muster personnel happens after the casualty (fire) is somewhat stabilized. At that time, all personnel onboard the vessel are accounted for by utilizing the muster sheet (R. Langley, personal communication, January 3, 2017).

The third research question, what are the specific differences between the Kings Bay Fire Department and U.S. Navy personnel accountability processes during a nuclear submarine fire, was examined through the exploration of articles and government documents. The United States Navy is not obligated to follow NFPA, but follows the *Industrial Ship Safety Manual for Fire Prevention and Response* while in refit or drydock. Although differences in outlook between the United States Navy (USN) and Kings Bay Fire Department (KBFD) exist, a common operating procedure at the scene of an emergency is critical. Morton (2008) remarked that firefighting with mutual or automatic aid departments require military precision, common operating procedures, and radio talk groups which use common terminology. A firm commitment from the Chiefs to the jump-seat firefighters concerning common firefighting strategies and uniform tactics must be implemented. Morton's suggestions are not consistent with the operations that are currently conducted during a submarine fire at Kings Bay Naval Base.

Whatever system of accountability that is consistent with the goals and outcome expectations should be utilized by the USN and KBFD. Feyst (2013) stated that a system needs

to be effectively implemented, and all personnel must be trained on the operation of the system, not just in the host department, but also in mutual aid departments. The goal of any system must be to track firefighters and prevent a loss of life or serious injury.

From the onset of a submarine fire, the differences between the USN and KBFD firefighters are apparent. Because ships force firefighters immediately begin fire attack, the customary staging and accountability processes that occur before fire attack cannot be established. Tripolone stated that the Navy does not track time on air for each firefighting team as the sailors get assigned to a hose line (A. Tripolone, personal communication, January 3, 2017). Kings Bay Fire Department (KBFD) assigns personnel together as teams, and the team time is tracked by a stopwatch that is assigned to each team and started when the team enters the Immediately Dangerous to Life or Health (IDLH) zone. Additionally, the location of the team is noted on the accountability board before the team crosses the brow. Once fire attack begins, muster of personnel begins, and accountability of ships force personnel on each hose line is determined by communication through the phone talker by the man in charge of each hose line or level containing hose lines.

Personnel are led by a member who is labeled as the man in charge which is similar to a company officer. This member has communication capability with the incident commander and must utilize an additional individual known as the phone talker who can communicate with the incident commander. The means of communication are limited because the communication system is hard-wired to the vessel and portable radios are not utilized. A lack of portable radios becomes a major problem.

If the hose team and phone talker become geographically separated, the hose teams can communicate, but each member cannot communicate with team members, the man in charge, or

the Incident Commander. The entire team becomes dependent upon the phone talker to complete Personnel Accountability Report (PAR) checks as well as activate a rescue in the event a firefighter is incapacitated. Additionally, the initial attack teams do not have Self-Contained Breathing Apparatus (SCBA) fitted with Personal Alert Safety System (PASS) devices that will activate in the event a firefighter is incapacitated. In essence, the initial attack teams have a diminished capability of rescue and communication in the event a firefighter is injured.

The KBFD firefighter structure is based on the principles in NFPA, and the incident command structure establishes accountability before making entry into an Immediately Dangerous to Life or Health (IDLH) area. Once accountability is established, crews begin deployment of fire hose and fire attack. With establishment of accountability, it becomes a challenge for the accountability officer to encompass all ships force firefighters. Ships force firefighters will already be actively fighting fire onboard the vessel before KBFD arrival. The commanding officer of the vessel, who assumes the role of IC, and the fire chief, who assumes the role of managing operations, will need to ensure ships force and KBFD officers tasked with accountability communicate the location of all personnel. When combatting a fire, ships force personnel utilize completely different terminology than KBFD firefighters. The terminology differences are as simple as the difference in terminology between structure fire for KBFD and casualty for USN personnel.

KBFD firefighters utilize portable radios, and each member of the firefighting team has a portable radio with emergency signaling capability. Portable radios enable hose team members to communicate in the event of separation. This portable radio enables the firefighter to activate an emergency signal and transmit a mayday message directly to the Incident Commander. All self-contained breathing apparatus (SCBA) have a passport accountably system (PASS) device

that will alert personnel in the event a firefighter is incapacitated. KBFD firefighters also have the added benefit of establishing hose lines from outside the vessel. Deploying hose lines from outside the vessel ensure that firefighters have a lifeline if it becomes necessary to make emergency egress.

The fourth research question, what are the similarities of the Kings Bay Fire Department and the United States Navy personnel accountability processes during a nuclear submarine fire, was explored through government documents and resources. The common goal of extinguishing a fire is the major similarity between the two organizations. Both organizations account for their personnel, but in a different manner. Because ships force firefighters do not base their structure and decision-making on NFPA, Kings Bay Fire Department firefighters cannot assume that military firefighters will follow their plan without a high-level of training and coordination. The process is ever evolving and improves with each exercise and training evolution. With improvements in communication and understanding of the goals of each organization, the coordination effort has driven improvements to the process.

The United States Navy (USN) and Kings Bay Fire Department (KBFD) incident commanders initiate an Incident Action Plan (IAP) and in the formulation of that action plan, key components are developed. A Standard Operating Procedure (SOP) or instruction in the case of USN personnel is necessary to provide structure for the operation that occurs during a fire on a nuclear submarine. The SOP that KBFD developed has key positions that are required to manage the incident scene. The positions are incident command, safety officer, accountability officer, staging officer, rehab officer, medical officer, and company officers for each attack team. Following IC being established and the IAP being developed, accountability and the establishment of staging becomes the top priority to ensure the operation functions and the exact

location of all personnel are accounted for on the vessel. According to Meroney (2013), The National Institute for Occupational Safety and Health (NIOSH) and Line of Duty Death (LODD) reports exposed breakdowns in the accountability system. The findings concluded that IC was unaware of the location of the firefighters, or the task the firefighters were performing. If a major fire onboard a submarine occurs, a well-developed accountability system that incorporates staging is a necessity. A unified command must be established with the commanding officer of the vessel establishing IC, and the fire chief assuming the role of operations.

United States Navy (USN) personnel have the same task of accountability when combatting an onboard submarine fire. The development of the design plan for ships forces is very similar in regards to structure. Langley (personal communication, November 20, 2016), described the Incident Command Structure as one that included the same positions with different terminology to designate the positions. The plan designates that ships force personnel assume the role of IC, accountability officer, staging officer, safety officer, medical or rehab officers, and company officers to direct firefighting teams. Because ships forces must instantly engage in firefighting efforts, the IAP and development of crucial positions must occur on the vessel. This plan must adjust by moving the incident command post and key command staff positions off the vessel when the fire progresses to the point of being declared a major fire. Meroney (2013) noted that the reporting of information on the fire ground was a major concern. The National Institute for Occupational Safety and Health (NIOSH) and Line of Duty Death (LODD) reports indicated that crews sometimes separate to handle numerous tasks, but the crews do not always notify the IC or the accountability officer so the accountability system that is utilized to track the crews can be updated. While that information must be disseminated so the IC can protect firefighters, the incorrect use of an accountability system, or the lack of one, poses a major danger to firefighters'

safety. Communication is a key concept in the transition from interior IC to exterior operations; therefore, more than one system is necessary to ensure the flow of information reaches the incident command staff.

The Kings Bay Fire Department (KBFD) and United States Navy (USN) have communications capability with IC. Because similarities exist in the way information is communicated to the IC, better coordination needs to occur to ensure the same information from interior operations is being relayed to the command staff. The man in charge of USN personnel and the company officer from KBFD must coordinate the flow of information. If a message must be sent to the incident commander, then the message should be transmitted through the USN hard-wired system as well as through the portable radios that are utilized by KBFD personnel. Communication from both teams can ensure that the IC receives the message from ships forces, and the fire chief would receive the same message via the portable radio. Redundancy may take place; however, redundancy can ensure integrated teams are accounted for at all times.

Procedures

The author conducted research utilizing the descriptive methodology which focused on the following research questions: What is the Kings Bay Fire Department personnel accountability process during a nuclear submarine fire? What is the United States Navy personnel accountability process during a nuclear submarine fire? What are the specific differences between the Kings Bay Fire Department and United States Navy personnel accountability processes during a nuclear submarine fire? What are the similarities of the Kings Bay Fire Department and United States Navy personnel accountability processes during a nuclear submarine fire? The National Fire Academy's Learning Resource Center provided documents that pertained to the research topic and questions. Government internet websites, government

manuals, and documents were used to gather information concerning the research topic. The author utilized current and germinal literature to explore similar research that had been conducted related to the research questions. Next, the author developed data gathering questions for email questionnaire and e-mail correspondence. Then procedures were developed to answer the identified research questions.

The author reviewed the current Submarine Fire Standard Operating Procedures (SOP) utilized at Kings Bay and identified key features and components within the accountability section that were congruent with National Fire Protection Association (NFPA) 1500 and NFPA 1561 to answer the first research question: what is the Kings Bay Fire Department personnel accountability process during a nuclear submarine fire? Questionnaires were emailed to Fire Chief Freddie Thompson, Assistant Chief of Operations; Robert Womble, and Assistant Chief of Training; Anthony Tripolone to ensure adequate understanding of the accountability section within the SOP. This group of individuals was selected due to being members of the team that created the submarine fire SOP at KBFD. This group has significant experience in the development of fire department related Standard Operating Procedures and Guidelines on installations throughout the Navy and Air Force.

The author gathered documentation that could be utilized to describe the process for accountability while submarines were at sea and also the process to be utilized while in port for research question two: what is the United States Navy personnel accountability process during a nuclear submarine fire? However, the most pertinent document that could be utilized was restricted to distribution to the Department of Defense and U.S. DoD contractors only. The NAVSEA *Technical Publication Industrial Ship Safety Manual for Fire Prevention and Response* could not be utilized for reference while conducting the review of literature.

Email questionnaires were sent to Trident Refit Facility Commander, John Gamble; USS Florida Gold Crew Chief of the Boat, Robert Langley; and USS Wyoming Gold Crew Chief of the Boat, Christopher Perreault. This procedure was used to ensure a full understanding of the Navy's accountability structure during a submarine fire. It was pertinent to distinguish between the accountability procedures that took place while at sea versus the procedures when in port. The questionnaires were emailed to multiple members of the USN, but the author received limited responses. The lack of responses severely limited the information that was available for review and inclusion.

The information and research gained from research question one and question two was used to answer research question three: what are the specific differences between the Kings Bay Fire Department and U.S. Navy personnel accountability processes during a nuclear submarine fire? The questionnaire responses for research questions one and two were analyzed to determine differences in policy and procedure between KBFD and the USN. The initial email questionnaires were sent to DoD civilian fire chiefs in order to compare the personnel accountability systems of other departments that were mandated to develop submarine fire response plans. Only Navy Region Northwest (NRNW) Regional Fire Chief, Kurt Waeschle responded. Chief Waeschle provided an in-depth review of the accountability system utilized by the fire departments at NRNW. Chief Waeschle also provided information pertaining to the differences in the systems utilized by NRNW and the USN personnel.

The author analyzed information and research that was gained from research questions one, two, and three to answer research question four: what are the similarities between the Kings Bay Fire Department and the United States Navy personnel accountability processes during a nuclear submarine fire? The questionnaire responses received from research questions one and two were

analyzed to identify the commonalities in regards to policies, procedures, and actions. The author was able to determine that despite the vast differences between each organization, commonalities existed in the approach for accounting for personnel.

Severe limitations to the procedural section of the ARP including limited responses, limited non-classified literature, limited subject matter expertise, and limited access to USN submarine force personnel were found. These limitations prevented a more robust and thorough examination of policies and procedures for review and discussion. Email questionnaires were sent to multiple USN officers and multiple Fire Chiefs throughout the Navy in an effort to gain an understanding of differences and similarities throughout the Navy. With limited responses a broad view across the Navy was not obtainable.

Results

The author addressed four research questions throughout this applied research project. The questions were developed and grounded in the problem and purpose of the research. Utilizing the descriptive research methodology, the author examined current and germinal literature and emailed questionnaires to participants to explore the research questions.

Respondents had differing levels of training, certification, and experience. The participants had varying levels of expertise based on the number of years in their current position. The number of years varied from 1 year to more than 25 years of experience. The responses to the questions were widely varied based on the perspective of the current position.

In order to address the first research question, questionnaires were sent via email to Kings Bay Fire Department fire officers which included Fire Chief, Freddie Thompson; Assistant Chief of Training, Anthony Tripolone; and Assistant Chief of Operations, Robert Womble. These

questionnaires included 10 open-ended questions that would allow the fire officers to provide in-depth information concerning the accountability process at KBFD.

Each fire officer was asked to describe the personnel accountability process that is utilized during a nuclear submarine fire. The author reviewed and analyzed the questionnaire responses. Each officer at the department understood the concept of the plan at Kings Bay Fire Department, but all officers had a different perspective on the process about their role during a fire. Officers are assigned a different task depending upon arrival time at the scene. The key positions that develop as a result of the accountability process are Incident Command, Operations Officer, Accountability Officer, Staging Officer, and Rehab Officer. According to the respondents, all of these positions are vital when the accountability process begins during a nuclear submarine fire.

One question on the questionnaire included whether firefighter respondents thought the personnel accountability system utilized by Kings Bay Fire Department was effective. Each officer expressed that their belief was that the plan was effective. Respondents cited numerous submarine fire exercises and drills that have indicated the effectiveness of the system. These respondents added that the submarine fire response plan meets or exceeds all NFPA requirements and developed to integrate ships force personnel into the plan.

Another of the questions included whether firefighter respondents believed that Kings Bay Fire Department conducts formal training on the accountability system currently utilized. All respondents stated that formalized training was conducted in a several different ways. Respondents added that training was provided in a classroom setting to discuss the difficulties in coordinating the establishment of accountability and management during a fire incident. Respondents replied that vessel familiarization is conducted on a monthly basis for personnel to

maintain an awareness of the submarine. This familiarization ensures personnel are aware of the many dangers encountered while fighting a fire and the attempt to maintain accountability of personnel on the vessel. Respondents added that practical evolutions were also conducted on a monthly basis with the submarine trainer that the department employs. This training enables multiple personnel to have an understanding of the accountability system and ensures that there will be less confusion on the fire ground in the event of an actual fire.

A question was added that addressed the effectiveness of the personnel accountability plan when integrated with the process the Navy utilizes at a submarine fire. The answers were more varied for this question than for other questions. Some respondents stated that the Navy did not have a satisfactory accountability system for land-based firefighting on the vessel. Other respondents replied that the Navy had a system in place. However, the system was the same as the plan utilized while the vessel was at sea. All respondents stated that the Navy did not have a plan in place that met the requirements of NFPA. One respondent stated that when marine/shipboard firefighting occurs and shore-based fire and emergency services forces arrive, they are incorporated into the KBFD system to account for their members on the fire ground.

Another question asked involved the conduction of formalized training between the United States Navy and Kings Bay Fire Department. Respondents stated that the complexity involved in combatting a fire onboard the vessel, one would expect that training would be conducted with both organizations present. However, the only training conducted consisted of large-scale exercises, and there was no specialized training for staging, accountability, or integration of personnel while combatting the fire. The training came during large-scale exercises, and a training plan was not coordinated to ensure integration training was completed. One respondent stated that training had been initiated. However, the Navy was not able to allow

their personnel to attend that training due to multiple problems. The problems ranged from difficulties in scheduling the training for ships force personnel to the inability of personnel to obtain personal protective equipment for live fire training.

The differences between the accountability processes of the Navy and Kings Bay Fire Department during a nuclear sub fire was asked of the respondents. One of the respondents stated that KBFD has a policy that train to it, and the Navy has no official policy; therefore, they cannot train to it. Other respondents stated that the Navy had an accountability process that was based on muster sheets that did not meet NFPA requirements and was difficult to show the contrast between the two processes.

A further question was asked to determine the similarities between the KBFD and Navy personnel accountability processes during a nuclear submarine fire. Many of the respondents stated that the only similarity was the fact that the accountability process utilized by the Navy was attempting to track their personnel. One of the respondents saw no similarities in the two processes when accounting for personnel.

The final question asked was what could KBFD and the USN do to improve upon the integrated personnel accountability system. The consensus from the respondents was that KBFD should work with the USN to have them adopt and train to the fire ground accountability that they use during a land-based nuclear submarine fire.

While addressing the second research question, the author utilized questions that were emailed to Trident Refit Facility Commander, John Gamble; USS Florida Gold Crew Chief of the Boat, Robert Langley; USS Wyoming Gold Crew Chief of the Boat, Christopher, Perreault. This questionnaire was arranged as a series of questions that would enable the respondents on

each of these vessels to answer the second research question and describe the accountability process of the USN.

The initial question asked was to describe the differences in the personnel accountability process that is utilized during a nuclear submarine fire at sea versus being in port. Each of the respondents had similar responses to this question. The responses included that the Navy utilizes common practices that are dictated based on Navy instruction. The main difference in combatting a fire while in port was the fact that there was accessibility to the vessel by personnel who were not on the vessel at the time of the initial fire. While in port if extensive refit is necessary, there is a limited power supply to the vessel as well as limited availability of water supply. As a result, the responsibilities of some responders change to provide adequate communications and water supply.

The question was asked to determine if the current accountability system utilized was effective. All respondents questioned stated that the process utilized was very effective when faced with combatting a fire. One respondent gave the analogy of ants in an ant hill when personnel are responding to a fire onboard the vessel. The respondent added that the process was very effective. Personnel onboard the vessel understood their role during a fire based on location at the time of the incident.

Another question asked was if ships force personnel conduct formal training on the accountability system. Respondents stated that ships force personnel conduct mandatory exercises based on Navy instruction. Exercises are conducted on a continual basis while vessels are at sea. These exercises involve the entire crew based on the location of personnel at the time of the exercise.

A further question asked dealt with the effectiveness of the personnel accountability system when integrated with the process that KBFD currently utilizes. Respondents stated that the goal of each organization was the same, but that differences in mentalities contributed to confusion during the accountability process. Respondents stated that a lack of understanding between the plans each organization conducted added to issues with integration. Respondents stated that better communication between the Commanding Officer of the vessel and the Fire Chief would alleviate the majority of confusion and improve the integration.

Following that question, respondents were asked if there was any formal training conducted with KBFD on the personnel accountability system. Respondents stated that there had been multiple sub fire exercises conducted. However, limited training on the integrated personnel accountability system had been conducted. All respondents stated that a coordinated effort to complete training on fire practices and principles would be very effective.

The next question asked about the differences between the accountability process utilized by the USN and the process utilized by KBFD. Respondents stated that the process of accountability was different because each person on the vessel knew their role and responsibility before a fire. With the KBFD plan, personnel are not assigned a role or responsibility until they reach staging. Once personnel reach the staging area, they are placed in three-man teams, and USN personnel are integrated with KBFD personnel. Once assigned to an integrated team, they report to the fire operations commander and then to accountability before reporting to the interior operations section.

Following that question, respondents were asked to describe the similarities between the accountability process utilized by ships force personnel and the process utilized by KBFD. The responses stated that all personnel reporting to interior operations and entering an area that is

deemed an Immediately Danger to Life and Health (IDLH) are tracked. USN and KBFD accountability officers track their personnel and the amount of time they are utilizing on SCBA and breathing air. Both entities utilize a twenty-minute rotation schedule before the accountability officer rotates relief teams to the firefighting teams. KBFD utilizes a crew lead to manage accountability for his firefighting team, and ships force utilize the man in charge to manage accountability for the firefighting team.

Despite the fact that the United States Navy and Kings Bay Fire Department have differing terminology, the man in charge and the crew lead have the same job. They report to the Operations Officer who in turn reports to the Incident Commander. Both individuals responsible for their firefighting team have communications with the Operations Officer. The Man in Charge utilizes a dedicated phone talker to communicate, and the crew lead utilizes his portable radio. Both individuals are responsible for performing a Personnel Accountability Report (PAR) when requested from the Accountability Officer.

To address the third research question, the author utilized multiple avenues to determine the differences in the accountability process for the USN and KBFD. The questionnaire that was sent to KBFD personnel and USN personnel were utilized for an initial comparison. These questions were discussed at length in the first two research questions within this section. Information from the after action report that the Navy conducted following the USS Miami fire was utilized to determine if similarities at the PNSY and those at Kings Bay Naval Base exist. Based on the material presented in this project, it was apparent that there were multiple differences in the approach to firefighting. The personnel accountability system utilized by both organizations was shown to be effective individually. However, during the USS Miami fire it became apparent that integration of an accountability system between the USN and a civilian fire

department was ineffective and would require additional training and coordination. All of the research presented showed that the differences at PNSY were similar to the differences that were found between KBFD and the USN.

To address the final research question, the author utilized the same information that was compiled in answering the previous three research questions. This information enabled the author to compare the similarities between the USN and KBFD's accountability process. The questionnaire sent to KBFD personnel and USN personnel was utilized for the initial comparison and additional literature provided information to clarify the similarities of each organization.

The structure of the accountability system utilized by each organization is very similar based on the answers provided in the email questionnaire. Both organizations ensure that personnel are accounted for during the course of firefighting. KBFD utilizes a company level officer and the USN utilizes the man in charge to direct firefighting teams. This individual is responsible for maintaining contact with his personnel as well as the accountability officer. Due to this level of communication, the accountability officer can maintain contact with his personnel in the event of emergency or changing fire conditions for evacuation.

Discussion

Research question one: What is the KBFD personnel accountability process during a nuclear submarine fire? Every individual who completed the questionnaire for this research question stated that the current standard operating procedure in place for submarine fires was a thorough and complete document. The plan follows the requirements outlined in NFPA 1500, 1561, and Presidential Directive V for the development and enactment of an appropriate incident command structure (ICS) during a submarine fire. This procedure outlines processes and procedures for incident command, safety, accountability, staging, rehab, and triage. As KBFD

arrives on scene the senior fire officer assumes command of the fire operations section of the emergency. Once a unified command is established with the commanding officer of the vessel, he maintains the fire operations section during the emergency. NFPA 1561 dictates that the IC should initiate and maintain an accountability system throughout the duration of the emergency. In the case of a submarine fire, the senior fire officer in his role as the leader of the operations section will initiate and maintain accountability.

The USN does not follow NFPA and as such follows the *Industrial Ship Safety Manual for Fire Prevention and Response* during submarine fires while in port. Waeschle pointed out that per *The Industrial Ship Safety Manual for Fire Prevention and Response*, Fed Fire is responsible for the accountability of all responders on the scene at a submarine fire. The Passport system utilized by KBFD has been identified by Brunacini (2002) as an excellent option for a fast attack front end operation that can develop during the course of the emergency.

The thought processes behind the development of the accountability section within the KBFD submarine fire response SOP was to ensure that all responders on scene were incorporated into the accountability structure. Rubin (2009) noted that personnel accountability enhancements were a major part of the blueprint developed in 2004 by the NFFF to improve health and safety of firefighters. With a major shipboard fire, the need for a unified command structure was identified as a necessity following a fire onboard the USS Miami. Womble pointed out that the accountability system utilized by Kings Bay Fire Department is only as effective as the departmental members utilizing the system. With the introduction of any accountability system, the personnel utilizing the system must receive the proper training and utilize the system effectively. This process is a key concept during training evolutions and exercises while preparing for a major submarine fire.

Research question two: What is the USN personnel accountability process during a nuclear submarine fire? In answering this research question, members of the USN submarine force were provided a questionnaire. The questions were structured in a manner that would enable the author to have a full understanding of the accountability process utilized by the USN onboard submarines. Perreault stated that the response to a submarine fire at sea versus being in port could be different based on the number of personnel on the vessel at the time of the fire.

The questions that were answered provided insight into the procedures for USN personnel during a submarine fire. The responses indicated that USN personnel have a standardized response to fires, and personnel on the vessel have an excellent understanding of their role. Dependent upon the watch station at the time of a fire, all personnel know their roles and responsibilities. Langley (personal communication, January 3, 2017), stated that initial accountability is difficult to accomplish simply because the personnel at each watch station are on a rotating schedule. It is not to say that personnel are not accounted for, it simply means that the commanding officer does not have accountability for each and every individual on the vessel when fire attack begins.

When fire attack begins, the man in charge of each fire attack team has accountability of their personnel and relays that information to the incident command post when requested. The man in charge utilizes the phone talker assigned to each fire attack team to relay accountability information. The USN personnel were in complete agreement that the accountability system utilized by the Navy is effective both in port and at sea.

Research question three: What are the specific differences between the KBFD and USN personnel accountability processes during a nuclear submarine fire? The focus of this ARP is the accountability process of both entities during response to a submarine fire. There are many

components of a large scale fire that must be initiated in order for accountability to be successfully maintained. Based on the literature review, it is apparent that a submarine fire has two separate stages.

The first stage is the initial response by USN ships force personnel to combat the fire. This stage was described in detail by Langley (personal communication, January 3, 2017), and Perreault (personal communication, November 17, 2017), from the initial response until the declaration of a major fire. USN personnel responding to the report of a fire stand watch and respond from those locations to the fire. As a result of this orchestrated response, personnel accountability cannot be initiated until incident command is established.

During this phase of the operation, all of the ships force personnel on fire attack teams do not have direct communication with the individual assigned as the accountability officer. The only individual who has direct communication is the individual assigned to a hard-wired communication system and designated as the phone talker. The individuals on the attack teams do not have PASS devices as part of the SCBAs that are utilized. In the event of separation, personnel do not have the ability to call a mayday or be located due to PASS device activation. Due to this severe lack of direct communication, there is a lack of true accountability of personnel at all times. This type of response is necessary based upon the situation; however, this information is contrary to everything that NFPA 1500 and 1561 suggests in regards to response to fire and other hazardous emergencies. As the fire progresses and becomes a major fire, KBFD response is requested.

Once arriving on scene, the interior operations and the accountability system must be transitioned to exterior operations off the vessel. During this transition, the KBFD accountability

officer is responsible for developing the accountability system to be maintained for both entities. This system will be utilized throughout the entire operation until its conclusion.

KBFD personnel utilize an accountability system that tracks personnel at all times. Once accountability is established, personnel are assigned fire ground tasks. Once tasks are assigned, these individuals provide their passport to the accountability officer who maintains accountability of all personnel at all times. PAR checks are completed at set intervals, and the company officer will account for all of his personnel. He communicates with the accountability officer utilizing a portable radio. If he is unable to communicate with the accountability officer, each member of his team has a portable radio for use. If at any time communications cannot be maintained or personnel are separated, a mayday can be initiated. A mayday can be initiated by any member of the team. This means of communication and constant PAR checks enable true accountability of all personnel. Due to the fact that KBFD SCBAs are equipped with a PASS device, personnel can be deemed as a down firefighter, and another team member can request a mayday. Due to the PASS device activation, team members can actively search for a team member while the Rapid Intervention Team (RIT) is being activated. This improves the likelihood of finding a down firefighter due to the immediate activation by any team member.

Research question four: What are the similarities of the KBFD and USN personnel accountability processes during a nuclear submarine fire? Despite vast differences in the structure and enactment of accountability systems, KBFD and the USN have a common goal. As a result of this common goal, there are similarities that are apparent. Waeschle commented that both responding agencies use the same overarching accountability process. Both entities have a plan that has been effective and meet their needs up to this point. KBFD and USN personnel assume IC and develop an incident action plan once the need has been identified. With the

initiation of the IAP command staff positions are established. Accountability and staging are two assigned positions that each organization develops as the incident progresses. Once these two positions have been designated, the plan of attack, accountability, attack team staging, and rotation follow a similar outline.

KBFD and the USN have dedicated communication systems utilized to relay information to the IC and accountability officer when necessary. The man in charge on USN vessels and the company officers of KBFD maintain accountability of their team members. Both have the capability to relay information to the accountability officer with emergency traffic in the event it becomes necessary. The accountability officer ensures that all personnel are accounted for when attack team crews rotate from actively fighting the fire to the rehab area.

During the course of conducting research and determining results, multiple implications to the organization became apparent to the author. Without an effective personnel accountability system, the most significant implication could be a tremendous loss of life. During the course of the USS Miami fire, it was noted that more than 100 firefighters were utilized to combat the fire. KBFD and mutual aid firefighters, USN personnel, and civilian contractors are some of the lives that could be lost while combatting a fire onboard a Trident Nuclear submarine. The large number of individuals on scene could be as many as 300 during the most intense portion of the emergency. The inability to control a fire of this magnitude could have dire consequences that reach far beyond the personnel on scene. The possibility that weapons and weapons systems within the vessel could detonate and cause massive explosions is a very real possibility. With the possibility of a mass explosion, there is also the possibility that the nuclear reactor could meltdown and cause even more devastating damage to personnel and also the environment. This

event could have long term effects for not only the base and the environment, but also the southeastern United States.

Recommendations

To develop and maintain a unified and effective Personnel Accountability System, the USN and KBFD will need to continually evaluate the policies and procedures utilized for this type of catastrophic event. Onboard each vessel, the commanding officer determines ships force deployment during a fire. When a fire overwhelms the capability of USN personnel, the commanding officer will make the determination to request KBFD personnel. The request for additional support will activate a response from KBFD as well as additional mutual aid firefighters from neighboring departments. The training officer for KBFD should continue to coordinate shipboard fire integration training for each submarine returning to Kings Bay from deployment. The importance of this constant training cannot be understated. Without a solid understanding of the actions KBFD personnel will take during a submarine fire, USN personnel will not be able to integrate into the Personnel Accountability System KBFD has developed. This training will ensure that USN personnel understand the purpose and background of the Personnel Accountability System utilized by KBFD. The training will also enable USN personnel to determine if the plan is consistent with the manual utilized by ships force to combat fire onboard a submarine. The input generated by both organizations would provide a platform for constant evaluation and improvement for response to this type of emergency.

Submarine exercises should be conducted on the same basis as the training for each vessel. The exercises should be congruent with expectations within the Kings Bay Fire Department SOP and the *Industrial Ship Safety Manual for Fire Prevention.* By utilizing both guides, each entity

can ensure that any issues with integrated personnel accountability can be addressed during an exercise scenario.

Currently, the USN has connex boxes that contain firefighting ensembles and respiratory protection for USN firefighters to utilize during a submarine fire. This collection of equipment needs to be utilized for training at the KBFD training grounds to enable conduction of live fire training to be completed by the submarine fire trainer. This type of training will ensure that integrated teams of personnel will function in the same manner when in stressful and high-temperature conditions.

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Appendix A

Civilian Questionnaire

1. Can you briefly describe your departmental personnel accountability process that is used during a nuclear submarine fire?
2. Is that personnel accountability system effective?
3. Does your department conduct formal training on the accountability system?
4. Is the current personnel accountability system effective when integrated with the process that the military ships force currently utilizes?
5. Can you briefly describe the personnel accountability process that is used by ships force during a nuclear submarine fire?
6. Is the current ships force personnel accountability system effective?
7. Does your department conduct formal training with ships force personnel on integrated personnel accountability during a nuclear submarine fire?
8. What are the differences between the accountability process your department utilizes and the ships force personnel accountability processes during a nuclear submarine fire?
9. What are the similarities between the personnel accountability processes utilized by your department and ships force during a nuclear submarine fire?
10. What could your departmental personnel and military ships force personnel do to improve upon the integrated personnel accountability system?

Appendix B

Military Questionnaire

1. Can you describe any differences in the accountability system that would be utilized during a submarine fire while at sea versus being in port?
2. Can you briefly describe the personnel accountability process that your personnel utilize during a submarine fire?
3. Is that personnel accountability system effective?
4. Do your personnel conduct formal training on the accountability system?
5. Is the current personnel accountability system effective when integrated with the process that Kings Bay Fed Fire currently utilizes?
6. Is the current Kings Bay Fed Fire personnel accountability system effective?
7. Do your personnel conduct formal training with Kings Bay Fed Fire personnel on integrated personnel accountability that would occur during a submarine fire?
8. What are the differences between the accountability process utilized by your personnel and the process utilized by Kings Bay Fed Fire during a submarine fire?
9. What are the similarities between the accountability process utilized by your personnel and the process utilized by Kings Bay Fed Fire during a submarine fire?
10. What could your personnel and Kings Bay Fed Fire personnel do to improve upon the integrated personnel accountability system?

Appendix C

Questionnaire Responses from Trident Refit Facility Commander John Gamble

Question 1. Can you describe any differences in the accountability system that would be utilized during a submarine fire while at sea versus being in port?

Each ship should designate a minimum of four fire teams for underway and one for in port. The number of people in each fire team will vary, depending on fire conditions, the number of people available and the individual ship's organization. Fire team leader responsibilities shall be assigned by the scene leader for every fire to either the nozzleman or to an individual whose only function is that of fire team leader. A separate individual is necessary as fire team leader if a NFTI is used. A separate individual as fire team leader is desirable to direct the rotation of fire team personnel. The fire team leader directs the nozzleman in employment of the hose, directs the hosemen, asks that the hose be charged or secured, selects the spray pattern to be used, and directs the rotation of fire team personnel. A fire team leader should not be responsible for more than one fire team. The scene leader determines the number of hosemen necessary to man each hose. Typical hose manning, in addition to the fire team leader (when assigned separately), is a nozzleman and two hosemen for a seawater or AFFF/SW hose line. The last hoseman operates the fireplug as required. Generally, the nozzleman works the hardest and will need to be relieved before the hosemen. Rotating the nozzleman and the hosemen can extend the endurance of the fire team. The NFTI operator, when assigned, should be a senior, experienced individual. He should don a SCBA and the maximum personnel protection available and proceed to the scene of the fire and report to the scene leader. Submarine firefighting depends on an immediate and escalating attack on the fire. The rapid response fire team fills the gap between the capabilities of the discovering crewman and the fire team, and is of the highest importance in maintaining an

unrelenting attack on the fire. Each ship should designate a rapid response fire team for underway. As a minimum, the following functions will be performed: Integrated Firefighting Organization. Ship's force personnel shall be familiar with and participate in the personnel accountability system of the F&ES while operating in integrated fire attack teams. A personnel accountability system is a formal safety process used to track which personnel enter and leave the hazard area. When the ship is covered by a drydock enclosure, the hazard area may encompass the entire enclosure.

Question 2. Can you briefly describe the personnel accountability process that your personnel utilize during a submarine fire?

At sea fire parties are trained and assigned in watch teams as explained in the answer to question 1.

Question 3. Is that personnel accountability system effective?

Yes, because we have the names of the personnel who would be the first responders and the backup hose teams assigned.

Question 4. Do your personnel conduct formal training on the accountability system?

Yes, but only the very basics (a brief one or two sentences of the presentation. We recommend that the Fed Fire representative, who already attends/assists with these "Back to the boat Crew Training" sessions (currently Asst. Fire Chief Tripolone) added a specific section to the training to better discuss accountability and how it will be managed at the integrated level topside. Recommendations include:

1. An accountability board should be brought along as a training aid.

2. Additionally, please provide us a couple of power point slides to aid with discussing this portion of training and we can add it to our power point presentation.

3. Review our complete power point presentation and see if there are any other adjustments that you recommend (additions, removal or tweaks for the Fed Fire provided portions. ---Note—this presentation is too large, data wise, to send you via email. A copy can be made and put on disk.

4. Keep in mind that our current training sessions are already about 50 minutes long (for a waterborne availability) and 75 minutes long for a dry docking availability…so we have to be aware of how much training time we add to a session…so we don't lose the audience's attention. Depending on the size that the training grows to, there may be a need to break up the training into different groups.

5. Recommend that Fed Fire have a different representative fill in for Mr. Tripolone, on the days that he is not available. There is a very small "training window" set aside for crew training so we typically have to flex around their schedule.

6. Recommend additionally (separate) training be provided to only the senior leadership of the crews (CO, XO, ENG, COB for example). I truly believe that the only way we achieve a strong relationship and understanding of how this process works is to have intimate training with the senior leadership of the submarine crews. Recommend coordinating this action with MMCM Glisson at Sub Group 10 and potentially also get NSSC involved with this training process.

Question 5. Is the current personnel accountability system effective when integrated with the process that Kings Bay Fed Fire currently utilizes?

We have gotten a little better over the past few drills with me communicating with the ship and relaying the information to the FED Fire accountability officer. It is very difficult as the ship is not really sure the initial responders were.

Question 6. Is the current Kings Bay Fed Fire personnel accountability system effective?

The current system used still needs as few tweaks, I do feel that once we train the ship and get the senior leadership onboard with the system that it could be very effective. Names need to be passed to the topside watch as soon as possible with the times they went on air, locations, and status of casualty, in order to pass the most up to date information to the FED Fire Accountability Officer and the Repair Officer.

Question 7. Do your personnel conduct formal training with Kings Bay Fed Fire personnel on integrated personnel accountability that would occur during a submarine fire?

Yes, we have attended training with FED Fire where we reviewed fire response and the various stations that are set up to include accountability.

Question 8. What are the differences between the accountability process utilized by your personnel and the process utilized by Kings Bay Fed Fire during a submarine fire?

For FED Fire the accountability officer is on station prior to any of his/her personnel going on to the ship to combat the fire. Ship's force personnel are the first responders and a scene leader is established and should be sending the names of all personnel back to the topside watch for accountability. The problem here is the scene leader is at the scene so the boundary personnel may not be accounted for.

Question 9. What are the similarities between the accountability process utilized by your personnel and the process utilized by Kings Bay Fed Fire during a submarine fire?

Maintaining an accurate list of personnel combating the fire and time the personnel went on air. Ship's Force could improve on relaying the information topside.

Question 10. What could your personnel and Kings Bay Fed Fire personnel do to improve upon the integrated personnel accountability system?

Explained in question 6.

Appendix D

Questionnaire Responses from Chief of the Boat USS Florida Gold Robert Langley

I would be happy to answer any questions that you have. Accountability is something that is pretty difficult to accomplish. In port accountability is best done like it is done up in Portsmouth, NH. They use a badge in/badge out system for both ship's force and shipyard personnel. At any given time, they can print out a list of who is on the ship. This includes people going into the drydock.

Underway we don't use an accountability system. We have a whole crew response where people are assigned to different tasks based on the watchstation that they stand and their relative watchsection cycle. We do dedicated searches for injured personnel and we go through the berthing areas to make sure that everyone is awake and out of their racks. Our ability to muster personnel would happen after the fire is out and the casualty is somewhat stabilized. Our #1 priority is getting the fire out. There is some risk associated with this mindset and strategy but it is necessary while we are underway.

One key to successful integration between ship's force and Fed Fire that I like is the accountability board. I like the way you guys do that with your guy but that takes time for him to acclimate once on scene. When I was at the shipyard up in Portsmouth, we had a ship's force guy running the same type of board and we also had name plates made for all ships force and fire fighters. The only downfall of this system would be that the name plates were made of plastic and I think that if the guys fighting the fire wore them while fighting the fire, they would have melted.

Hopefully this helped. I will answer any additional questions you have. Just let me know. We turn over the ship to the other crew on the 19th and I will be up at the off crew office. Let me know if you need anything else. Thanks, Rodney

Appendix E

Questionnaire Responses from Chief of the Boat USS Wyoming Gold Christopher Perreault

Question 1. Can you describe any differences in the accountability system that would be utilized during a submarine fire while at sea versus being in port?

There are no differences.

Question 2. Can you briefly describe the personnel accountability process that your personnel utilize during a submarine fire?

All hands are assigned duties on the Watch Quarter and Station Bill for damage control responsibilities. There are no “musters” taken, all hands respond and the have personnel assigned to search the ship for injured personnel using the TALISMAN. Personnel are tracked by watch station more than by name for response.

Question 3. Is that personnel accountability system effective?

Historically, yes.

Question 4. Do your personnel conduct formal training on the accountability system?

The crew is trained through their qualification process and we run drills throughout the week under way. In port we run drills as the refit schedule allows.

Question 5. Is the current personnel accountability system effective when integrated with the process that Kings Bay Fed Fire currently utilizes?

I have never been involved in a scenario where the ship and KBFF have been integrated.

Question 6. Is the current Kings Bay Fed Fire personnel accountability system effective?

I am not familiar with the KBFF accountability system.

Question 7. Do your personnel conduct formal training with Kings Bay Fed Fire personnel on integrated personnel accountability that would occur during a submarine fire?

We will have a classroom training session during our “back to the boat’ training at the end of the PDTP where TRF and KBFF personnel will give a lecture on how the system is designed to work.

Question 8. What are the differences between the accountability process utilized by your personnel and the process utilized by Kings Bay Fed Fire during a submarine fire?

Submarine crews rely on having personnel properly trained on what their responsibilities are for any given casualty, and their responding in accordance with their training.

From what I remember from the training, KBFF’s system tracks personnel from before they enter the submarine through the entire casualty.

Question 9. What are the similarities between the accountability process utilized by your personnel and the process utilized by Kings Bay Fed Fire during a submarine fire?

I think the only similarity is both entities know where the casualty is and that personnel are combating it. The KBFF system in much more controlled and they have a better picture of who on their teams are doing what and where they are by name.

Question 10. What could your personnel and Kings Bay Fed Fire personnel do to improve upon the integrated personnel accountability system?

The KBFF system is much more controlled, but I believe that is because their response time is longer giving them more time to prepare. Not having run a scenario to see how the system works for real, I can’t give any input for improvement.

Appendix F

Questionnaire Responses from Kings Bay Fire Department Fire Chief Freddie Thompson

Question 1. Can you briefly describe the Kings Bay Fire Department personnel accountability process that is used during a nuclear submarine fire?

The King Bay Fire Department (KBFD) uses the “Passport” accountability system. Every KBFD firefighter is issued an accountability name tag; and when assigned to a crew, each crew member attaches his/her tag to a single plate making up the passport. The passport is maintained in the cab of the apparatus until required. Upon arriving at the scene of a submarine fire, the crew is assigned firefighting/rescue duties aboard the submarine. Prior to crossing the brow to make entry into the submarine, the passport tag is given to the Accountability Officer. The Accountability Officer verifies the names and maintains the tags until the crew exits the vessel. Upon exiting the vessel the crew lead will redeem the his/her crew’s passport, and proceed to rehabilitation. This system is consistent with the National Incident Management System.

Question 2. Is that personnel accountability system effective?

Yes, it ensures 100% accountability of all Kings Bay personnel, integrated Navy fire fighters, and mutual agencies.

Question 3. Does Kings Bay conduct formal training on the accountability system?

Yes, KBFD accountability training is incorporated into all response training and response drills.

Question 4. Is the current personnel accountability system effective when integrated with the process the Navy currently utilizes?

No. In order to be effective, Navy firefighters must integrate with the KBFD and use the passport system. Navy personnel are assigned to teams and issued passport accountability tags.

Question 5. Can you briefly describe the personnel accountability process that is used by the Navy during a nuclear submarine fire?

Navy firefighting crews begin firefighting efforts aboard the vessel and are accounted for by name by an onboard supervisor as they enter the fire environment. Names are written on to a tracking board and Passports are not used.

Question 6. Is the current Navy personnel accountability system effective?

In small numbers and/or out at sea, the Navy system can be effective; but when managing a major fire in port with large numbers of Navy personnel, and local state and federal agencies, their system is ineffective.

Question 7. Do Kings Bay and the Navy conduct formal training on integrated personnel accountability during a nuclear submarine fire?

No, Navy personnel are highly resistant to any change to their procedures and are equally as reluctant to engage integrated training.

Question 8. What are the differences between the Kings Bay Fire Department and the Navy personnel accountability processes during a nuclear submarine fire?

The KBFD uses the passport system and all personnel entering or exiting the vessel must process through the Accountability Officer. Navy firefighters use a written by name tracking board and not all personnel entering and exiting the vessel are accounted for.

Question 9. What are the similarities between the Kings Bay Fire Department and United States Navy personnel accountability processes during a nuclear submarine fire?

The only similarity is both agencies are operating under the premise that there must be a system to account for all personnel engaged in submarine emergency operations.

Question 10. What could Kings Bay and the Navy do to improve upon the integrated personnel accountability system?

Train together, use the passport accountability system, embrace each other's expertise and NIMS, and implement a single method of accountability that is used by Kings Bay, Navy, and mutual partners.

Appendix G

Questionnaire Responses from Kings Bay Fire Department Assistant Chief Anthony Tripolone

Question 1. Can you briefly describe the Kings Bay Fire Department personnel accountability process that is used during a nuclear submarine fire?

The Kings Bay Fire &Emergency Services Dept. (KBF&ES) uses a Passport system for all Kings Bay Firefighters and the Mutual Aid Fire Departments use the same passport system and they roll right into our operation. For Tracking the Ships Force and off Crew personnel on scene we issue a blue accountability tag to each with their name written on it to track the Military personnel involved with fighting the fire as they are leaving the vessel from being the initial attack team or as they are initially reporting to the staging area. The KBF&ES Accountability Officer teams up with a Ships Force representative at the Ships brow for the Accountability Officer to get a list of names of Ships Force currently involved fighting the fire and their location inside the submarine.

Question 2. Is that personnel accountability system effective?

Yes, the accountability system listed in item #1through training with Ship's Force has proven to be effective in tracking all Ship's Force, KBF&ES, as well as Mutual Aid firefighting personnel on the emergency scene.

Question 3. Does Kings Bay conduct formal training on the accountability system?

Yes, Kings Bay conducts training in-house on accountability for all civilian KBF&ES Federal Firefighters. Training on the accountability system used by KBF&ES (the Passport system) is also given to each Submarine Crew (each Sub has a Blue Crew and Gold Crew) during scheduled Back to Boat Training which is required for all crews before taking over the vessel for

the opposite crew. Also this accountability system is practiced during all fire training drills conducted on NSB Kings Bay.

Question 4. Is the current personnel accountability system effective when integrated with the process Navy currently utilizes?

Yes, through training with the Ship's Force Crews during on going Back to Boat Training as well as fire training drills conducted on NSB Kings Bay the accountability system used at NSB Kings Bay during In-Port emergencies has proven to be effective.

Question 5. Can you briefly describe the personnel accountability process that is used by the Navy during a nuclear submarine fire?

The Navy underway accountability does track the Navy Firefighters in combatting the emergency by listing the names of the individual sailor in the fire IDLH area, but does not track the time inside the IDLH fire area or once they leave the fire IDLH for rest. The Navy normally has up to five firefighters per hand line and as one firefighter gets low on air they leave the line and then another gets sent in to replace the firefighter coming out. They do not enter and leave as a team. In-Port the Navy Firefighters uses the Passport system as described in item #1.

Question 6. Is the current Navy personnel accountability system effective?

For underway purposes it fulfills their requirement. In Port if the Ship's Force continued to use its own accountability as if underway it has shown to be ineffective in tracking all responders as an integrated Firefighting force. It also lends itself to having two staging areas and confusion to what personnel are assigned to what task, time on air, and location of the Firefighter teams.

Question7. Do your personnel conduct integrated personnel accountability during a nuclear submarine fire?

Yes, as part of their regular training prior to taking over the Submarine from the opposite crew (Subs have Blue & Gold Crews) per NAVSEA Instruction 8010 each crew has Back to Boat Training with part of that training given by KBF&ES on the Passport Accountability System and how Ship's Force gets included in this system during an In-Port emergency. During training drills conducted on NSB Kings Bay the accountability (Passport) process is practiced.

Question 8. What are the differences between the Kings Bay Fire Department and the Navy personnel accountability processes during a nuclear submarine fire?

A. The Navy while underway does not track time on air for each firefighting team as the sailors get assigned to a hoseline as they respond. KBF&ES assigns personnel together as teams and their team time is tracked as each team has a stopwatch assigned to them and is started when the team enters the IDLH. Also the location of the team is noted on the accountability board before the team crosses the brow.

B. Sailors are added to extended handlines as they show up properly outfitted to fight the fire hence all members on the hoseline are have different starting times on air. KBF&ES has teams enter together and get relieved together.

C. Once the sailor comes out of the IDLH and sent to dress down and rest the sailor is no longer tracked on their location. KBF&ES tracks accountability of all firefighters on scene to include in the fire area IDLH, rehab, and staging. KBF&ES will also conduct PAR checks to aide in accountability and safety.

Question 9. What are the similarities between the Kings Bay Fire Department and United States Navy personnel accountability processes during a nuclear submarine fire?

There is a basic similarity in one area, and that is both have the names of the personnel inside the fire area IDLH.

Question 10. What could Kings Bay and the Navy do to improve upon the integrated personnel accountability system?

Train, Train, Train. Continued training with Navy personnel is a must due to the continuous rotation of personnel to and from the Submarines and SUBASE. Since the Miami fire the Navy has been required to change the way that they do business while combatting an emergency in Port and training on the process of integration of Ship's Forces with responding Civilian Federal Fire and Mutual Aid responders is a must to have a safe and successful outcome.

Appendix H

Questionnaire Responses from Navy Region Northwest Region Chief Kurt Waeschle

Question 1. Can you briefly describe your departmental personnel accountability process that is used during a nuclear submarine fire?

Commander Navy Region Northwest Fire and Emergency Services (CNRNW F&ES) utilizes the Passport Account system for all emergencies. After the USS Miami Fire, CNRNW F&ES developed an accountability system to track the ship forces (SF) during an emergency. The tracking system is a generic expanded passport system that is assigned to each location throughout CNRNW F&ES AOR. Our department's standard operating guideline explains the process in detail. See included document.

Question 2. Is that personnel accountability system effective?

Yes, the accountability system that CNRNW F&ES uses has proved to be effective on both 6010 and 8010 drills.

Question 3. Does your department conduct formal training on the accountability system?

Yes, we train internally and use this system on every 6010 and 8010 drill that is conducted within the region. Additionally, the accountability training is provided as part of the Fire Response Training with all new arriving ships and off section crews prior to the turnover between Blue and Gold crews.

Question 4. Is the current personnel accountability system effective when integrated with the process that the military ships force currently utilizes?

Yes, and per the 8010 manual, Navy F&ES is responsible for accountability of all responders. The ships maintain their own accountability process prior to our arrival. Once

integration takes place with CNRNW F&ES, our accountability officer is married up with someone from the affected ship.

Question 5. Can you briefly describe the personnel accountability process that is used by ships force during a nuclear submarine fire?

As stated earlier this is modified version of the Passport Accountability system. Each CASCOM at each dry dock or pier location has an assigned accountability board for SF. Each SF is identified as a number e.g. Ship Force #1 to Ship Force #50. The SF last name is written into the space with grease pencil and a numbered tag is given to the SF member. A second identical tag remains with the board and is attached to one of three areas; operations, rehabilitation, or staging. This allows for the integration and overall accountability of the SF.

Question 6. Is the current ships force personnel accountability system effective?

Their process works for them while at sea and prior to our arrival. The transition to the 8010 accountability system has been progressively more effective for submarines that are pier/dock side at CNRNW. Once we arrive on scene and integrated operations begin, the process is seamless. After the last major ship board evaluation, we discovered that the SF passport tags ended at #50 and we had greater than 50 SF's. We are looking to expand our numbering system to allow for greater flexibility and additional personnel support the emergency from unaffected ships.

Question 7. Does your department conduct formal training with ships force personnel on integrated personnel accountability during a nuclear submarine fire?

Yes, a CNRNW F&ES training officer or representative assists the submarine ship safety officer with the fire response training, which includes a lesson on accountability.

Question 8. What are the differences between the accountability process your department utilizes and the ships force personnel accountability processes during a nuclear submarine fire?

Submarine Ship forces track individuals throughout the accountability process and F&ES tracks crews via a passport, such as Engine 28 being assigned as Attack Team 1, with included individuals identified. Carriers in the shipyard are transitioning to use the same accountability system as the submarines, but will use the passport concept to match F&ES.

Question 9. What are the similarities between the personnel accountability processes utilized by your department and ships force during a nuclear submarine fire?

Upon arrival of CNRNW F&ES both responding agencies use the same overarching accountability process.

Question 10. What could your departmental personnel and military ships force personnel do to improve upon the integrated personnel accountability system?

Standardize the accountability system for both surface and submarines so the process in the same while at sea and in port. This would require a revision to current navy doctrine to align to standardized accountability system for NAVSEA and CNIC personnel.

Appendix I

Questionnaire Responses from Kings Bay Fire Department Assistant Chief, Robert Womble

Question 1. Can you briefly describe the Kings Bay Fire Department personnel accountability process that is used during a nuclear submarine fire?

Simply put firefighter accountability is managed through the utilization of the passport accountability system. Each F&ES unit has a passport identifier with each individual crew member's passport name tag placed onto it (normally a crew of four. For marine/shipboard fires or emergencies or large scale incidents accountability is managed by following the SOP for Submarine Fire Response. Firefighters incoming will report to the staging officer, placed on a passport team tag normally (3) firefighters per team. When needed the team will then go to the access brow of the submarine, check into accountability, receive their assignment (hose team location, level etc.) and go to work. Once relieved the team will exit, checking out of the submarine at accountability, go to rehab, check into rehab and then back to staging repeating over again the circle.

Question 2. Is that personnel accountability system effective?

It is as effective as can be, as long as members follow the guidance.

Question 3. Does Kings Bay conduct formal training on the accountability system?

Yes, formal training can be through either classroom or hands-on practical drilling or exercises. All training must be documented to be considered formal.

Question 4. Is the current personnel accountability system effective when integrated with the process the Navy currently utilizes?

The Navy at Kings Bay has no accountability system that meets or exceeds NFPA requirements. For marine/shipboard firefighting in which shore based F&ES forces arrive, they are incorporated into the KB F&ES system to account for their members on the fire ground.

Question 5. Can you briefly describe the personnel accountability process that is used by the Navy during a nuclear submarine fire?

SEE ABOVE.

Question 6. Is the current Navy personnel accountability system effective?

NO, they have no policy

Question 7. Do Kings Bay and the Navy conduct formal training on integrated personnel accountability during a nuclear submarine fire?

Yes.

Question 8. What are the differences between the Kings Bay Fire Department and the Navy personnel accountability processes during a nuclear submarine fire?

KB F&ES has a policy, we train to it and the Navy has no “official” policy, therefore they cannot train to it.

Question 9. What are the similarities between the Kings Bay Fire Department and United States Navy personnel accountability processes during a nuclear submarine fire?

There are no similarities as far as I am concerned.

Question 10. What could Kings Bay and the Navy do to improve upon the integrated personnel accountability system?

KB F&ES can have a positive impact. We need to get the Navy to adopt and train to the KB F&ES fire ground (marine shipboard firefighting) accountability process.