

Appendix A: Human Factors Analysis of 7005 Woodscape Drive Incident

General Background

A thorough Human Factors Analysis is absolutely necessary to determine the cascading events causal to a mishap, and to recommend corrective actions to prevent recurrence. Human error continues to plague both the fire service and civilian mishaps. Analysis indicates that human error is identified as a causal factor in 80 to 90 percent of mishaps and is present but not causal in another 50 to 60 percent of all mishaps, and is the single greatest mishap hazard¹¹⁷. Yet, simply writing off mishaps to firefighter error is a simplistic, if not naïve, approach to mishap causation and hazard identification. Further, it is well established that mishaps are rarely attributed to a single cause, or in most instances, even a single individual¹¹⁸. Rather, mishaps are the end result of myriad latent failures or conditions that precede active failures. The goal of a mishap or event investigation is to identify these failures and conditions in order to understand why the mishap occurred and how it might be prevented from happening again.

As described by Reason¹¹⁹, active failures are the actions or inactions of operators that are believed to cause the mishap. Traditionally referred to as error, they are the last acts committed by individuals, often with immediate and tragic consequences. In contrast, latent failures or conditions are errors that exist within the organization or elsewhere in the supervisory chain of command that effect the tragic sequence of events characteristic of a mishap. Viewed from this perspective then, the actions of individuals are the end result of a chain of factors originating in other parts, often the upper echelons, of the organization. The problem is that these latent failures or conditions may lie dormant or undetected for some period of time prior to their manifestation as a mishap. The question for mishap investigators and analysts alike is how to identify and mitigate these active and latent failures or conditions. One approach is the Domino Theory which promotes the idea that, like dominoes stacked in sequence, mishaps are the end result of a series of errors made throughout the chain of command.

A modernized version of the domino theory is Reason's Swiss Cheese model that describes the levels at which active failures, latent failures and conditions may occur within complex operations (see Figure 1). Working backward from the mishap, the first level of Reason's model depicts those Unsafe Acts of Operators that lead to a mishap. Traditionally, this is where most mishap investigations have focused their examination of human error, and consequently where most causal factors are uncovered. After all, it is typically the actions or inactions of individuals that can be directly linked to the mishap. Still, to stop the investigation here only uncovers part of the story. What makes Reason's model particularly useful in mishap investigation is that it forces investigators to address latent failures and conditions within the causal sequence of

¹¹⁷ Naval Safety Center. (2007). DoD Human Factors Analysis and Classification System (HFACS).

¹¹⁸ Reason, J. (1997). Managing the risk of organizational accidents. Burlington, VT: Ashgate.

¹¹⁹ Reason, J. (1990). Human Error. Oakleigh, Victoria: Press Syndicate of the University of Cambridge.

events. For instance, latent failures or conditions such as fatigue, complacency, illness, physical and technological environment all affect performance but can be overlooked by investigators with even the best of intentions. These particular latent failures and conditions are described within the context of Reason's model as Preconditions for Unsafe Acts. Likewise, Supervision can promote unsafe conditions of firefighters and ultimately unsafe acts will occur. For example, if a Command Officer were to pair a below average Company Officer with a very junior and inexperienced crew, the result is increased risk of mission failure. Regardless, whenever a mishap does occur, the crew naturally bears a part of the responsibility and accountability. However, latent failures or conditions at the supervisory level are often equally responsible for poor hazard analysis and subsequent increased mission risk and may ultimately cause the mishap. In this particular example, the crew was set up for the opportunity for failure.

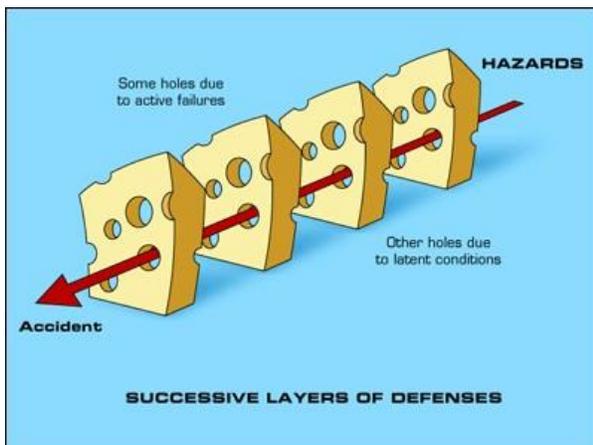


Figure 1 Cheese Layers to an Accident

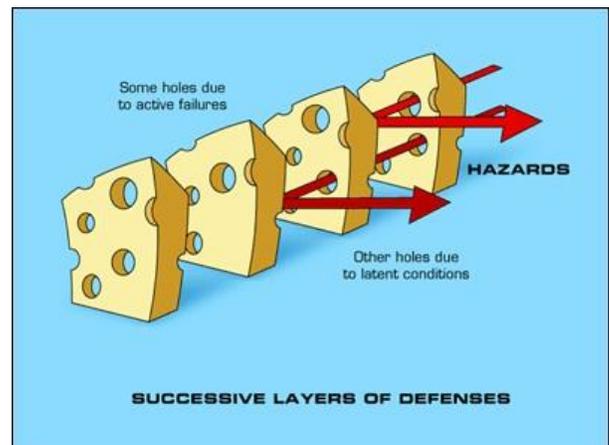
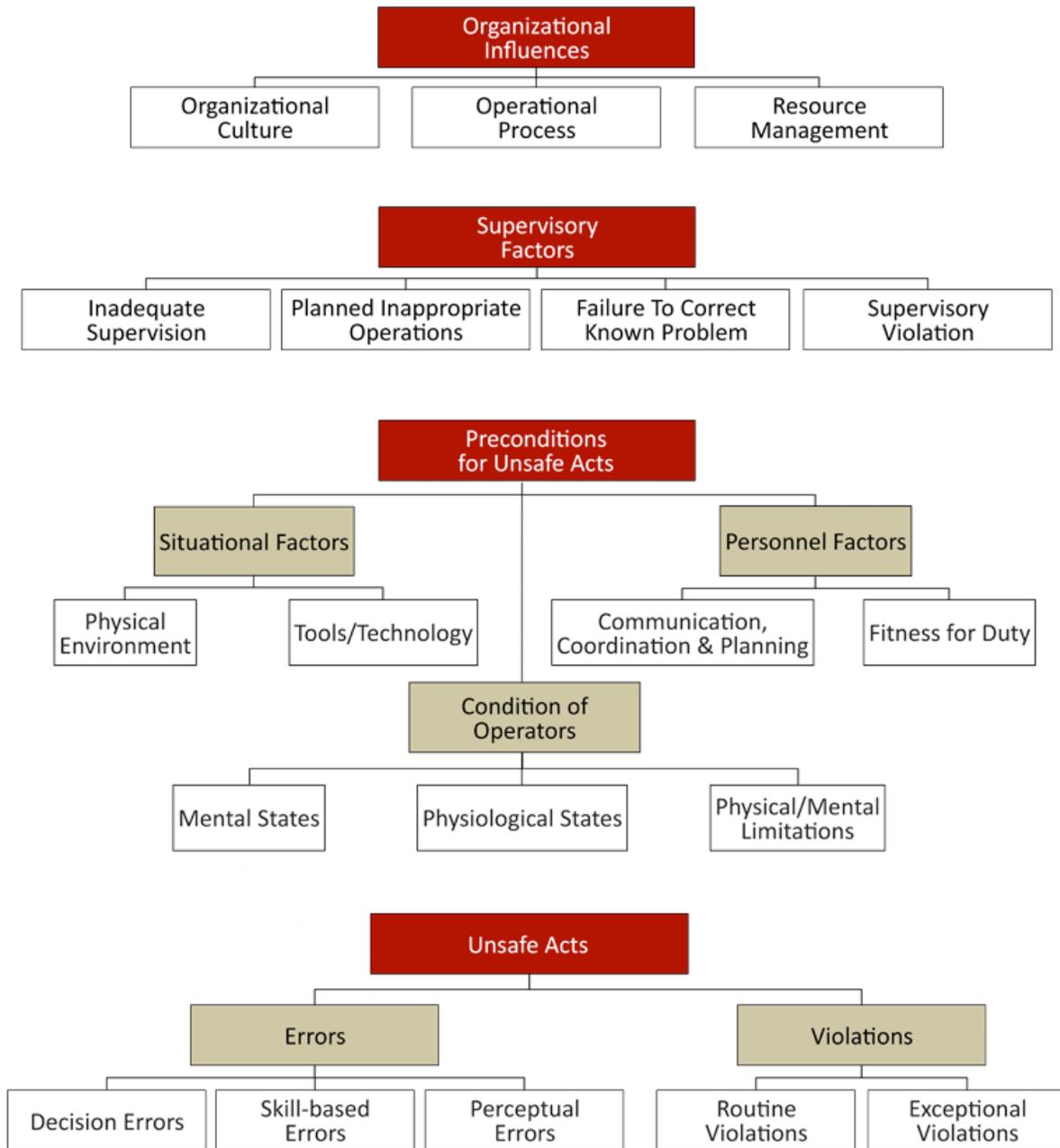


Figure 2 Supervision Stopping an Accident

Reason's model does not stop at supervision; it also considers Organizational Influences that can impact performance at all levels. For instance, in times of fiscal constraints, funding may be short and may lead to limited training opportunities. Supervisors are sometimes pressed to task non-proficient crews with complex missions. Not surprisingly, unintended and unrecognized errors may appear, and mission performance will consequently suffer. As such, hazards and risks at all levels must be addressed if any mishap investigation process is going to be effective. The investigation process then endeavors to detect and identify the holes (hazards) in the cheese (see Figure 1). So how do we identify these hazards? Well, it turns out that each mishap is not unique from its predecessors. In fact, most mishaps have very similar causes. They are due to the same holes in the cheese, so to speak. The hazards identified in each new mishap are not unique to that mishap. Therefore, if you know what these system failures and hazards or holes are, you can better identify their roles in mishaps -- or better yet, detect their presence and develop a risk mitigation strategy correcting them before a mishap occurs.

Drawing upon Reason's¹²⁰ and Wiegmann and Shappell's¹²¹ concept of active failures, latent failures and conditions, a taxonomy was developed to identify hazards and risks called the Human Factors Analysis and Classification System (HFACS). HFACS describes four main tiers of failures and conditions: 1) Acts, 2) Preconditions, 3) Supervision, and 4) Organizational Influences (Figure 3).



¹²⁰ Reason, J. (1990). Human Error. Oakleigh, Victoria: Press Syndicate of the University of Cambridge.

¹²¹ Shappell, S.A., & Wiegmann, D.A. (2001) Applying Reason: The Human Factors Analysis and Classification System (HFACS). Human Factors and Aerospace Safety, 1(1), 59-86.

General Analysis

Doctrine is a body of teachings, instructions, taught principles, or positions that represents the framework within the organization. One might think of doctrine more directly as what the organization chooses to teach and an element of organizational culture. Fire service organizations commonly use doctrine, both written and unwritten, to describe established procedures as they apply to complex operations on the fireground. It also provides a philosophy for leading firefighters in firefighting operations, a mandate for professionalism, and a common language. It establishes the way we practice our profession. Doctrine is transmitted through training to the organization.

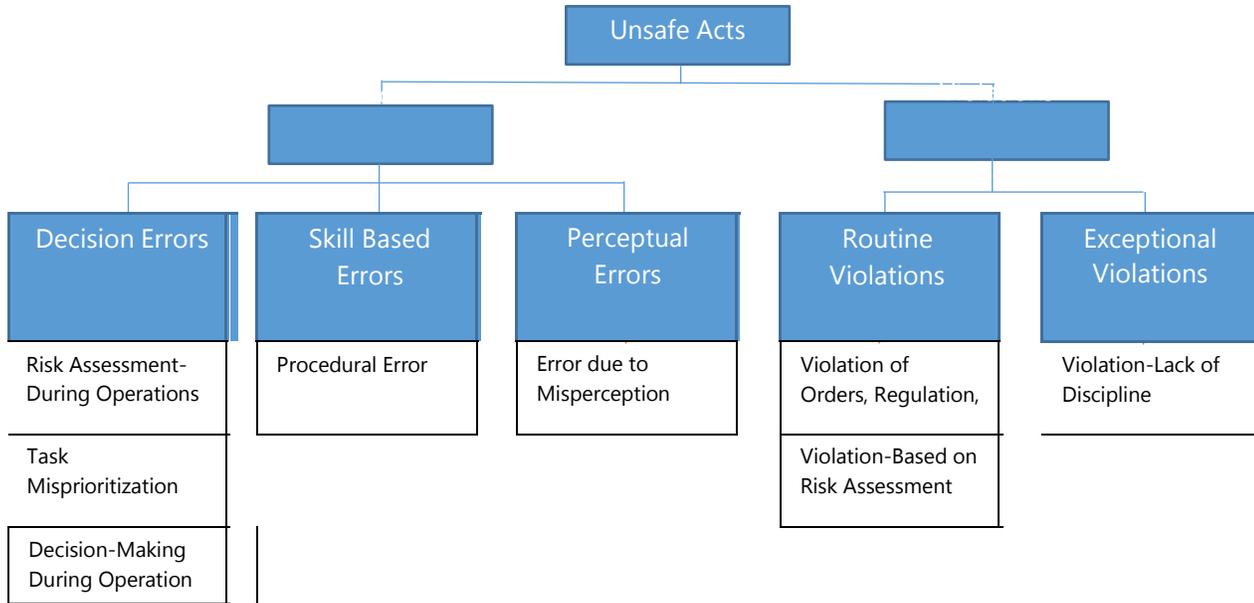
Howard County Department of Fire and Rescue Services doctrine functions on an industrial-age paradigm with respect to staffing, training, equipping and operating. The natural consequence of a system of this design is a focus on a baseline tactical effectiveness, on interchangeability of personnel, and on speed of production; members that are good enough to make the broader system work, rather than optimal or excellent at the level of their operation. Where excellence or significant innovation does occur, it is often achieved in spite of the HCDFRS doctrinal structural impediments. The influence of doctrine is inversely proportional to the importance attached to other factors. Operational advice and requests concerning field operations personnel structure, logistic procurement, and operational unit deployment are often ignored, overruled, or modified because of economic and political factors that assume overwhelming importance.

In particular, the ISRB examined HCDFRS' doctrine by analyzing the doctrine's classification system through the four main tiers of human error. The tiers are organizational influences, supervisory factors, preconditions for unsafe acts, and unsafe acts as they relate to the command and control of operational units. The Woodscape Drive incident was included as a specific incident in this analysis.

The ISRB's conclusions are stated within each section of this Analysis. In general, the ISRB identified various failure points which the ISRB believes are directly connected to the line-of-duty death of Fire Fighter Flynn. These failure points now identified, can be addressed by the HCDFRS to prevent future injuries or deaths and improve the doctrine of the HCDFRS. By addressing these failure points the HCDFRS honors the sacrifice of Fire Fighter Flynn.

1. Unsafe Acts

Unsafe Acts are those factors that are most closely tied to the mishap and can be described as active failures or actions committed by the operator that result in human error or unsafe situation. We have identified these active failures or actions as Errors and Violations.



Judgement and Decision-Making Errors: Judgement and decision-making errors are factors in a mishap when behavior or actions of the individual proceed as intended yet the chosen plan proves inadequate to achieve the desired end state and results in an unsafe situation.

Risk Assessment- During Operation: Is a factor when the individual fails to adequately evaluate the risks associated with a particular course of action and this faulty evaluation leads to inappropriate decision and subsequent unsafe situation. This failure occurs in real-time when formal risk assessment procedures are not possible.

1. Incident Command did not reevaluate risk assessment after receiving an all clear from the occupants of the structure.
2. There is evidence that unit officers lacked full comprehension of their tactical choices.
 - a. Initial failure to establish water supply by first two arriving engines had an outsized effect on subsequent incident strategies and tactics.
 - b. Crew's recognized, but did not comprehend, that there was fire in the basement.
 - c. Engine 51's initial entry into the structure was unreported, keeping critical information from the Incident Commander regarding condition with the structure.
 - d. Crews failed to communicate.
3. Engine 101 and Fire Attack Group made entry into the first level into the Hazard Zone without express authorization from Command.

Task Misprioritization: Is a factor when the individual does not organize, based on accepted prioritization techniques, the tasks needed to manage the immediate situation.

1. Fire Attack Group and Engine 101 redeployed from the basement entrance back to the first-floor entrance.

Decision Making- During Operations: Is a factor when the individual through faulty logic selects the wrong course of action in a time constrained environment.

1. There is evidence that unit officers lacked full comprehension of their tactical choices.
 - a. Initial failure to establish water supply by first two arriving engines had an outsized effect on subsequent incident strategies and tactics.
 - b. Crew's recognized, but did not comprehend, that there was fire in the basement.
 - c. Engine 51's initial entry into the structure was unreported, keeping critical information from the Incident Commander regarding condition with the structure.
 - d. Crews failed to communicate.
2. Engine 101 and Fire Attack Group made entry into the first level into the Hazard Zone without express authorization from Command.
3. FF Flynn acted on implied orders and Engine 101A's acceptance to FF Flynn's actions were command negation.
4. There were immediate efforts to rescue FF Flynn after the MAYDAY emergency, however there were no tactical orders targeted at locating and extinguishing the fire until after RIC operations were completed, there was no attempt to extinguish the fire in the crawlspace from above.
5. Numerous situational cues to a working basement fire were recognized and crews still entered on the floor above.

Skill based Errors: Skill based errors are factors in a mishap when errors occur in the operator's execution of a routine, highly practiced task relating to procedure, training and proficiency and result in an unsafe situation. Skill based errors are unintended behaviors.

Procedural Error: is a factor when a procedure is accomplished in the wrong sequence or using the wrong technique.

1. Responding units lacked Level I accountability established under HCDFRS General Order 300.02 Personnel Accountability because of inconsistent and organization of Personnel Accountability Tags.
2. Engine 51 and Engine 101 did not lay a supply line under HCDFRS General Order 310.01 as the first and second arriving engine companies.
 - a. Crews failed to comprehend the time and complexity to establish a sustained water supply from a static source.
3. Responding crews did not follow the standard naming of floors as specified in General Order 300.07.

Misperception Errors: Misperception errors are factors in a mishap when misperception of an object, threat or situation from cognitive or attention failures that results in human error.

1. Fire Attack Group and Engine 101 working on the floor above a basement fire.
 - a. Engine 101A failed to recognize that the fire noted on Floor 1 originated from the crawlspace and had burned through the floor on Floor 1 when Engine 101A made her radio transmission at 0215 hours.
2. Engine 51 and Engine 101 did not lay a supply line under HCDFRS General Order 310.01 as the first and second arriving engine companies.
 - a. Crews failed to comprehend the time and complexity to establish a sustained water supply from a static source.
3. The Incident Commander did not have a strong mental model of the incident, likely because HCDFRS practice of Incident Commanders relying on aides to complete a 360-degree assessment of the incident instead of conducting it themselves.
 - a. Responding crews did not follow the standard naming of floors as specified in General Order 300.07.

Violations: Violations are factors in a mishap when the actions of the operator represent willful disregard for rules and instructions and lead to an unsafe situation.

Routine Violations-Violation of Orders, Regulations, or SOP's: Is a factor when a procedure or policy violation is systemic in a unit/ setting and not based on a risk assessment for a specific situation. It needlessly commits the individual, team, or crew to an unsafe course-of-action.

1. Fire Attack Group and Engine 101 working on the floor above a basement fire.
2. IRIC did not function as a team, with the two members in separate physical locations completing tasks.
3. Initial failure to establish water supply by first two arriving engines had an outsized effect on subsequent incident strategies and tactics.
 - a. The failure of Engine 51 and Engine 101 to establish water supply proved to be a distraction to the incident commander because it caused him to focus his attention on establishing a sustainable water supply for the fireground.
4. Engine 51's initial entry into the structure was unreported, keeping critical information from the Incident Commander regarding conditions within the structure.
5. Crews failed to communicate, conditions, actions, needs and PAR to the Incident Commander.
6. Engine 101 made entry into the first level into the Hazard Zone without express authorization from Command.
7. Crews did not initiate common terminology when referencing occupancies in all communications, to maintain a shared mental model. In particular, when referencing floors of a structure in conjunction with basement, attic and roof as specified in General Order 300.07.

Routine Violation- Based on Risk Assessment: Is a factor when the consequences of violating published procedures are recognized, consciously assessed and honestly determined by the individual, crew or team to be the best course of action.

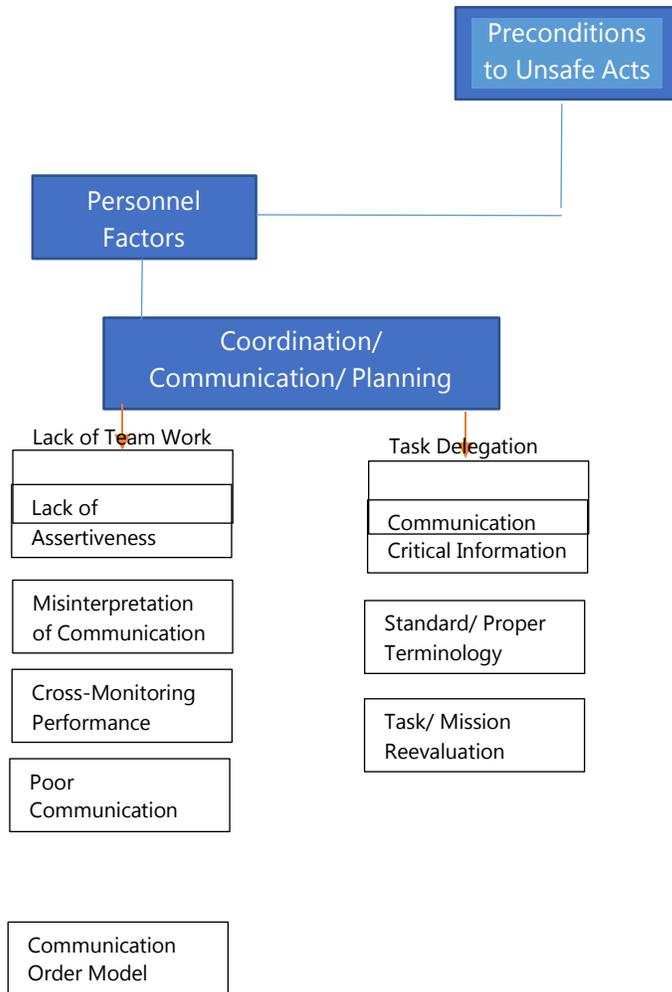
1. Fire Attack Group and Engine 101 working on the floor above a basement fire.
2. The common practice on A Shift at Station 5 for the IRIC to divide to accomplish water supply tasks.

Exceptional Violations: Lack of discipline is a factor when an individual, crew or team intentionally violates procedures or policies without cause or need. These violations are unusual or isolated to specific individuals rather than large groups.

1. Initial failure to establish water supply by first two arriving engines had an outsized effect on subsequent incident strategies and tactics.
2. Engine 111's failure to assume RIC as dictated in General Order 310.01 did not impact RIC operations during the incident because the Incident Commander assigned RIC duties to Truck 7 prior to the Mayday and Engine 71 immediately after the Mayday. Even though Engine 111's action did not directly impact RIC, Engine 111's action did cause the incident command to assign another engine company to cover the RIC assignment with Truck 7 and thus negated the ability of the Incident Commander from assigning Engine 71 to fire suppression or other related duty.
 - a. Engine 111A self-directed to assist in water supply rather than assume RIC as specified in General Order 310.01.
3. The Fire Attack Group and Engine 101 reentering floor 1 above the fire.

2. Preconditions to unsafe Acts

Preconditions are factors in a mishap if active and latent preconditions of the operators, environmental or personal factors affect practices, conditions or actions of individuals and result in human error or an unsafe situation.



Coordination/ Communication/ Planning Factors: Refers to interactions among individuals, crews, and teams involved with the preparation and execution of an assignment that resulted in human error or an unsafe situation.

Lack of Team Leadership: Is a factor when the crew and team leadership techniques failed to facilitate a proper crew climate, to include establishing and maintaining an accurate and shared understanding of the evolving assignment and plan on the part of all crew and team members.

1. The Incident Commander's understanding of crew location and deployment did not match the actual location of the crew(s).
2. Fire Attack Group and Engine 101 did not maintain an accurate shared understanding with the Incident Commander and each other. Which lead to a breakdown in crew integrity and continuity.

Lack of Assertiveness: Is a factor when individuals fail to state critical information or solutions with appropriate persistence.

1. The Incident Commander's tone of voice did not impart the urgent nature of Engine 101A's decision to redeploy to the first floor instead of directing them to flow water from an exterior position.
2. Tower 10A attempted to state the location change to the Incident Commander, from the basement level to the first floor, of the Fire Attack Group and Engine 101 but cut-off the communication loop between the Incident Commander and Engine 101A.
 - a. Tower 10A and Engine 51B both identified that the incident involved a basement fire and that crews were entering the structure above the fire but failed to stress such information to the Incident Commander to clarify the Incident Commander's understanding of crew position.

Misinterpreted Communication: Is a factor when correctly communicated information is misunderstood, misinterpreted, or disregarded.

1. Fireground communications were ineffective at relaying critical information among fire crews and Command.
2. When referencing the structure crews did not initiate common terminology in all communications, to maintain a shared mental model. In particular, when referencing floors of a structure in conjunction with basement, attic and roof as specified in General Order 300.07.
 - a. Engine 101A's communication at 0216 hours is misinterpreted by the Incident Commander as the Incident Commander understood Engine 101A as repositioning the attack line to an adjacent entry at the same level (basement).

Cross-Monitoring Performance: Is a factor when crew and team members fail to monitor, assist and back-up or challenge each other's actions and decisions.

1. Incident Commander did not question for clarification or understanding the purpose of Engine 101A's decision to redeploy to the first floor and stop said redeployment after Engine 101A was questioned by the Incident Commander concerning flowing water from the exterior.
2. Fire Attack Group Supervisor, Engine 51A, did not challenge Engine 101A's decision to redeploy to the first floor.
3. Tower 10A did not challenge Engine 51A or Engine 101A's decision to redeploy to the first floor.
4. Engine 101A did not stop FF Flynn's action of redeploying to the first floor.
5. FF Flynn did not challenge Engine 101A's order to redeploy to the first floor.

Communication Order Model: Is a factor when communications did not include supportive feedback or acknowledgement to ensure personnel correctly understood announcements or directives.

1. Responding crews left communication loops open, failing to use the Communication Order Model. This led to responding crews interrupting and cross-talking on the operational radio channel.
 - a. Tower 10A attempted to state the location change to the Incident Commander, from the basement level to the first floor, of the Fire Attack Group and Engine 101 but cut-off the communication loop between the Incident Commander and Engine 101A.
 - i. Tower 10A and Engine 51B both identified that the incident involved a basement fire and that crews were entering the structure above the fire but failed to stress such information to the Incident Commander to clarify the Incident Commander's understanding of crew positioning.

Task Delegation: Is a factor when the crew and team members fail to actively manage the distribution of mission tasks to prevent the overloading of any crew member.

1. Incident Commander instituted the Fire Attack Group which gave the crews the responsibility of all areas inside the structure. Because of limited initial units, the Incident Commander was unable to assign divisions and was limited to assigning fire suppression duties to a group which did not have geographical boundaries.
2. Charlie Division Supervisor was given the geographical assignment without assigning companies to the Charlie Division.

Communication Critical Information: Is a factor when known critical information was not provided to appropriate individuals in an accurate or timely manner.

1. Fireground Communications were ineffective at relaying critical information among fire crews and to Command.
 - a. Engine 51's initial entry into the structure was unreported, keeping critical information from the Incident Commander regarding conditions within the structure.
 - b. Fire Attack Group did not relay their Thermal Imager Camera findings to the Incident Commander indicating a basement fire.
 - c. Crews failed to communicate conditions, actions, and needs and PAR to the Incident Commander.

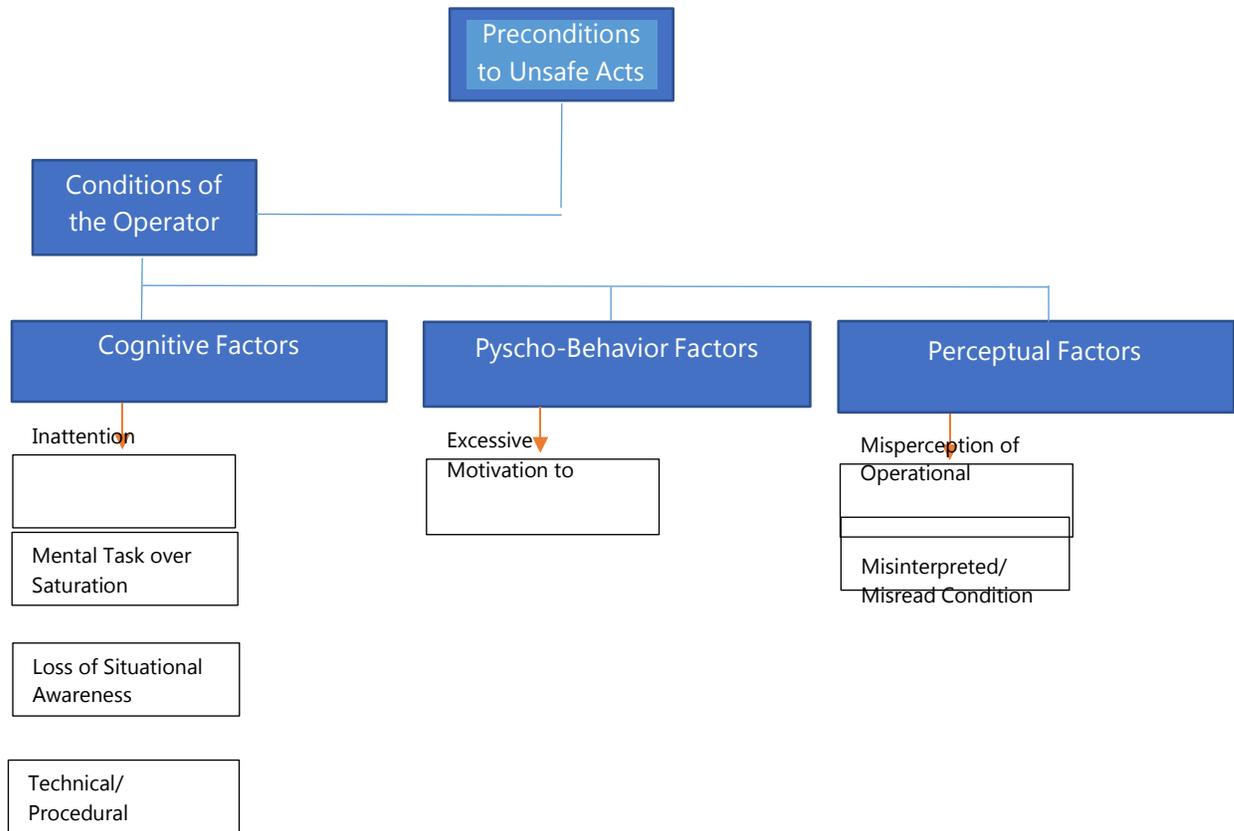
Standard and Proper Terminology: Is a factor when clear and concise terms, phrases, per service standards and training were not used.

1. Fireground Communications were ineffective at relaying critical information among fire crews and to Command.
2. Crews did not initiate common terminology when referencing occupancies in all communications, to maintain a shared mental model. In particular, when referencing floors of a structure in conjunction with basement, attic and roof as specified in General Order 300.07.

Task Mission Reevaluation: Is a factor when crew and team members fail to adequately reassess changes in their dynamic environment during mission execution and change their mission plan accordingly to ensure adequate management of risk.

1. Incident Commander did not reevaluate the risk after receiving an all clear from the occupants.
2. Fire Attack Group, Engine 101A and FF Flynn did not reevaluate the risk of redeploying from the basement to the first floor.

Condition of the Operator: Condition of the operators are factors in a mishap if cognitive, psycho-behavioral, adverse physical state, or physical and mental limitations affect practices, conditions or actions of the operators and result in human error or an unsafe situation.



Cognitive factors: are factors in a mishap if cognitive or attention management conditions affect the perception or performance of individuals and result in human error or an unsafe situation.

Inattention: is a factor when the individual has a state of reduced conscious attention due a sense of security, self-confidence, boredom, lack of a state of alertness or readiness to process

immediately available information, or a perceived absence of threat from the environment which degrades crew performance.

1. Fire Attack Group and Engine 101A and FF Flynn did not process the situational cues of a basement fire as evidenced by their redeploying from the basement to the first floor.

Mental Task Oversaturation: is a factor when the quantity of information an individual must process exceeds their cognitive or mental resources in the amount of time available to process information.

1. During and after the MAYDAY emergency, crews not involved in the RIC efforts showed no consideration to continue activities to locate, confine, and extinguish the fire.
2. Charlie Division Supervisor's radio transmission at 0230 hours identifying his lack of understanding of crews assigned and operating within his Division.
3. The Incident Commanders oversaturation with directing company level tasks which included establishing a sustainable water supply while commanding a fire in a large dwelling with limited crews.

Loss of Situational Awareness: is a factor when the individual is focusing all conscious attention on a limited number of environment cues to the exclusion of others of a subjectively equal or higher or more immediate priority, leading to an unsafe situation. It may be described as a tight focus of attention that leads to the exclusion of comprehensive situational information.

1. The Incident Commander did not have a strong mental model of the incident, likely because of current HCDFRS practices of Incident Commanders relying on aides to complete a 360-degree assessment of the incident instead of conducting it themselves.
2. Crews recognized, but didn't comprehend, that there was a fire in the basement.
3. The Incident Commanders understanding of crew location and deployment did not match the actual locations of the crew.

Psycho-Behavioral Factors: are factors when an operator's personality traits, psychosocial problems, psychological disorders or inappropriate motivation creates an unsafe situation.

Excessive Motivation to Succeed: is a factor when the individual is preoccupied with success to the exclusion of other mission factors leading to an unsafe situation.

1. Based on interview statements, FF Flynn quickly redeployed from the basement level to the first floor, extending a third hose line from Engine 51 through the first-floor laundry room to the recessed area of the living room.

Perceptual Factors: are factors in a mishap when misperception of an object, threat or situation creates an unsafe situation.

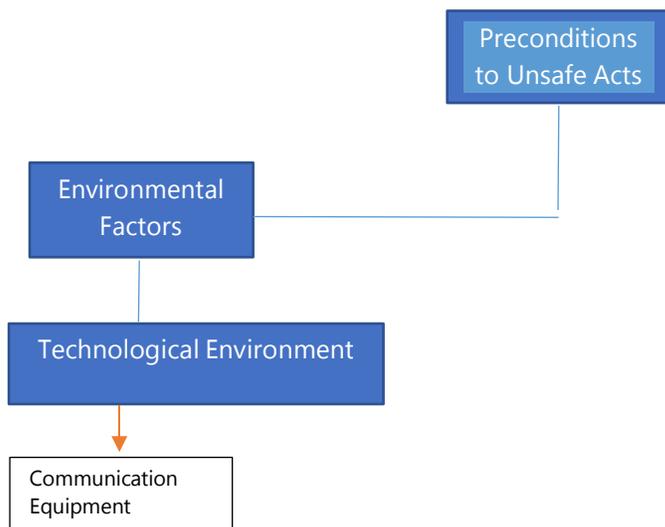
Misperception of Operational Conditions: is a factor when an individual misperceives or misjudges location with the performance envelope or other operational conditions and this leads to an unsafe situation.

1. Crews recognized, but didn't comprehend, that there was fire in the basement.

Misinterpreted/ Misread Conditions: is a factor when the individual is presented with situational cues but its significance is not recognized, it is misread or is misinterpreted.

1. Crews recognized, but didn't comprehend, that there was fire in the basement.
2. Crews failed to recognize or read the smoke conditions presented to them as they related to a fire in a structure which was substantially larger than other dwellings they normally encounter.

Environmental Factors: are factors in a mishap if physical or technological factors affect practices, conditions and actions of individual and result in human error or an unsafe situation.



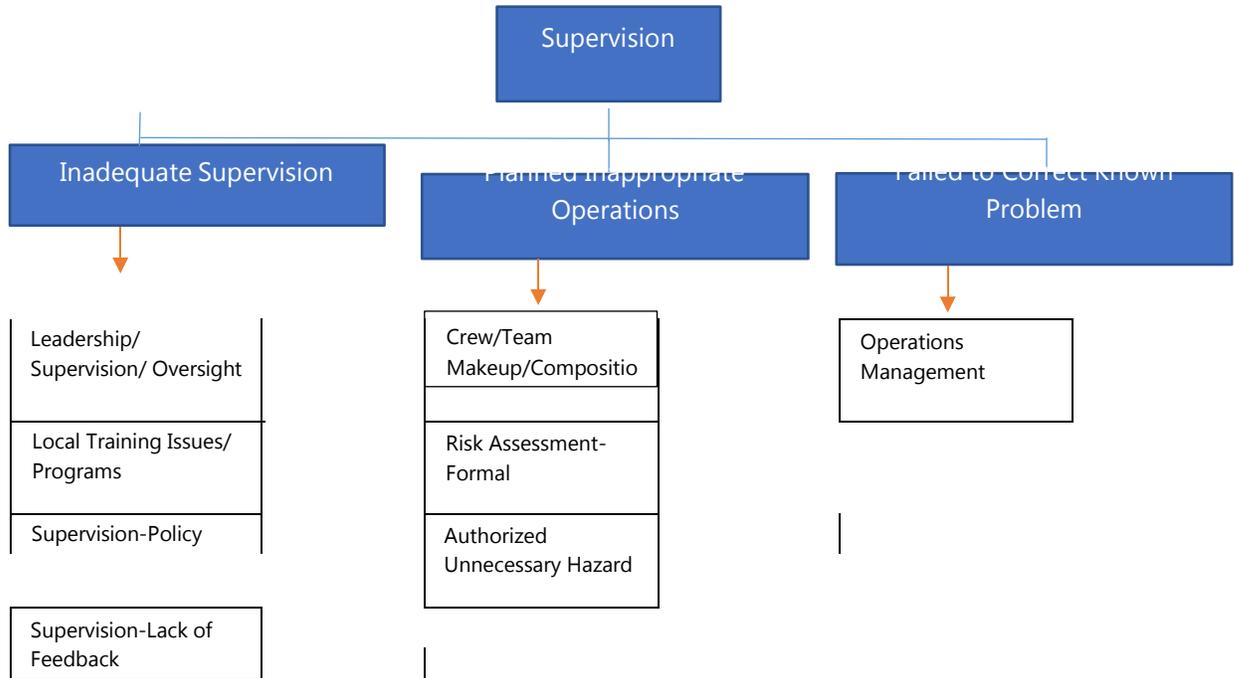
Technological Environment: are factors in a mishap when design factors or automation affect the actions of individuals and result in human error or an unsafe situation.

Communication Equipment: is a factor when communication equipment is inadequate or unavailable to support mission demands. This includes electronically or physically blocked transmissions.

1. FF Flynn transmitted a MAYDAY call, but it was unheard by the fireground personnel and Communications Center because it was on the unmonitored Bravo 2 talk group.

3. Supervision

Is a factor in the methods, decisions or policies of the supervisory chain of command directly affect practices, conditions, or actions of individual and result in human error or an unsafe situation.



Inadequate Supervision: is a factor in a mishap when supervision proves inappropriate or improper and fails to identify hazard, recognize and control risk, provide guidance, training and oversight and results in human error or an unsafe situation.

Leadership/ Supervision/ Oversight Inadequate: is a factor when the availability, competency, quality or timeliness of leadership, supervision or oversight does not meet task demands and creates an unsafe situation.

1. FF Flynn acted on implied orders and Engine 101A's acceptance to FF Flynn's actions was command negation.
2. During and after the MAYDAY emergency, crews not involved in the RIC efforts showed no consideration to continue activities to locate, confine, and extinguish the fire.
3. There were immediate efforts to rescue FF Flynn after the MAYDAY emergency, however there were no tactical orders targeted at locating and extinguishing the fire until after RIC operations were completed, there was no attempt to extinguish the fire in the crawlspace from above.
4. Dispatchers lack readily accessible job aids to assist during critical events. This led to inefficiencies in accessing mutual aid as well as deviations from protocols established in General Orders.

Local Training Issues/ Programs: are a factor when one-time or recurrent training programs, upgrade programs, transition programs or any other local training is inadequate or unavailable and this creates an unsafe situation.

1. Dispatchers lack readily accessible job aids to assist during critical events. This led to inefficiencies in accessing mutual aid as well as deviations from protocols established in General Orders.
2. Declaring an offensive or defensive strategy during the initial radio report is insufficient since it does not allow the Incident Commander to gain a firm sense of the incident before declaring a strategy.
 - a. General Order 310.01 articulates two strategies employed on the fireground limiting the Incident Commander's strategic alternatives.

Supervision-Policy: is a factor when the policy or guidance or lack of a policy or guidance leads to an unsafe situation.

1. Declaring an offensive or defensive strategy during the initial radio report is insufficient since it does not allow the Incident Commander to gain a firm sense of the incident before declaring a strategy.

Supervision-Lack of Feedback: is a factor when information critical to a potential safety issue had been provided to supervisory or management personnel without feedback to the source; failure to close the loop.

1. Incident Commander did not question for clarification or understanding the purpose of Engine 101A's decision to redeploy to the first floor and stop said redeployment after Engine 101A was questioned by the Incident Commander concerning flowing water from the exterior.

Planned Inappropriate Operations: is a factor in a mishap when supervisors fail to adequately assess the hazards associated with an operation and allows for unnecessary risk. It is also a factor when supervisors allow non-proficient or inexperienced personnel to attempt missions beyond their capability or when crew or team makeup is inappropriate for the task or mission.

Crew/Team Makeup/ Composition: is a factor when the makeup of the crew or team should have reasonably raised obvious safety concerns in the minds of crewmembers involved in the mission, or in any other individual directly related to the scheduling of this mission.

1. Lack of team cohesion from officer and crew instability secondary to the loss of interpersonal respect, trust, and confidence from the constant changing of personnel assignments. Current HCDFRS's staffing matrix emphasis administrative efficiency over team cohesion and unit/battalion proficiency. The effect being pooled interdependence.

Risk Assessment-Formal: is a factor when supervision does not adequately evaluate the risk associated with a mission or when pre-mission risk assessment tools or risk assessment programs are inadequate.

1. Engine 101 maintained physical crew integrity, but not complete crew integrity because FF Flynn acted on implied orders and Engine 101A's acceptance to FF Flynn's actions was command negation.

Authorized Unnecessary Hazard: is a factor when supervision authorizes a mission or mission element that is unnecessarily hazardous without sufficient cause or need.

1. Engine 101 maintained physical crew integrity, but not complete crew integrity because FF Flynn acted on implied orders and Engine 101A's acceptance to FF Flynn's actions was command negation.

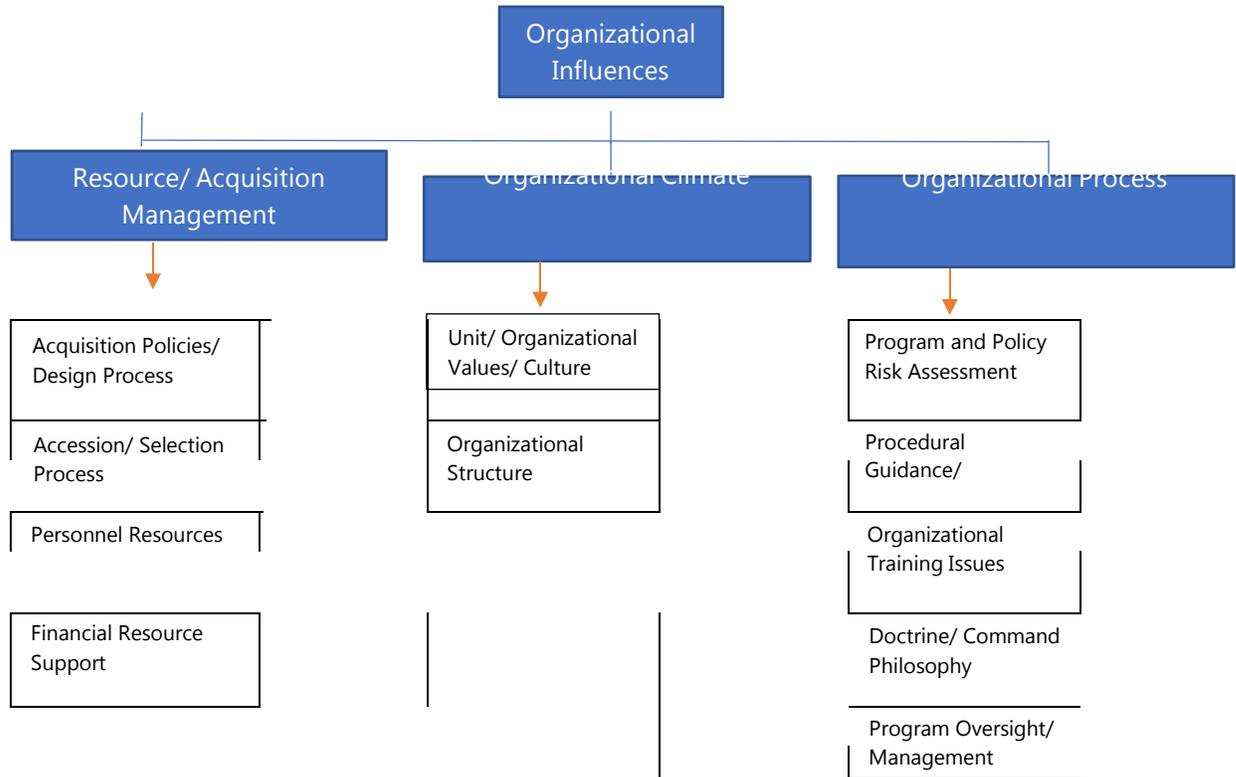
Failure to Correct Known Problems: is a factor in a mishap when supervision fails to correct known deficiencies in documents, processes or procedures, or fails to correct inappropriate or unsafe actions of individuals, and this lack of supervisory action creates unsafe situation.

Operations Management: is a factor when a supervisor fails to correct known hazardous practices, conditions or guidance that allows for hazardous practices within the scope of his/ her command.

1. Engine 101 maintained physical crew integrity, but not complete crew integrity because FF Flynn acted on implied orders and Engine 101A's acceptance to FF Flynn's actions was command negation.

4. Organizational Influences

Fallible decisions of upper level management directly affect supervisory practices, as well as conditions and actions of operators. These latent conditions generally involve issues related to Resource/Acquisition Management, Organizational Climate, and Organizational Processes.



Resource/ Acquisition Management: is a factor in a mishap if resources management and acquisition processes or policies, directly or indirectly, influence system safety and results in poor error management or creates an unsafe situation.

Acquisition Policies/ Design Processes: is a factor when the processes through which vehicle equipment or logistical support are acquired allows inadequacies or when design deficiencies allow inadequacies in the acquisition and the inadequacies create an unsafe situation.

1. The transmission of FF Flynn’s MAYDAY and emergency identifier on Bravo 2 likely had no impact on the survivability of FF Flynn as the RIC had already deployed and was gaining access to FF Flynn at the time of the activation.
2. Activation of an emergency button (via manual depression or man-down feature) sounds on the radio channel that the radio is set to operate on.
3. The Motorola APX8000XE radio programming was suboptimal for features such as the Emergency Identifier.
4. Engine 51’s 25-foot hydraulic extension hose couplings were corroded.
5. HCDFRS has neither standardized thermal imaging devices deployed in the field, nor established training for thermal imaging devices.

Accession/ Selection Policies: is a factor when the process through which individuals are screened, brought into the service or placed into specialties is inadequate and creates an unsafe situation.

1. Current HCDFRS training rarely provides realistic, practical, hands-on scenarios for personnel mastery of fireground fundamentals. Particularly noteworthy was the inability for fireground personnel to properly identify situational cues that there was an active basement fire. This aspect alone should have indicated that entry on the floor 1 was unsafe and caused personnel to alter their tactics for fire attack.

Personnel Resources: is a factor when the process through which manning, staffing or personnel placement or manning resource allocations are inadequate for mission demands and the inadequacy causes an unsafe situation.

1. Communications Center Fire Operations staffing levels limit the ability to expand operations for multiple incidents while maintaining focus on critical tasks and transmissions. This includes the absence of a 24/7 Operations supervisor from a HCDFRS officer.
2. With the complexity of this incident and size of the structure, it was unreasonable to only have one safety officer on the fireground, a second safety officer should have been requested and filled by a Company Officer, Chief Officer, or mutual aid Officer.
3. Operational Staffing Directives have created a pooled interdependence system among personnel secondary to administrative efficiencies. This has systemically broken down operational cohesiveness.

Financial Resource/ Support: is a factor when an organization or operation does not receive the financial resources to complete its assigned mission and this deficiency creates an unsafe situation.

1. Lack of financial resources to support realistic fireground training.
2. Lack of financial resources to develop and sustain a competency-based officer mentorship program.
3. Lack of financial resources to support the on-call program for additional safety officers, battalion chiefs, EMS Officers.
 - a. Without a single person being on-call for more than one type of position. As an example, on the Woodscape Drive incident, a Battalion Chief was the on-call Safety Officer and Battalion Chief.
4. Lack of financial resources to support and adequately staff Fire Operations in the Communications Center.
5. Lack of financial resources for additional personnel.
6. Lack of financial resources to support fleet maintenance and a pool of available reserve equipment.

Organizational Climate: is a factor in a mishap if organizational variables including environment, structure, policies, and culture influence individual actions and results in human error or an unsafe situation.

Unit/Organizational Values/ Culture: is a factor when explicit/ implicit actions, statements or attitudes or unit leadership set unit/ organizational values that allow an environment where unsafe mission demands or pressure exists.

1. A lack of trust, by the rank and file, of the HCDFRS command staff, concerning the command staff's transparency and concern for the benefit its' members has affected the cohesiveness of the Department. Which has distorted the shared common core values of the Department and negatively affected its' operational efficiencies.

Organizational Structure: is a factor when the chain of command of an individual or structure of an organization is confusing, non-standard or inadequate and this creates an unsafe situation.

1. Operational Staffing Directives have created a pooled interdependence personnel system to support financial administrative efficiencies. This has systemically broken down operational cohesiveness.
2. Inconsistencies with operational policies that involve high-risk hazards and low frequency events.
3. Fire Station staffing is not standard throughout the Department.
4. HCDFRS engine companies are not standard with four personnel throughout the Department.

Organizational Processes: is a factor in a mishap if organizational processes such as operations, procedures, operational risk management and oversight negatively influence individual, supervisory, and organizational performance and results in unrecognized hazards and uncontrolled risk that leads to human error or an unsafe situation.

Program Policy and Risk Assessment: is a factor when the potential risks of a large program, operation, acquisition or process are not adequately assessed and this inadequacy leads to an unsafe situation.

1. Response assignment initially dispatched to manage this incident was consistent with HCDFRS policies in place at the time of the incident. But through analysis the response policy has been determined to be inadequate and require revision.
2. 7005 Woodscape Drive was an 8,400 square foot residential structure. However initial responders treated it similarly to a smaller single-family home. Responders failed to adapt staffing, strategy and tactics for the unique size, scale and design of the residence.

Procedural Guidance/ Publications: is a factor when written direction, checklists, graphic depictions, tables, charts or other published guidance is inadequate, misleading or inappropriate and this creates an unsafe situation.

1. The HCDFRS General Order 300.02 Personal Accountability does not reflect current fireground operations.
2. The current system for accountability using verbal PAR reports is time consuming and requires significant radio communications.
3. There are multiple areas where General Order 300.07 *Incident Command System* and the General Order 310.01 *Single Family and Townhouse Structure Fire Operational Guidelines*, when read together, do not run parallel and could confuse the reader. There are multiple

areas where a lack of clarity will hamper accountability and the presence of confusion is detrimental to operational consistency.

4. The current HCDFRS policy permitting the first arriving unit may forgo establishing command, when a chief, command officer, is arriving nearly simultaneously and takes Command is flawed. The first arriving unit must assume command regardless of circumstance, so that there is always clear command and control of the scene. The formal announcement of command does not add anything to the exercise of the command.
5. Declaring an offensive or defensive strategy during the initial radio report is insufficient since it does not allow the incident commander to gain a firm sense of the incident before declaring a strategy.
6. The Incident Commander did not have a strong mental model of the incident, likely because of current HCDFRS practice of Incident Commanders relying on aides to complete a 360-degree assessment of the incident instead of conducting it themselves.
7. General Order 410.01 Communications, does not reflect current operational practices for HCDFS or industry consensus standards.

Organizational Training: are a factor when one-time or initial training programs, upgrade programs, transition programs or other training that is conducted out the local unit is inadequate or unavailable and this creates an unsafe situation.

1. The Motorola APX8000XE radio is a complex piece of life safety equipment, requiring specific training to operate appropriately. As detailed in the training section of this Report, the department training for operation of this radio system prior to its wide deployment in the field was inadequate to ensure that all crew members could effectively operate the new equipment. A major shortcoming of the training was that it provided only an emailed slideshow of how to operate the radio and did not provide any hands-on practice to ensure that personnel could effectively operate the radio.
2. HCDFRS MAYDAY training does not incorporate error prevention or error trapping on the fireground.
3. Although all HCDFRS personnel train on the Incident Command System neither the current General Order nor the current training program establish a clear philosophy of Incident Command for divisions, groups, and unit operators.
4. Current HCDFRS training rarely provides realistic, practical, hands-on scenarios for personnel to master fireground fundamentals. Particularly noteworthy in this incident was the inability for fireground personnel to properly identify situational cues that there was an active basement fire. This aspect alone should have indicated that entry on the floor 1 was unsafe and caused personnel to alter their tactics for fire attack.
5. HCDFRS deployed equipment into the field without adequate training on the equipment (Thermal Imaging Cameras and Motorola APX8000XE portable radios).
6. Although many HCDFRS members have been trained on the Blue Card communication method, which uses the communication order model, personnel on the fireground did not effectively implement the communications order model.

Doctrine: is a factor when the doctrine, philosophy or concept of operations in an organization is flawed or accepts unnecessary risk and this flaw or risk acceptance leads to an unsafe situation or uncontrolled hazard.

1. HCDFRS does not have a clear philosophy of command, which limits an Incident Commanders effectiveness in executing strategies and tactics.

Program Oversight: is a factor when programs are implemented without sufficient support, oversight or planning and this leads to an unsafe situation.

1. Although the HCDFRS owns MSA A2 SCBA monitoring software, the software has not been adopted for use on the fireground.