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Basic Police Bicycle Patrol Course

1. Steering, Balance and Pedaling: The ability to maintain controlled steering and balance while steering through a line of traffic cones.
2. Shifting: The ability to properly down shift prior to a stop and up shift upon leaving a stop.
3. Threshold Braking: The ability to maintain control and balance while having both wheels locked.
4. Obstacle Jumping: The ability to maintain control and forward momentum while traversing an object.
5. Descending Stairs: The ability to control the bicycle, speed, balance and body position while descending stairs.
6. Subject Contact: The ability to safely contact both singly and in pairs.



M.A.P.S.

Pre-Assault Indicators of Threat

Unclassified//FOUO

M.A.P.S.

- This Concept of identifying and articulating specific identifiable indicators of threat *prior to assault* is borrowed from the psychiatric community.
  - The need to accurately describe these indicators so that one professional can months or years later read the comments regarding the observations of a patients behavior and understand exactly what is meant is obvious.

Unclassified//FOUO

M.A.P.S.

- There are four categories described by M.A.P.S., each having real-world application for law enforcement in, first, identifying the pre-assault indicator in the field, and then, second, in articulating an officers actions vs a suspect's threatening behavior and the cues the officer reacted to.

Unclassified//FOUO

M.A.P.S.

- Officers often realize they are seeing threatening actions, but are not able to articulate the specific threatening cues, later resorting to descriptions of the suspect being "hinky" or other non-specific terms that are difficult to quantify or explain to those who are not in law enforcement.

Unclassified//FOUO

Threat Cue

- **THREAT CUE DEFINED: a "threat cue" is a pre-assault indicator. It is a recognized pattern of *motor, attitude, physical,* and *speech* indicators that has been identified as signaling impending or probable assault.**

Unclassified//FOUO

Motor Activity

- Pacing.
- Restlessness
- Clenching of teeth/working jaws
- Striking objects in the presence of an LEO
- Rapid, uneven breathing, especially when there is no physical activity
- Repetitive body movements
- Excessive rigidity when moving
- Physical signs of avoidance
- Walking away while talking to officer
- Physical retreat or leaning away from the officer

Unclassified//FOUO

Attitude Pattern

- Disorientation
- Extreme euphoria
- Extreme distrust
- Controlled anger
- Raging
- Rapid mood swings, especially depicting sadness or hopelessness with a matter-of-factness

Unclassified//FOUO

Postural Signs

- Excessive eye contact
- Staring or studying
- Mad dogging
- Gripping an object intensely
- Unusual positioning of the hands or limbs
- Overt "Fighting Stance"
- Inappropriate or distorted facial features
- Grimace
- Blank

Unclassified//FOUO

Speech Patterns

- Angry/loud/forceful
- Quiet, but pushed speech
- Overly defensive
- Answering questions with questions
- Unnatural breaks in sentences

Unclassified//FOUO

Speech Patterns

- Statements of:
  - Past Violence
  - Accusations of persecution
  - Ominous threats/Direct challenges
  - Fear of losing control
  - Not going back to jail
  - Statements of Revenge on LEO's

Unclassified//FOUO

M.A.P.S.

- Pre-assault indicators, or "threat cues" are a signal that the suspect is attempting to work himself into a position or mental state where attack on an officer is possible.

Unclassified//FOUO

M.A.P.S.

- **These are threat cues showing his planning is either over or almost over, and that he or she is simply waiting for the opportune moment to assault the Officer:**

  - Sudden and extreme nervousness during questioning that is in contrast with prior behavior.

  - Suddenly darting eyes

  - Target glancing

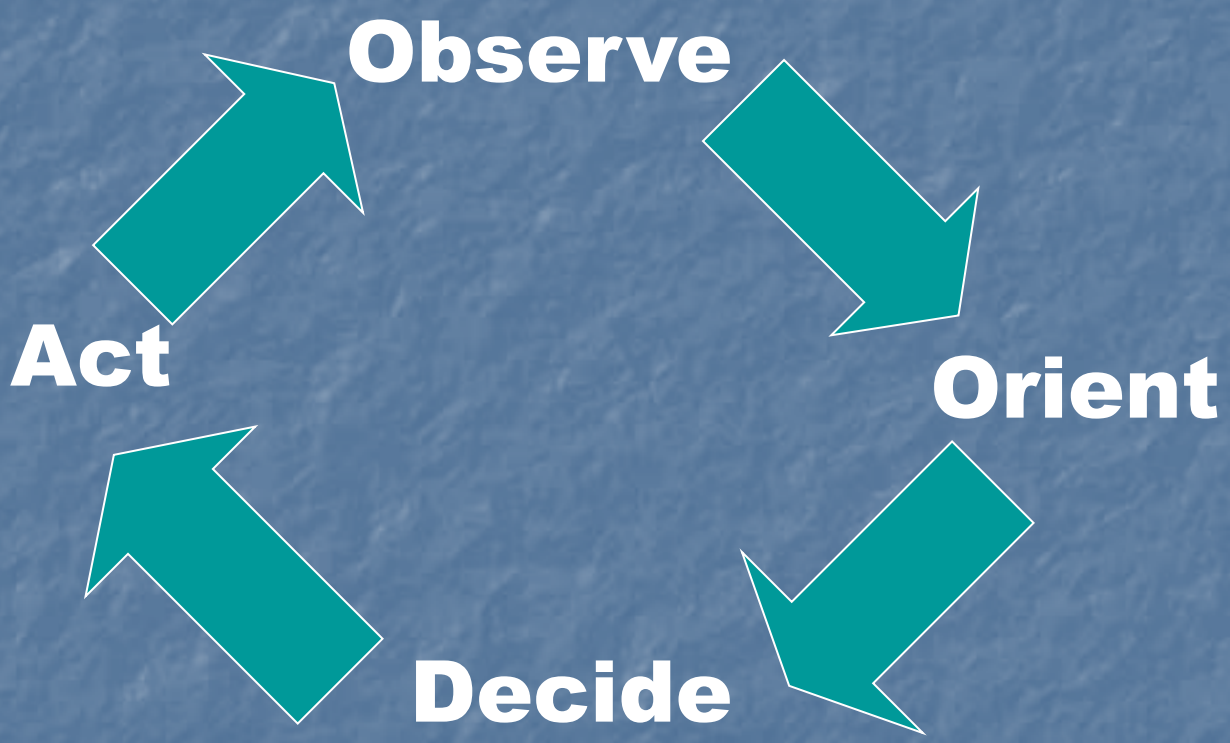
  - Parroting

  - Knowledge of police tactics and methods

  - Shedding of personal property

Unclassified//FOUO

OODA



Unclassified//FOUO

OBSERVE

This is, in an individual combatives problem-solving context, about the collection of data by means of senses- primarily by sight, touch, and sound

Gathering information early enough to permit the rest of the process to develop before the situation changes significantly is essential to fighting effectively

Unclassified//FOUO

ORIENT

Orientation is rapidly putting what is observed into context-**what does the observed information actually mean?**

Unclassified//FOUO

ORIENT

Failing to orient quickly to the changing situation can be as bad as not observing it in the first place:

- Not believing what one is seeing
- Not being able to place the action in context and then getting stuck while studying and over-analyzing the situation in trying to make sense of it

Unclassified//FOUO

ORIENT

The ability to orient to the threat is the most important component of OODA

Unclassified//FOUO

DECIDE

Based upon the information received, a decision about a response, and how that response will take place is made

The decision process is also where the Loop can significantly bog down, and the officer can loose his advantage-many a battle has been thrown away by a hesitant commander-or fighter-who delays a decision because of a fear of incomplete information.

Remember: an adequate solution early is better than a perfect decision that is to late to favorably affect the outcome

Unclassified//FOUO

ACT

The decision is acted upon and the response is initiated. The effort succeeds, is partially successful, or fails to influence the conflict. Feed back loops begin, as countless additional observation-orientation-decision-action cycles will be processed before the incident is resolved.

Unclassified//FOUO



Defensive Tactics

Why do you need this class?

- To assess your current retention of defensive tactics/use of force material from the academy.
- To give you the opportunity to expand the basic defensive tactics curriculum taught to you in the academy.
- To prepare you for your field training program as it relates to defensive tactics.

What to Expect Today

- Review of Department Use of Force Policies
- Review Use of Force Case Law
- Reporting Use of Force
- Physical Skills
- De-brief

How Does the Department View Use of Force?

- The Harbor Police recognizes and respects the value of human life. (Policy #300)
- Harbor Police Officers in the performance of their duties occasionally face situations where the use of force is reasonable and necessary in order to effect an arrest, overcome resistance, control a suspect or to protect themselves or others. (Policy #300)

- Even at its lowest level, the use of force by Harbor Police Officers is a serious responsibility.

What Gives Us the Authority to Use Force?

- The State Legislature, through the enactment of **Penal Code Section 835a** recognized that peace officers may be required to use force to perform their duties.

Section 835a P.C. provides:

- "Any peace officer who has reasonable cause to believe that the person to be arrested/detained has committed a public offense may use reasonable force to effect the arrest, to prevent escape or to overcome resistance. A peace officer who makes or attempts to make an arrest need not retreat or desist from their efforts by reason of resistance or threatened of the person being

835a P.C. cont.

arrested; nor shall such officer be deemed aggressor or lose their rights to self-defense by the use of reasonable force to effect the arrest or to prevent escape or to overcome resistance.”

Classification of Police Contacts

There are three levels of police contact with citizens:

- Consensual Encounters
- Detention
- Arrest

Consensual Encounters

- The subject is free to leave and decline conversation. There is no coercion by the officer at any time.
- There is absolutely no restraint of the individual's right to leave or terminate the police-citizen contact.

Florida v. Bostick, 501 U.S. 429, 439 (1991)

Detention

- **Reasonable Suspicion** is the basis for detention.
- **Reasonable Suspicion** – Unusual or suspicious behavior related to a crime that has occurred, is occurring, or is about to occur involving the person to be detained.

Arrest

- The officer has **probable cause** to believe the suspect committed a crime. Reasonable force may be used to effect the arrest, overcome the resistance, and/or prevent escape.
- **Probable Cause** – A set of facts leading a reasonable and prudent person to believe the accused had committed a crime.

Graham v. Conner

490 U.S. 386,109 S.Ct. 1865 (1989)

- The force used must be "objectively reasonable" under the **Graham vs. Conner standard.**
- **The Reasonable Officer Standard –**

  Would another officer with like or similar training and experience facing like or similar circumstances act in the same way or use similar judgment?

Reed vs. Hoy

909F. 2d 324 (9th Cir. Ct. 1989)

- It is also recognized that officers have no duty to retreat from resistance, and are not considered the aggressors when lawfully attempting to overcome resistance in effecting an arrest under **Reed vs. Hoy, 909F. 2d 324 (9th Cir. Ct. 1989) and Ca P.C. 835(a) –** Policy #300

Use of **Reasonable Force** may be used:

- To effect an arrest
- In self-defense or in the defense of another
- To prevent the escape of a suspected offender
- To maintain order
- To overcome resistance
- To protect a person from injuring him/her self

Use of Deadly Force

- Deadly force is any intentional force likely to produce death or serious physical injury
- **Basis of Deadly Force**

"The objective and reasonable belief my life or safety (or another's) is in imminent danger of death or serious bodily injury given the totality of the facts known to me at the time of my actions."

Monroe v. City of Phoenix (9th Cir., 2001)

Use of Deadly Force #300

- An Officer may employ deadly force only in those situations where the officer reasonably believes there is an imminent threat of death or serious physical injury to the officer or another person, based on the totality of the circumstances known to the officer at the time. An officer need not wait for an actual threat by another person in order to resort to deadly force.

- **Cont**

  Rather, the officer's decision to employ deadly force will be based on the reasonableness of the officer's action based on the totality of circumstances known to the officer at the time.

Serious Bodily Injury/Harm

- A serious impairment of physical condition that drastically limits your ability to defend yourself or your weapon

Serious Bodily Injury includes, but not limited to,

- Loss of consciousness
- Concussion
- Bone fracture
- Protracted loss or impairment of any bodily member or organ
- A wound requiring extensive suturing
- Serious disfigurement

Tennessee v. Garner

471 U.S. 1, 105 S. Ct. 1694 (1985)

- Garner provides strict guidelines in the use of deadly force to stop fleeing suspects

Effects of Garner

1. Moved deadly force under the 4th Amendment
2. Created a national standard regarding the use of DEADLY FORCE against fleeing suspects

#300

In the case of a fleeing suspect, the officer must have probable cause to believe the suspect, if not apprehended, poses a threat of great serious physical harm to the officer or others. The reasoning articulated by the officer must include:

- The officer had probable cause to believe the suspect committed a crime of violence or threatened violence **and,**
- The suspect was armed, **or** presented an extreme danger to arresting officers, future arresting officers, or to the public should the arrest be delayed **and,**
- A warning is given prior to the use of deadly force, if feasible.

"Police! Stop or I'll shoot!"

Reporting Use of Force

- The need for you to accurately document your uses of force has never been greater. Changing public opinion requires officers to gather as much evidence as possible in order to document exactly what happened.
- A **great** Use of Force Report should so accurately portray the events with such detail that one could film a video of the events without further input from the involved officer – simply by reading the narrative.

For reporting purposes, the following are considered use of force #300

- Use of any pain compliance techniques
- Use of any firearm, including less lethal
- Use of any impact weapon where the suspect has been struck
- Use of any chemical agent
- Use of the carotid restraint
- Any physical force resulting in injury to the officer or suspect, or where medical attention is required as a result of its use

Cont.

- Use of maximum restraint with the cordcuff
- Use of any weaponless technique
- Use of the Taser

Remember what jury studies are showing:

- **If it isn't in the initial report, it didn’t happen**

- Each and every suspect action eliciting a trained police reaction must be documented in the initial report. It is often a series of small acts by the suspect that leads to the cumulative belief of threatening or dangerous behavior.

FORCE REPORT STRUCTURE

- Pre – Incident
- Incident
- Post - Incident

PORT of SAN DIEGO



BASIC DIVE SKILLS/ EQUIPMENT

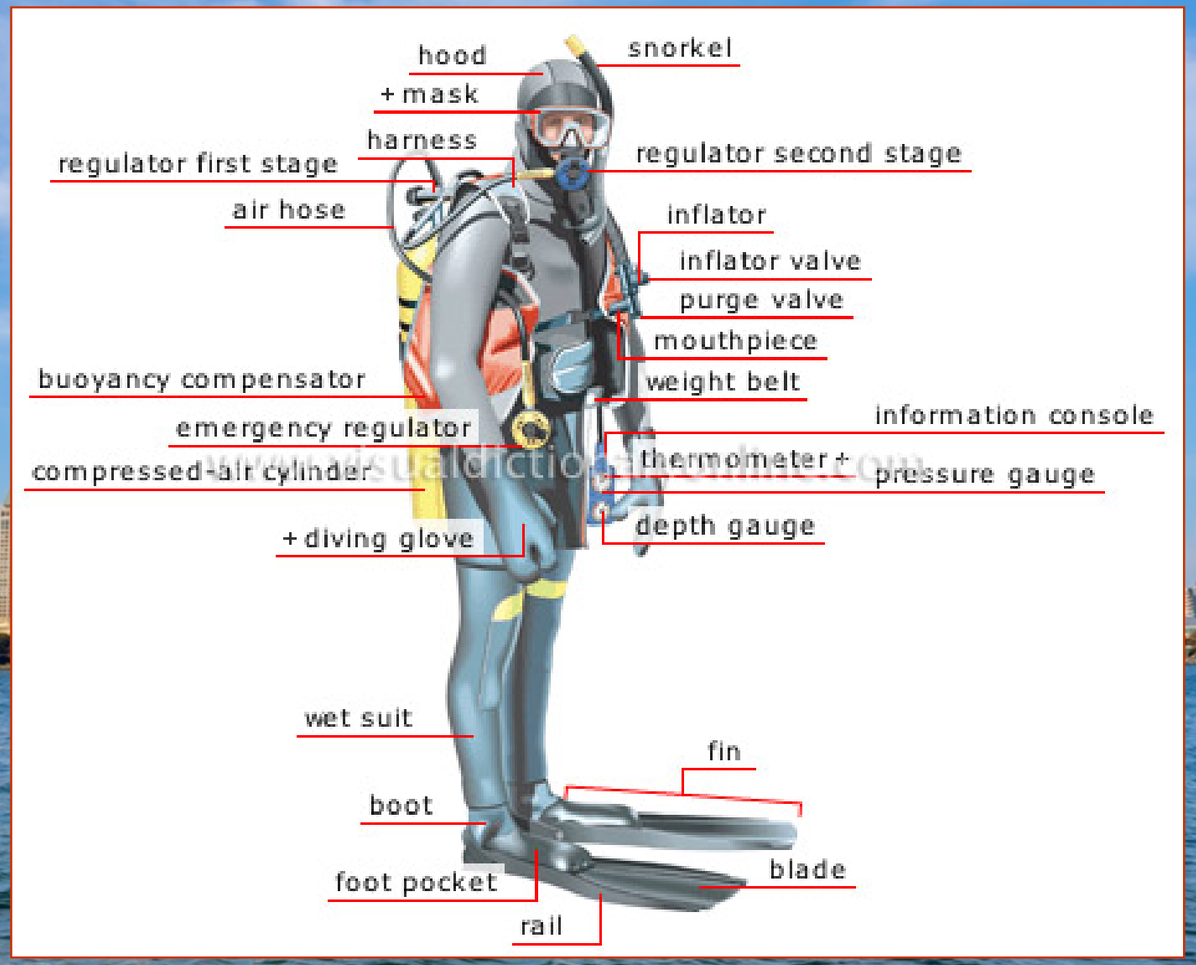
SAN DIEGO HARBOR POLICE

SDHPD DIVE TEAM

WHY FOCUS ON BASIC SCUBA SKILLS/EQUIPMENT?

1. YOUR SAFETY
2. YOUR PARTNER'S SAFETY
3. REFRESH PERISHABLE SKILLS
4. IDENTIFY STRENGTHS/WEAKNESSESS

EQUIPMENT REVIEW



- BASIC EQUIPMENT
  - Set-up
  - Breakdown
  - Cleaning
- SPECIAL EQUIPMENT

PADI's "BWRAF" SAFTETY CHECK

B – BCD & Buoyancy

W – Weights/Weight Belt

R – Releases: Check that your buddies BCD is strapped correctly and all belts are tightened.

A – Air: Check that your buddy's air is turned all the way on and half a turn back

F – Final OK: Final check is a cursory visual inspection, of fins, mask, snorkel and testing dive flashlights if necessary, take a compass bearing, and check your dive computer before giving the all Ok sign to your buddy to begin descent.

STREAMLINING



- REDUCES DRAG
- REDUCES EQUIPMENT ENTANGLEMENT
- EFFICIENT SWIMMING
- SAFER IED/ EVIDENCE SEARCHES

BASIC DIVE SKILLS

- MASK REMOVAL/ REPLACE
- BASIC SKILLS WITHOUT A MASK

- REGULATOR RECOVERY/ CLEARING
- TRANSITION TO ALTERNATE AIR SOURCE

- BCD REMOVE/ REPLACE



WHY ARE THESE SKILLS IMPORTANT?

BASIC BOUYANCY SKILLS

- SURFACE CHECK
- FLOAT EYE LEVEL WHILE HOLDING BREATH
- ADD 5 LBS TO ADJUST FOR EMPTY TANK

- FIN PIVOT
- SHOULD PIVOT WITH INHALE/ EXHALE

- HOVER
- 30 SECONDS VERTICAL AND HORIZONTAL



WHY ARE THESE SKILLS IMPORTANT?

BASIC EMERGENCY SKILLS

- PRE DIVE SAFETY CHECK (BWRAF)

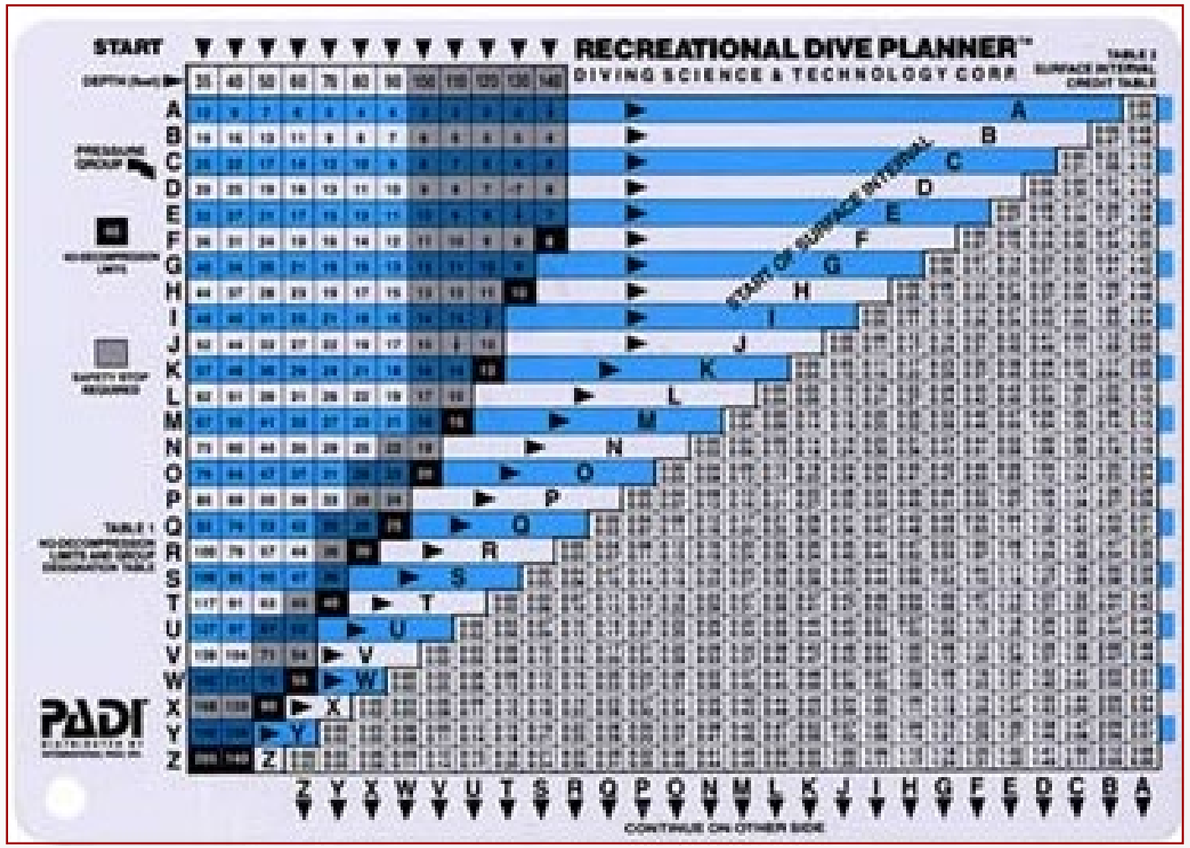
- OUT OF AIR INCIDENT
  - BUDDY BREATHING
    - LATERAL SWIMMING
    - ASCENT

- CONTROLLED EMERGENCY SWIMMING ASCENT

WHY ARE THESE SKILLS IMPORTANT?



DIVE TABLE EXERCISE



1. 25’/ :30 =

2. 65’/ :37 =
    1. :35 SURFACE INTERVAL =

3. 38’/ :49 =
    1. :45 SURFACE INTERVAL =
    2. PLANNED 35’ DIVE:
        RNT = ABT =
    1. DIVE #2: 35’/ :20 =

QUESTIONS?

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PULMONARY OVERINFLATION SYNDROME

SAN DIEGO HARBOR POLICE

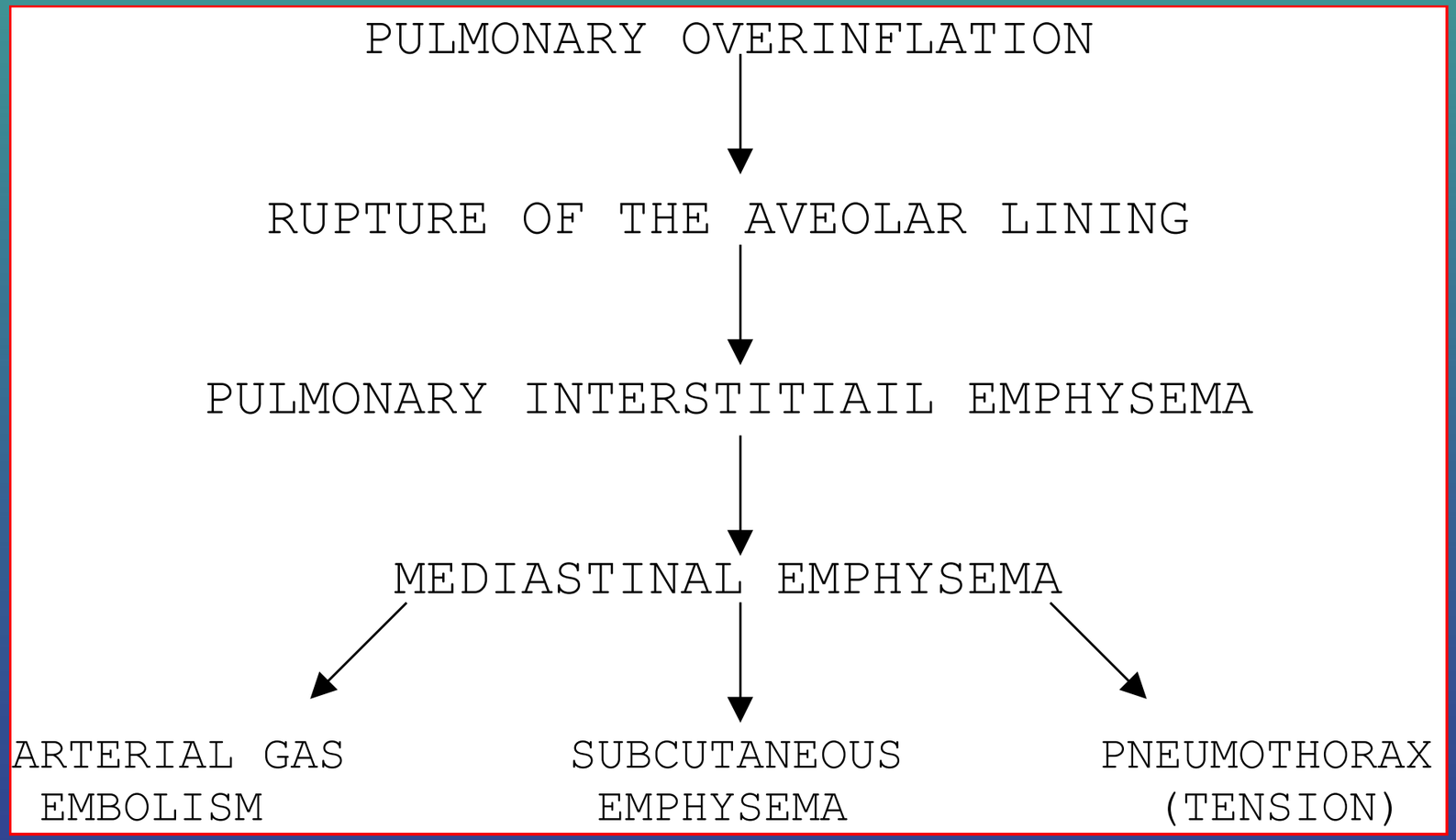
Pulmonary Over Inflation Syndrome:

a group of barotrauma-related diseases caused by the expansion of gas trapped in the lung during ascent (reverse squeeze) or over pressurization of the lung with subsequent overexpansion and rupture of the alveolar air sacs.

TWO MAIN CAUSES OF ALVEOLAR RUPTURE

- Excessive pressure inside the lung caused by positive pressure
- Failure of expanding gas to escape from the lung during ascent
- Rupture of the alveolus with a collection of air in the lung tissues is a condition known as interstitial emphysema. No symptoms will occur unless further distribution of the air occurs.

P.O.I.S
(pulmonary over inflation syndrome)



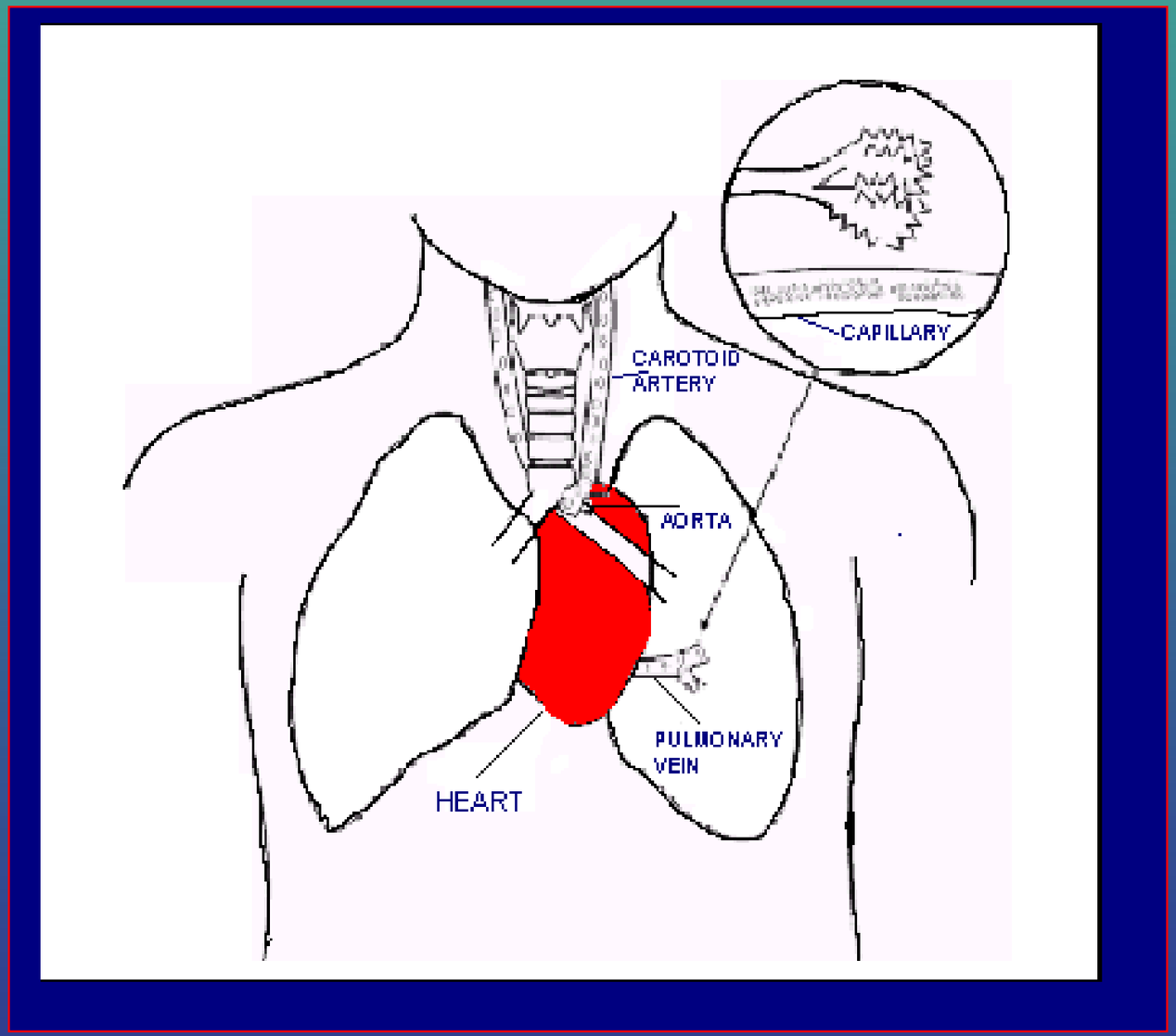
Arterial Gas Embolism

- Post rupturing of air sacs and blood vessels. Air is forced into the pulmonary capillary bed and bubbles are carried to the left chambers of the heart where they are pumped out into the arteries. Consequences depend upon the area or organ where the blockage occurs.

Arterial Gas Embolism

- SYMPTOMS:
  - NEUROLOGICAL
  - UNCONSCIOUSNESS (DIVER SURFACING)
- TREATMENT: 60ft WITH SYMPTOM IMPROVEMENT WITHIN FIRST O2 PERIOD (:20). TT-6
- PREVENTION:
  - PROPER TRAINING OF EQUIPMENT
  - NEVER INTERRUPT BREATHING ON ASCENT
  - EMERGENCY ASCENT, EXHALE CONTINOUSLY

Type II DCS/AGE



MEDIASTINAL EMPHYSEMA

- Gas that has been forced through torn lung tissue into the loose mediastinal tissues in the middle of the chest, around the heart, the trachea, and the major blood vessels.

MEDIASTINAL EMPHYSEMA

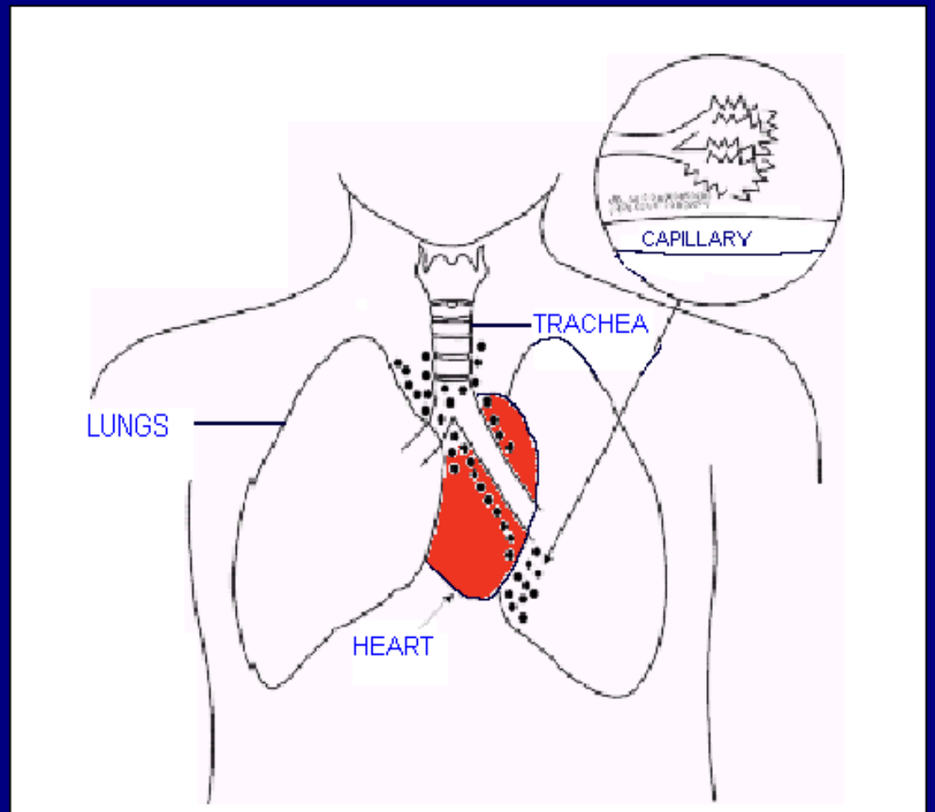
SYMPTOMS:

- MILD TO MODERATE PAIN BEHIND THE BREAST BONE, FEELS LIKE A DULL ACHE OR FEELING OF TIGHTNESS.
- PAIN MAY RADIATE TO THE SHOULDER NECK OR BACK.
- PAIN MAY BE WORSE WITH A DEEP INSPIRATION.

TREATMENT:

- MILD SYMPTOMS, 100% O2 ON THE SURFACE
- SEVERE SYMPTOMS REQUIRE RECOMPRESSION, SHALLOWEST DEPTH

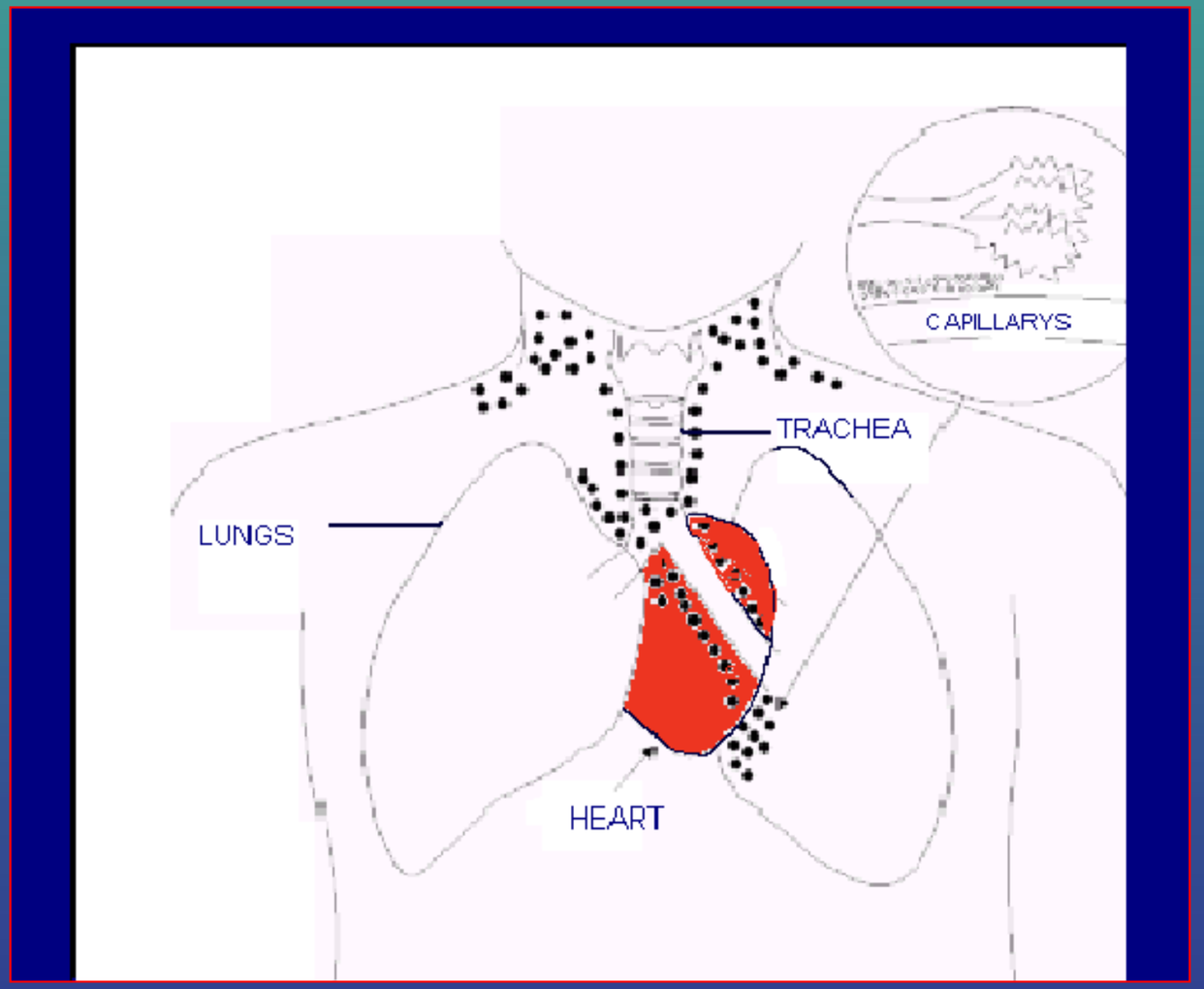
MEDIASTINAL EMPHYSEMA



SUBCUTANEOUS EMPHYSEMA

- Gas that has leaked from the mediastinum into the subcutaneous tissues of the neck and face.
- SYMPTOMS:
  - FEELING OF FULLNESS AROUND THE NECK.
  - DIFFICULTY SWALLOWING
  - VOICE CHANGE
  - CRACKING OR CRUNCHING SOUND
- TREATMENT: SAME AS MEDISTINAL EMPHYSEMA

SUBCUTANEOUS EMPHYSEMA



PNEUMOTHORAX

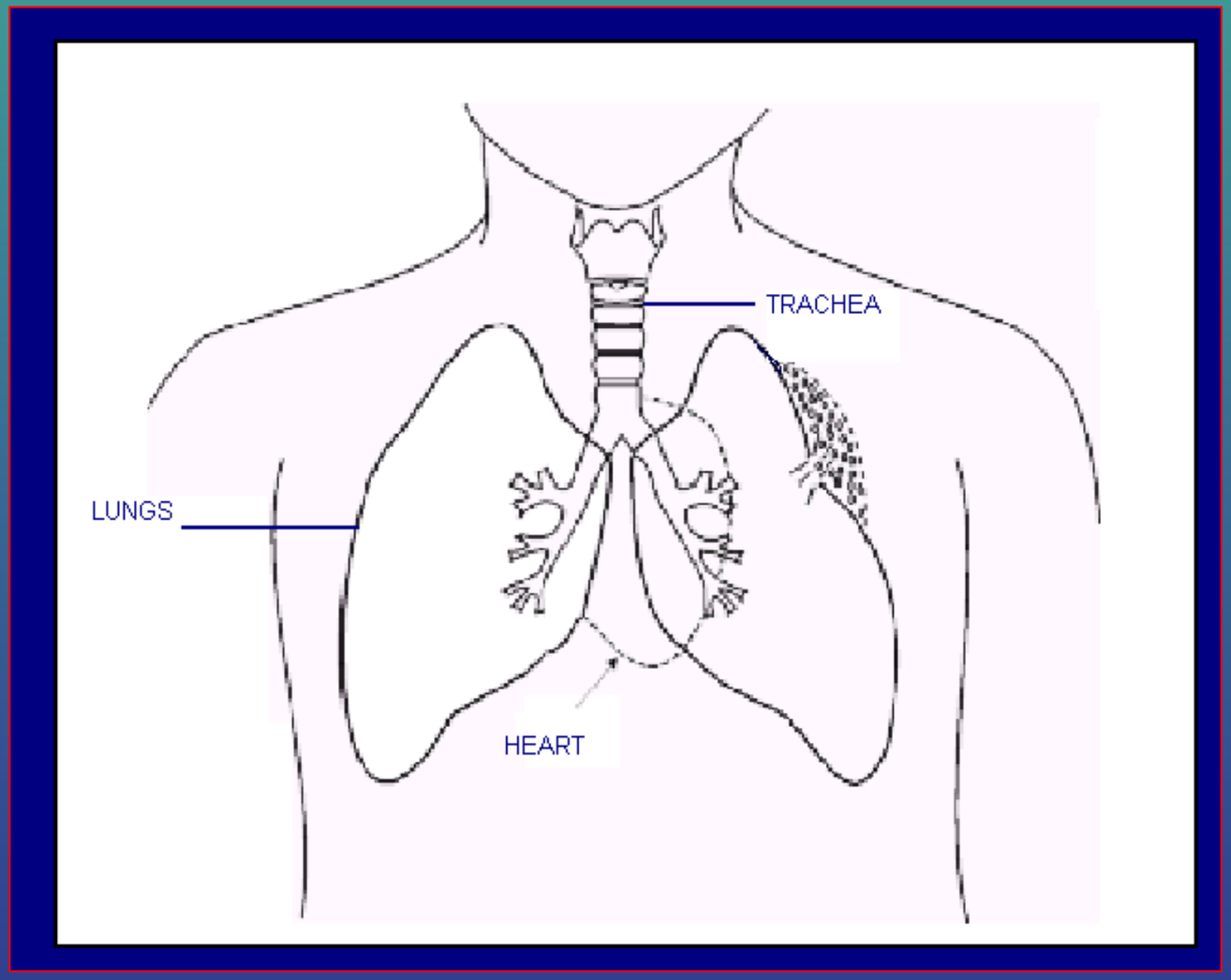
- A one time leakage of air between the lung covering and the lining of the chest wall (simple pneumothorax). This leakage causes the lung to partially collapse causing varying degrees of respiratory distress.

PNEUMOTHORAX

- SYMPTOMS:
  - SHARP PAIN IN THE CHEST (ONE SIDE)
  - PAIN MAY BE IN SHOULDER OR UPPER BACK

- TREATMENT:
  - 100% O2 ON THE SURFACE
  - INSERTION OF A CHEST TUBE
  - NEURO
  - X-RAYS

PNEUMOTHORAX



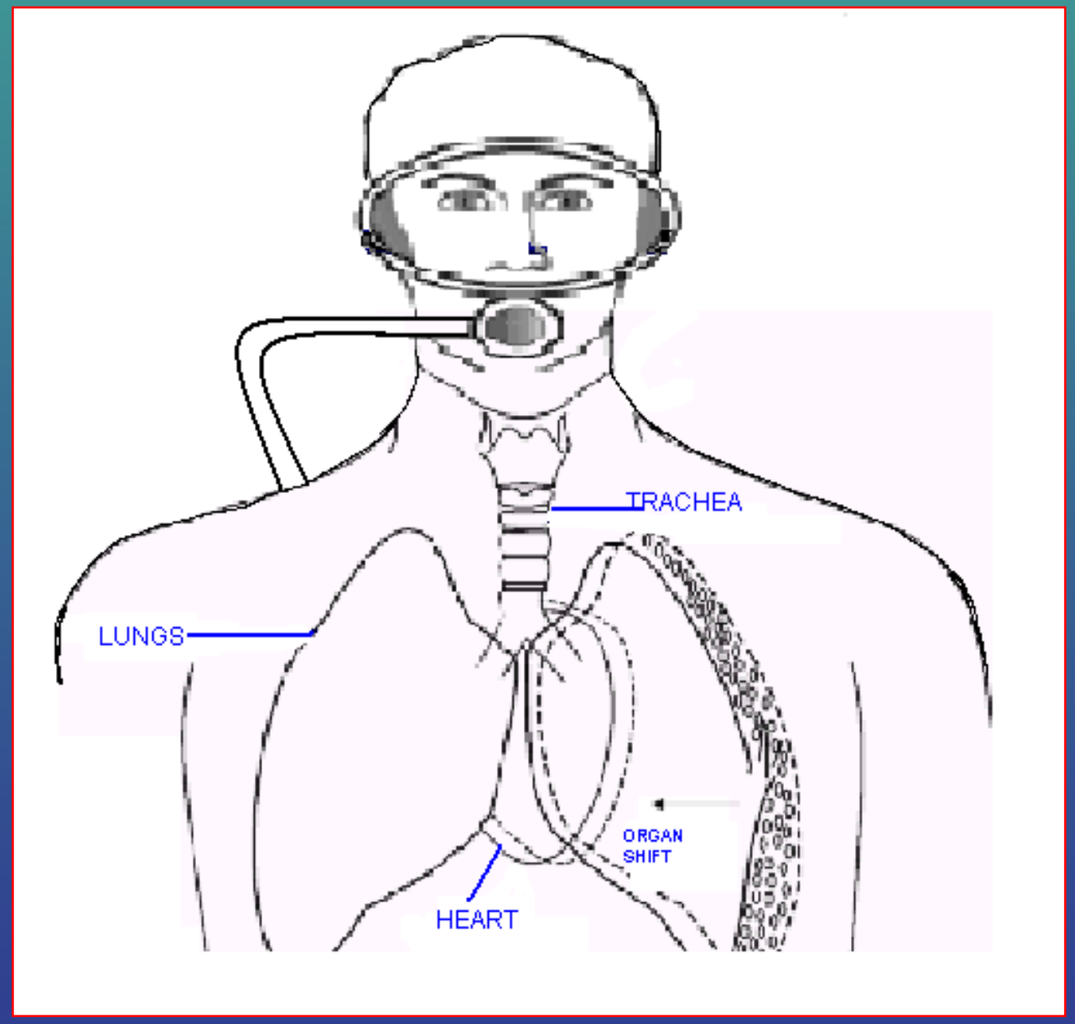
TENSION PNEUMOTHORAX

- Air escaping into the pleural lining of the lung but not exiting. Successive breathing gradually enlarges the air pocket until pressure is exerted on the heart and lung.

TENSION PNEUMOTHORAX

- SYMPTOMS:
  - SHOCK
  - BREATHING IS SHALOW AND RAPID
  - VICTIM APPEARS TO BE PALE
  - VICTIM BENDS TOWARD AFFECTED SIDE
  - NO AUDIBLE SOUNDS (STETHOSCOPE)
  - DEATH
- TREATMENT: VENTING OF GASES WITH CHEST TUBE

TENSION PNEUMOTHORAX



QUESTIONS?

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San Diego Harbor Police Basic Dive Course

Processing an Underwater Crime Scene



Purpose

The purpose of this block of instruction is to familiarize the student with the processing of an underwater crime scene. Collection of evidence will be covered in a later block of instruction, and thus in this course, students will be familiarized with all steps leading up to the actual collection of items of evidence.

Objectives

The student will be able to identify items of evidence and work through the process of documenting the crime scene. The documentation of the scene will include a scene sketch, marking and documenting items of evidence, and measuring a crime scene. Students will demonstrate proficiency in all aspects listed above as it relates to documenting a crime scene.

Establish control of the scene

- An uncontrolled scene promotes loss, contamination, and destruction of evidence

- Exercise all means at your disposal to establish the boundaries of the scene and to control the movement of personnel in and around it



Define the boundaries of the scene

- Once the scene is located, you should insure that discarded evidence and trace evidence are not removed, contaminated or destroyed
- Proper identification of the scene helps management the movement of persons in and around it
- Delineate the shore portion of an underwater scene as you would on land





Defining boundaries on the water

- If any water traffic is likely, cordoning off the area with buoys or support vessels may be necessary

- The investigators need to have the best possible opportunity to collect and evaluate the evidence and that only happens in a secured scene



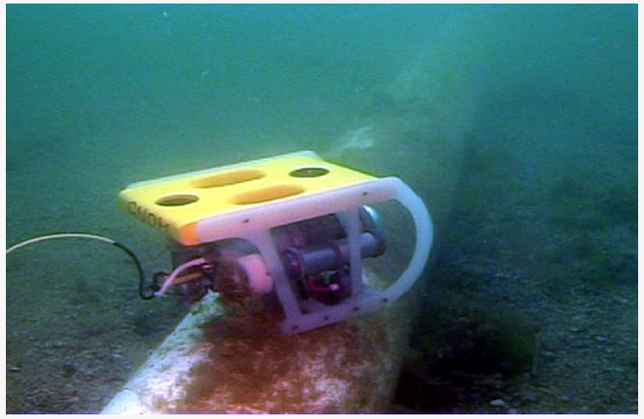


Preliminary Photography

- Photograph the area above the surface as soon as possible after arrival
- Photograph the nearby shore, for both inclusion as part of documenting the crime scene, and to provide reference for the underwater photos
- Photograph points identified by investigators or witnesses

Completing the Scene Survey

- Using the information at from first responders and case investigators, an initial survey of the scene should be conducted
- Conditions and estimated scene size will dictate how to move forward once the scene boundaries are established
- Conducting an initial survey with remote sensing technologies prior to diver deployment is preferable



Parts of the Scene Survey

- Mapping of the crime scene:
  - General location
  - Specific crime site
  - Map location of where suspects and victims were found, arrested (etc.)
- Video and digital photographs of the crime scene

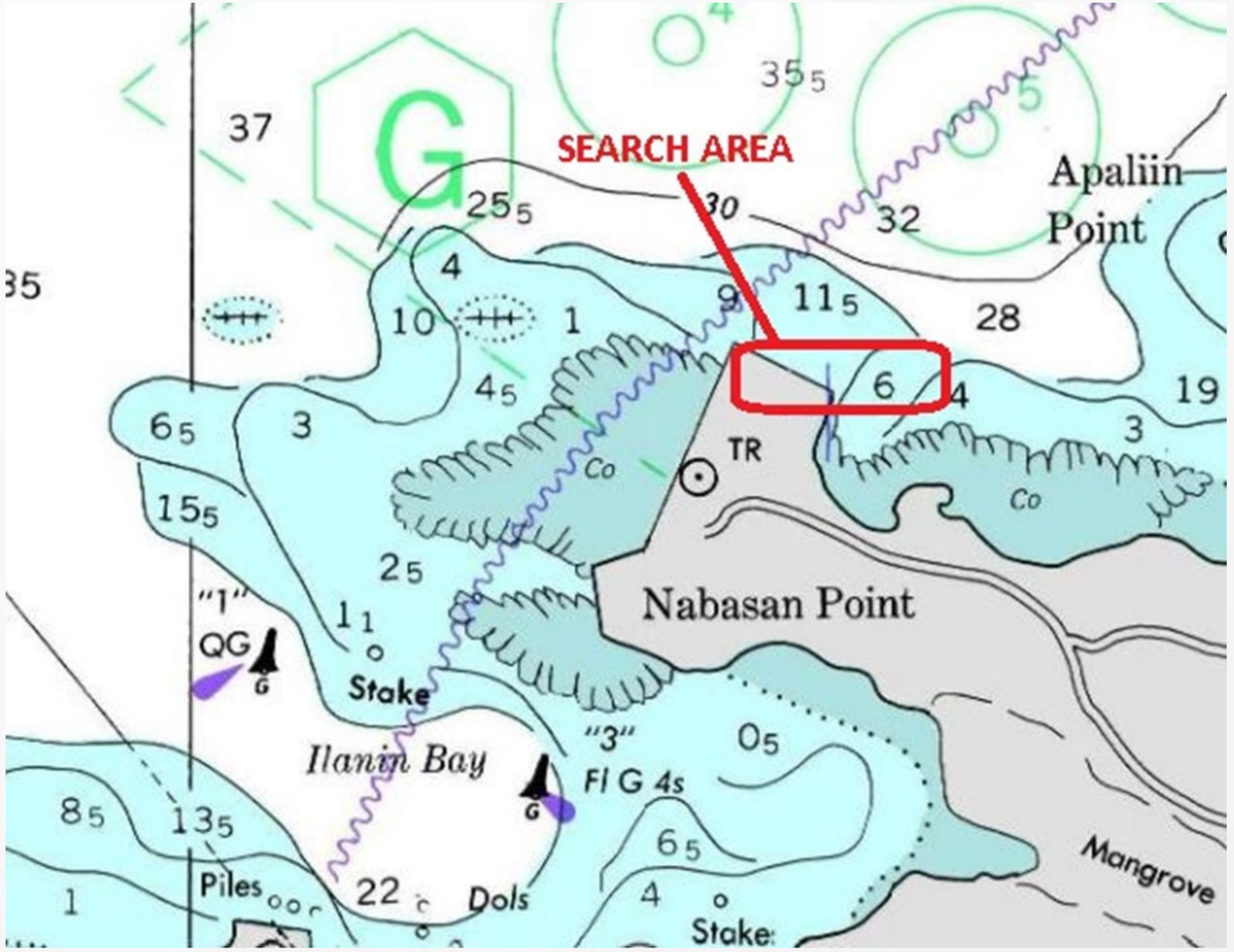
Water, weather, and other environmental data

- **ALL of this information should be contained in your final report.**

Example #1



Example #2

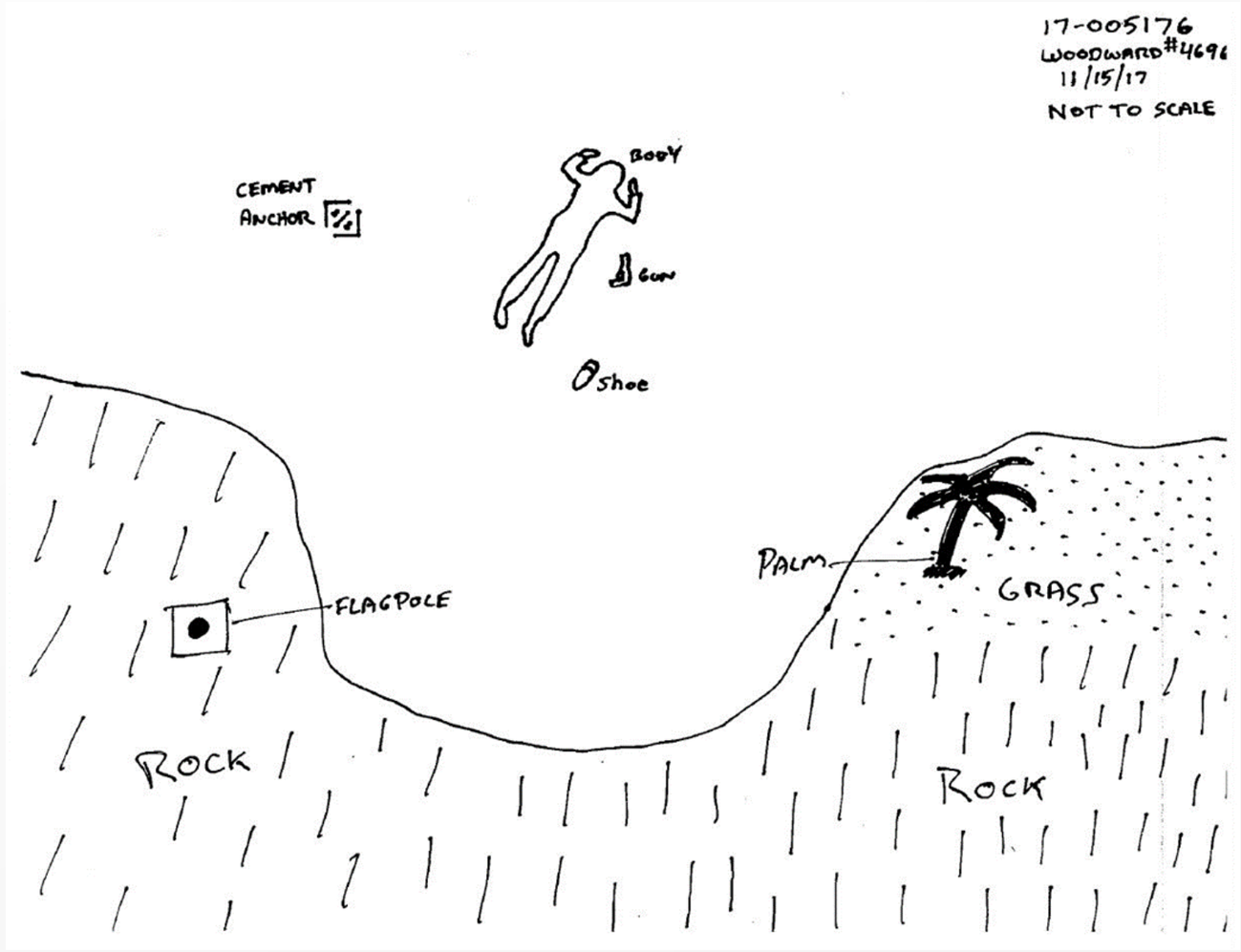


SEARCH AREA
Apaliin Point
Nabasan Point
Ilanin Bay
Stake
Piles
Dols
Mangrove
TR
"1" QG
"3" Fl G 4s

Scene Sketch

- All items of evidence need to be identified and noted individually
  - Particular attention must be made to document the condition of the evidence prior to its disturbance
- The different items of evidence should also be documented in terms of their spatial relationships to each other, and incorporated into the overall scene
- A scene sketch records the arrangement of the scene and items of evidence located within it

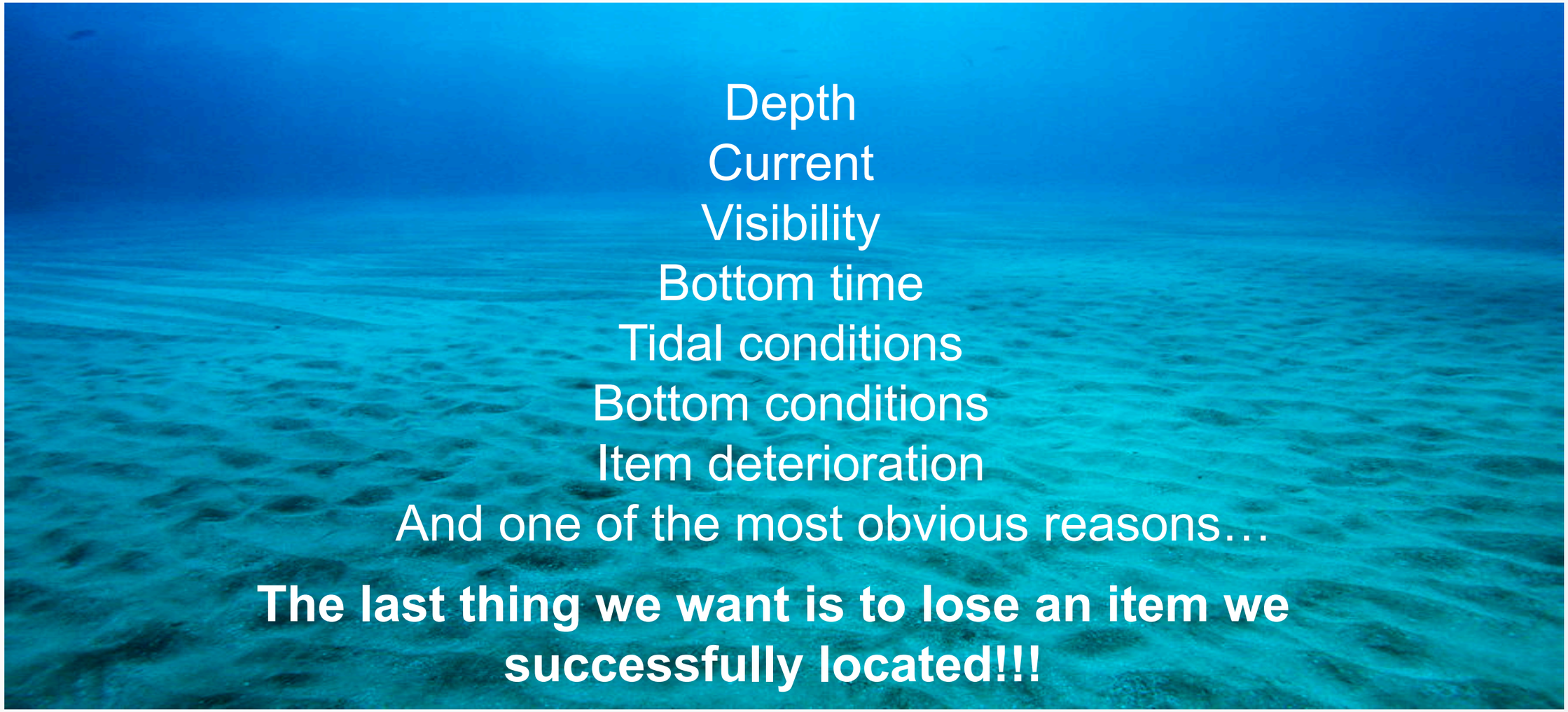
Sample scene sketch



Scene Sketch (Continued)

- Scene conditions and visibility will dictate how to proceed
  - Great visibility with a small scene may allow a swim-through to be conducted which would allow the diver to get an overall picture of the crime scene prior to the collection of evidence.
    - If this method is used, the entire scene should be documented with video, photographs, or a sketch
  - It could also be likely that due to the harsh and often changing environment of underwater crime scenes, divers will not have the luxury of pristine scene conditions allowing for the viewing of the entire scene at once.
    - This will make marking an item and returning to it later for processing impossible

What are some reasons that compel us to collect evidence as we discover it?



Processing the Scene

- In poor visibility, once an item of evidentiary value is located underwater, it should be processed at the time of discovery

- The steps of Evidence Collection will be started and followed through to completion with each individual piece of evidence
    1. Locate item
    2. Photograph/Sketch
    3. Mark & Measure
    4. Collect

Locating Items

ONCE YOU IDENTIFY AN ITEM AS EVIDENCE YOU WANT TO STAY WITH THAT ITEM AND PROCESS THAT SCENE!

- A search team should already have an action plan established to begin the next steps in the collection process should they locate an item of evidence

- Generally, a secondary or backup diver can act as the “Go between” from the surface and the lead diver who located the item. This diver can conduct the visual documentation with cameras and assist in future collection by carrying the proper containers for recovery

VISUAL DOCUMENTATION

Once the item has been located, we must give our best efforts to visually document the item in the manner which it was discovered. Whenever possible, this should occur before anyone touches the evidence or disturbs the scene in any way. The item should be re-photographed once it is marked.

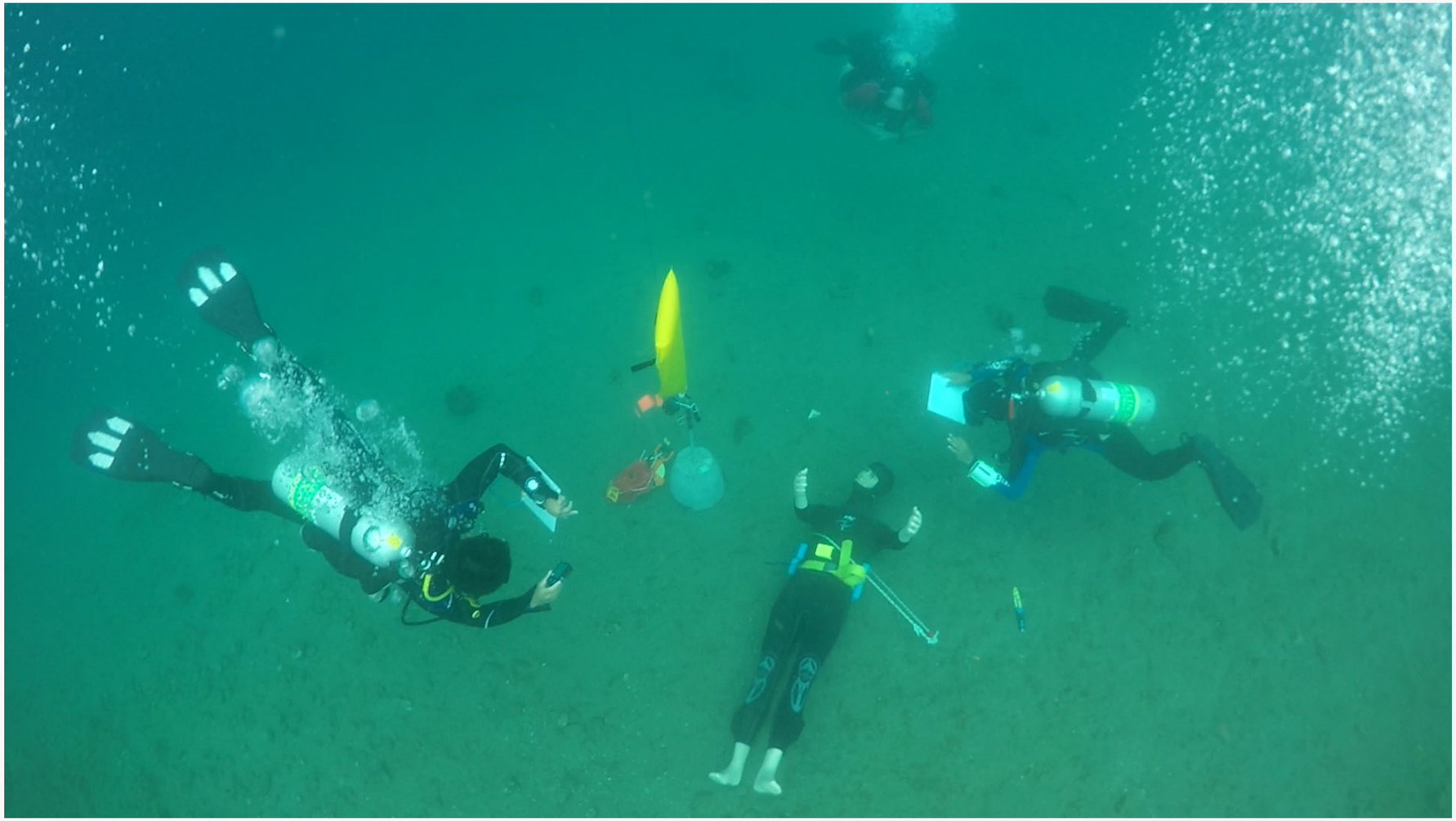
Methods of visual documentation…

Digital Video- The use of digital video allows viewers to get a first hand impression of not only the item but also the conditions surrounding it

Digital Photo- Still images often produce a better resolution and accuracy than video and is the most commonly used method

Item Sketch- Not to be confused with a crime scene sketch, an item sketch would be a hand drawn representation of the item based on the divers statements and memory. A Sketch is not a preferred method of Visual Documentation

Photographing Evidence

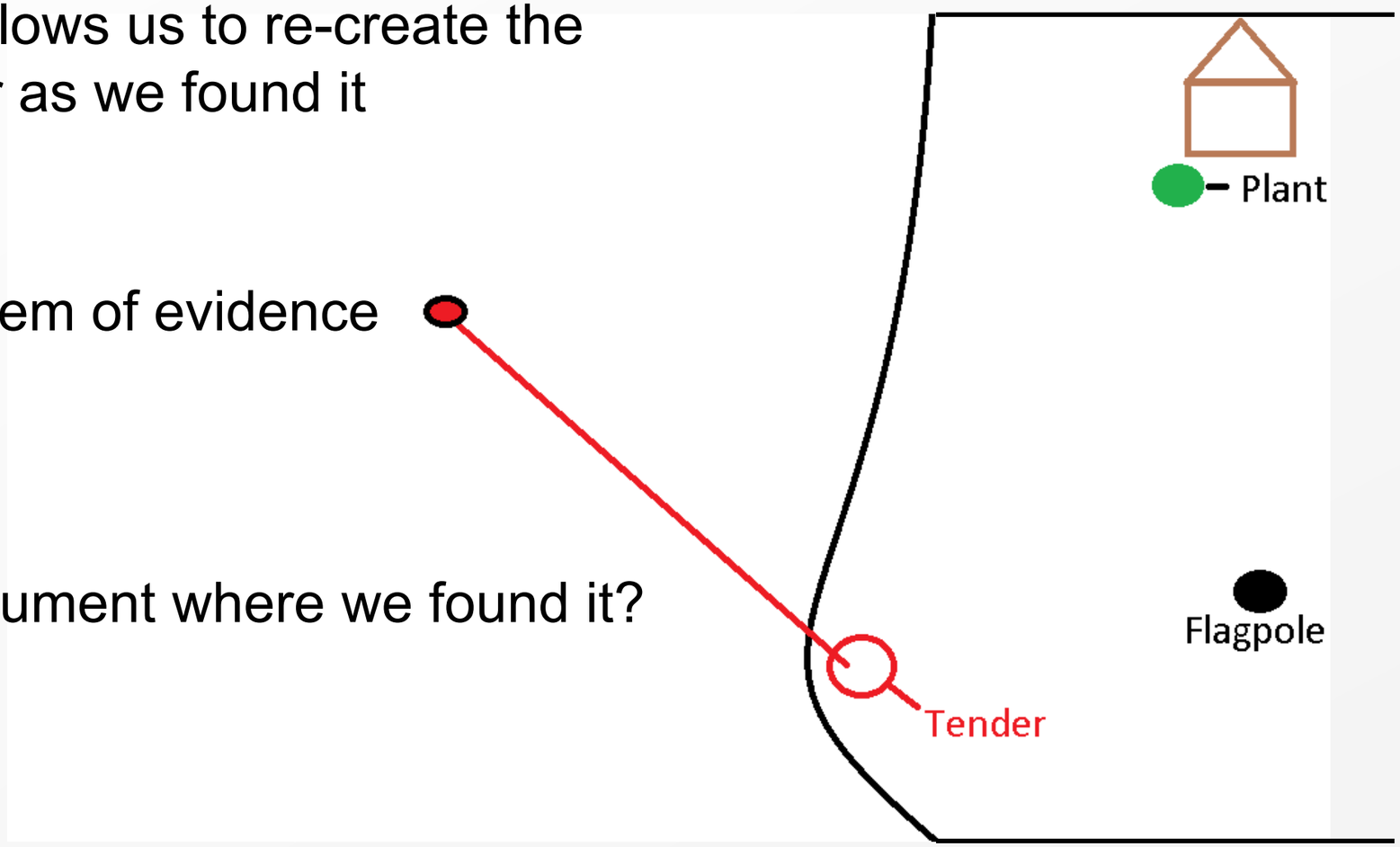


Triangulation

Triangulation allows us to re-create the scene on paper as we found it

Diver locates item of evidence

How do we document where we found it?

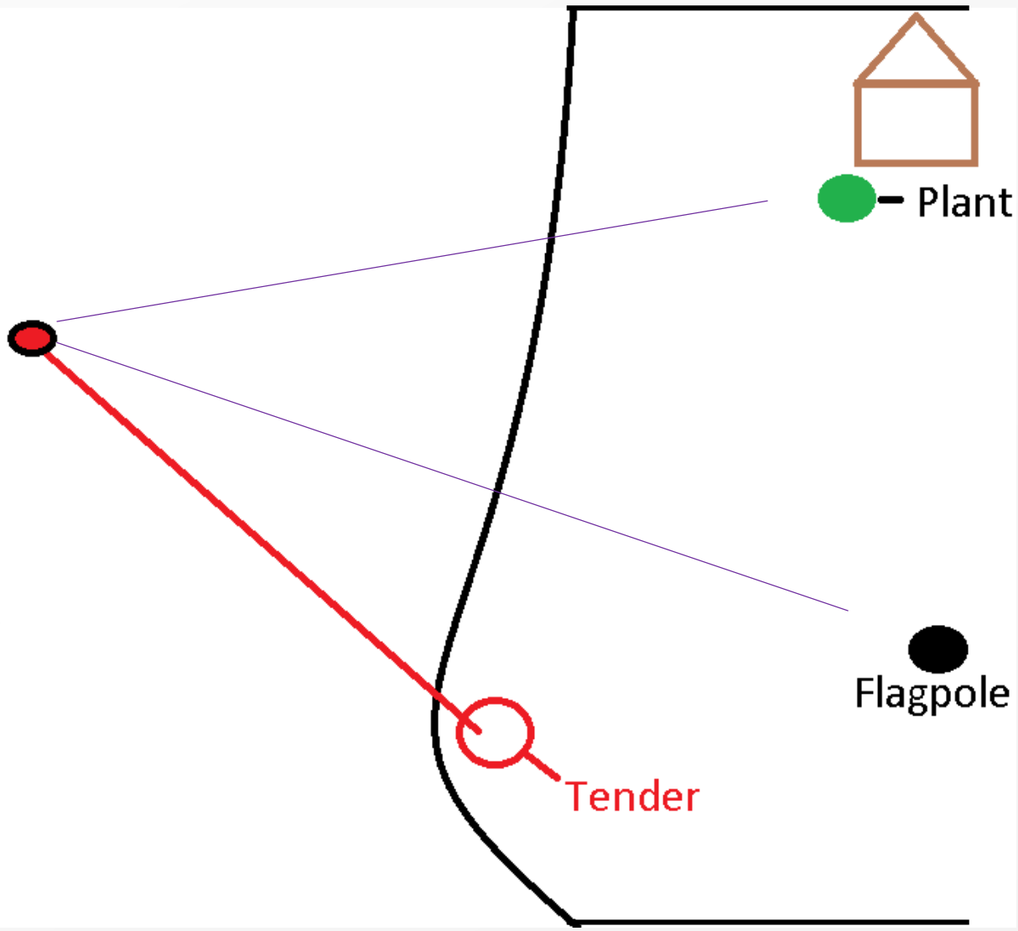


Triangulation Continued

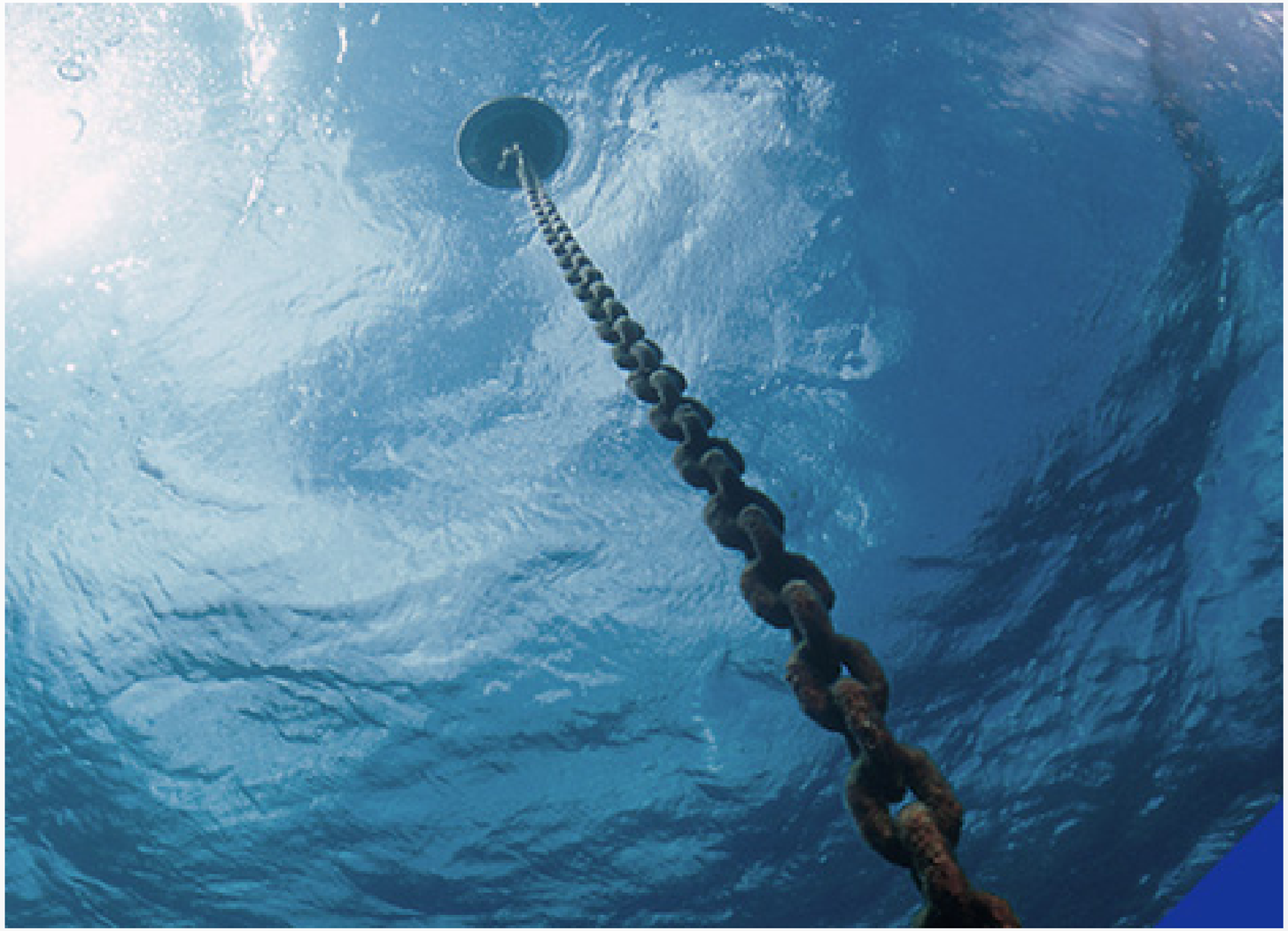
In order to get an accurate location of an item of evidence:

- **The diver should**:
  - Advise the tender they have located an item
  - Float a buoy to the surface
  - Note the depth
  - Take at least two line of sight compass readings on the surface (Next to the buoy)

- **The tender can:**
  - Note the length of line payed out by tying a knot in the line for an even more accurate data set



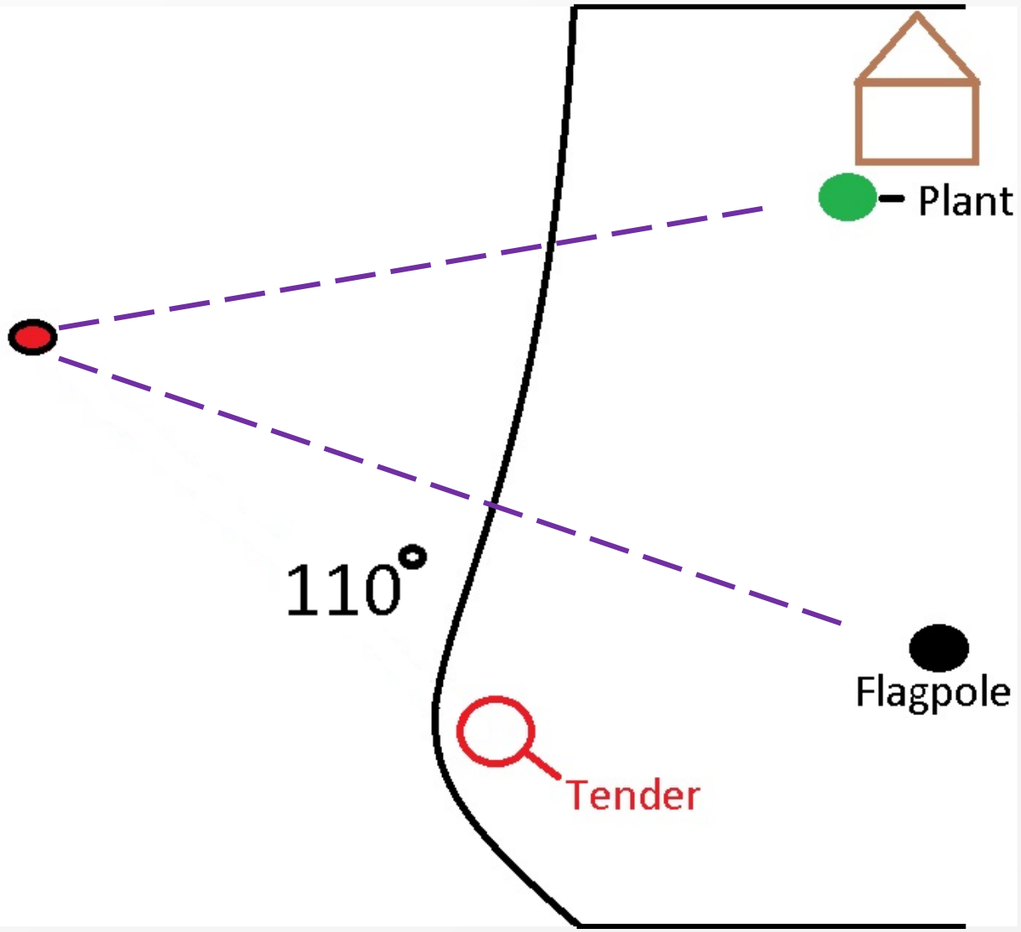
Fixed Point



Taking Compass Readings

- Diver comes to surface and floats next to buoy. It is important to make sure the buoy tether is vertical
- Diver takes visual compass readings off of at least two permanent objects





Data Collection

- The diver should note the compass headings and depth of each item

- The theory is to be able to document each piece of evidence to a degree that would allow you to place it exactly back where you found it…even years later

You’re Ready to Collect…

- Remember, once you disturb the evidence, you lose the opportunity to further document its position
- The actual collection methods will be covered in another class

Questions?

PORT of SAN DIEGO



San Diego Harbor Police Basic Dive Course

Underwater Collection of Evidence



Purpose

The purpose of this block of instruction is to familiarize the student with the procedures of collecting evidence discovered underwater. The student will be in instructed in the current practice of collecting common items of evidentiary value as well as the collection of human cadavers. This instruction will focus on the containment and preservation of those items for forensic analysis.

Objectives

The student will be able to properly collect evidence from where it was originally located and package it in a way that best preserves it for future analysis. Additionally the student will learn to do this with minimal contamination and destruction of the item itself as well as any forensic evidence it may possess. The student will then learn the importance of properly sealing and labeling the evidence for protection against tampering.

The Main Purpose

The main purpose for the critical steps we take during evidence collection can be summed up as…

PRESERVATION!!

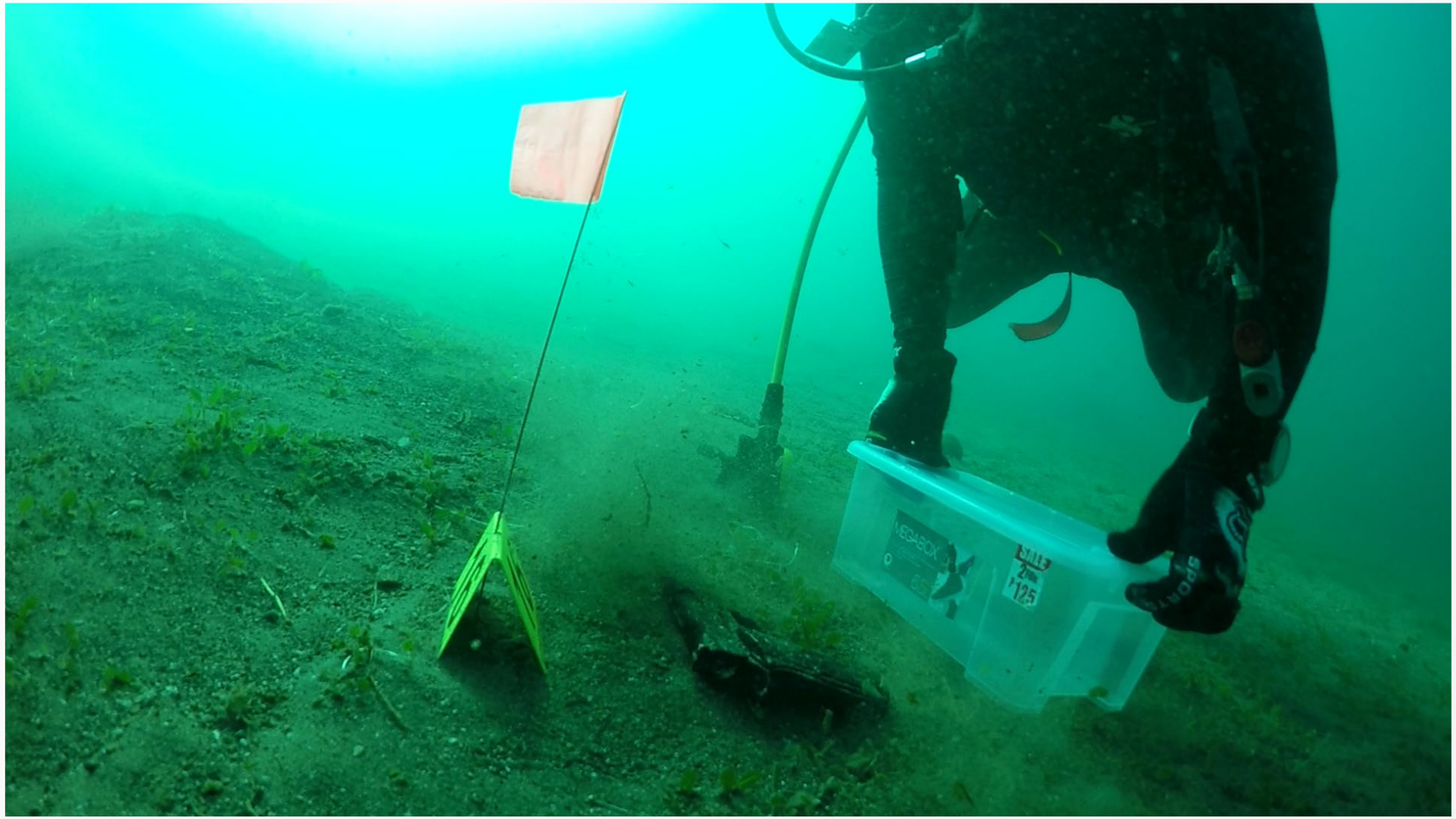
Our objective when recovering evidence is to preserve it, as much as possible, in the condition and way it was found.

By doing so, we are providing an untainted view of the evidence which is critical for forensic analysis and presentation in court.

Class Activity

- How do you currently collect evidence both in water and on land?
- What type of evidence might you come across and what type of containers would you use both in water and on land?
- Why would you use certain containers over others?
- What additional containers could you use for under water collection?

Collecting Evidence



Contamination

Glove up! If you are not wearing gloves, you risk contaminating evidence with your DNA and fingerprints



Handling

- Handle all items of evidence with care
- We want to avoid causing unnecessary destruction of the evidence
- This includes trace evidence that might be found on the items such as DNA or fingerprints





Preservation

It is recommended to contact your forensic lab to truly know how to best collect and preserve evidence for their analysis abilities

Collection

Although there are many ways to collect physical evidence, the common rule is…

- Collect it where it was found! The best practice is to package the items within a water tight container on the sea floor
- This will allow us to, as accurately as possible, preserve the item how we found it
- Even though an item may be deteriorating underwater, if we introduce it to air, we will greatly increase the rate at which it deteriorates due to oxidation

Collection

- Common found Tupperware bins and containers are preferred to keep the item submerged within the water in which it was found
- These containers are ideal for holding the evidence with water and can be labeled and sealed with anti-tamper evidence seals
- Glass containers are not recommended due to risk of breaking

Area Samples

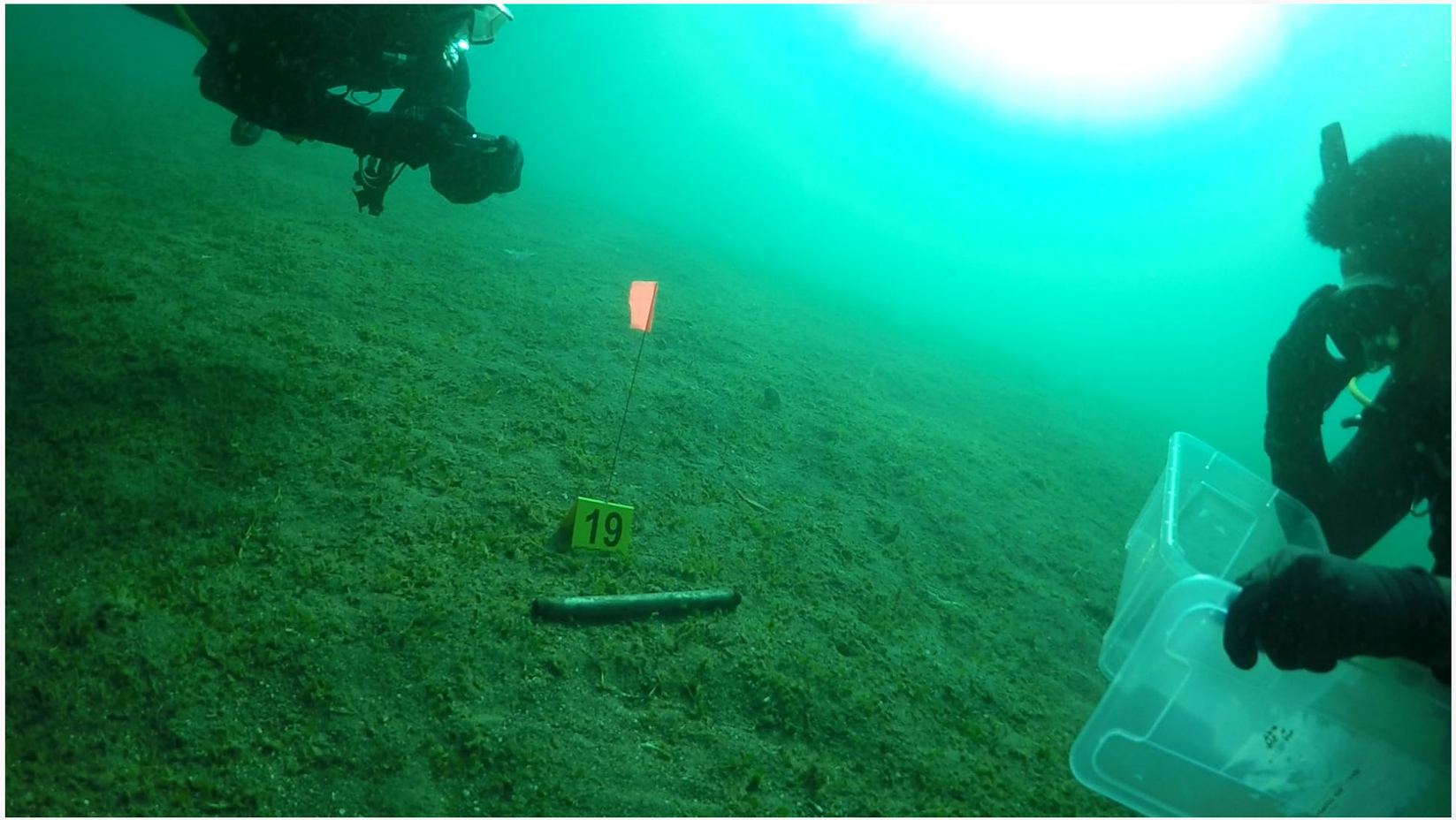
- When collecting evidence, it is advisable to collect independent samples of the surrounding areas for future analysis

- Forensic Labs should be provided with separate samples of both the soil and water around the evidence





Collecting Evidence



Evidence Seals

- Upon reaching the surface, every container holding a piece of evidence should be document for the Chain of Custody and sealed with an evidence tamper seal



- The packaging and sealing of evidence should be done in a way that would make any attempts to tamper with the evidence obvious

Cadavers

- The collection and containment of human remains, like other types of evidence, should take place where they were discovered

- If the death is criminal in nature, placing bags over the decedent's hands and head will help preserve forensic evidence which may be crucial to the investigation

Cadavers

- Special equipment such as UW body bags and lift bags should be used during the recovery



Body Bags

Self draining body bags with mesh walls and lifting points are designed to allow you to…

- Enclose the victim on the bottom
- Attach a lift bag for buoyancy and a surface line for constant control
- Drain water while retaining most evidence within the bag
- Provide anonymity for the deceased



Cadavers

- The use of screens and visual barriers should be considered in the event that media and loved ones are on scene
- Also we should maintain a high level of professionalism and respect throughout the process



Cadavers

- The collection of a cadaver will require multiple divers to work together
- Together they will place the body in a body bag securing it within that bag. This can be difficult depending on the state of decomposition and rigor mortis
- The divers must maintain control of the body at all times and should attach a surface line to the bag as soon as possible establishing positive contact at all times



Post Blast



Post Blast

- Searching within a Post Blast scene is inherently dangerous!!
- Always be cautious of secondary devices and unexploded ordnance!!



Post Blast

- Although under water blast evidence has been subjected to great forces, the evidence generally does not travel very far from the epicenter of the blast
- Post Blast evidence usually sinks to the floor in a debris field of very small pieces
- Post blast evidence is one of the few exceptions to the rule when it comes to collecting and sealing items in place.

Post Blast

- Post Blast evidence recovery is very meticulous in nature.
- It requires good buoyancy control
- After collecting visual debris, you should fan the area with your hand to expose any small pieces covered by silt
- Consider using a sifting screen of some sort

In Summary

- It is our responsibility to preserve the evidence as much as possible, this is done by proper handling, packaging, and recovery

- Our role of preserving the evidence carries beyond just packaging and recovery, we must begin a chain of custody and ensure the evidence is labeled, documented, properly stored and transported to the appropriate authority

Questions?

PORT of SAN DIEGO



San Diego Harbor Police Basic Dive Course

Evidence Theory



Purpose

This block will familiarize the student with the theory of evidence and its relevance to the prosecution of crimes. Additionally, students will be instructed in the differences between underwater crime scenes, and crime scenes on land. The student will be provided examples which demonstrate a high level of evidentiary value to further strengthen their mindset when processing crime scenes.

Objectives

The student will be able to properly identify pieces of evidence and their importance. Additionally, students will gain an understanding of how salt water affects pieces of evidence, and the value that remains even when the evidence is exposed to a harsh environment.

How Crime Occurs



What is the purpose of collecting evidence?

We can convict criminals & exonerate the innocent

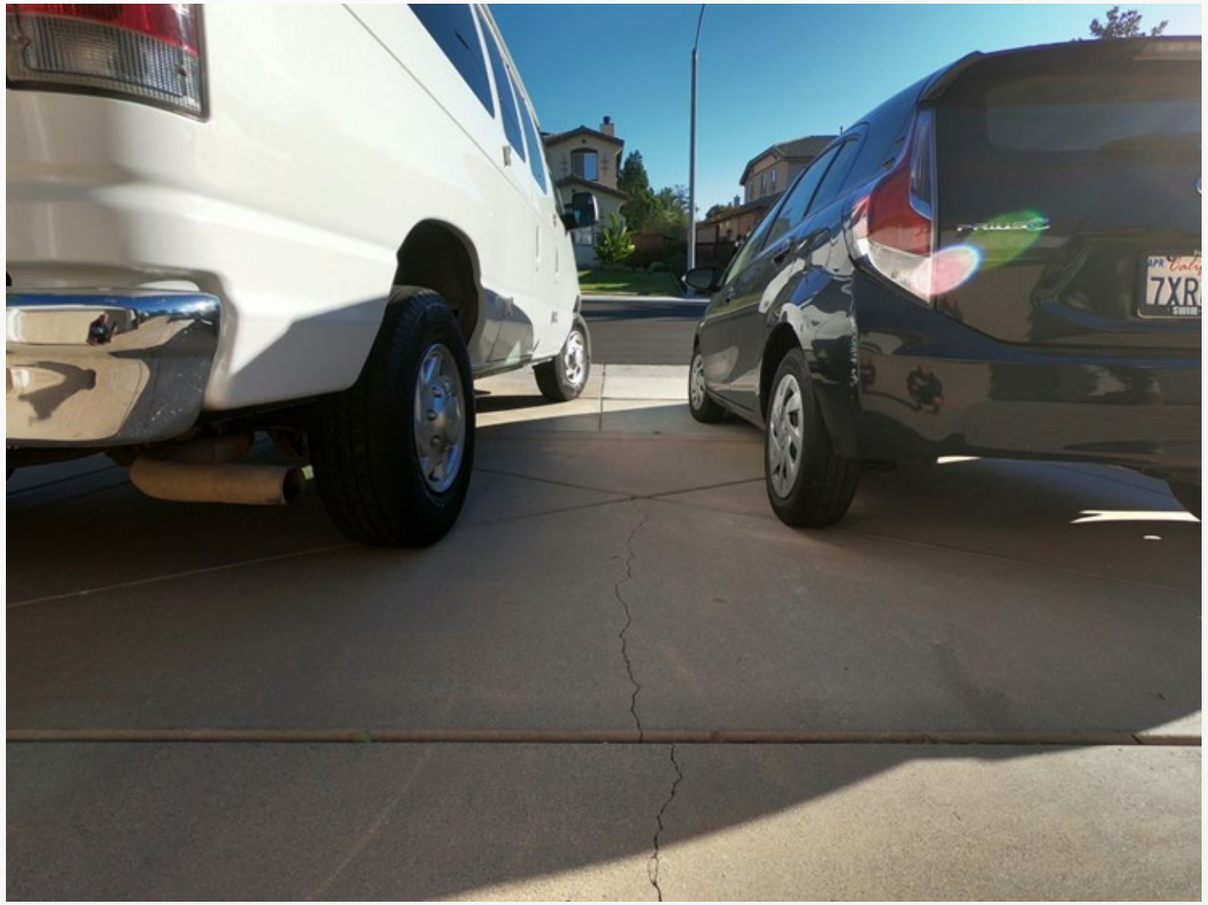
- Forensic scientists can analyze changes in the crime scene that resulted from the commission of the crime

Remembering the basics…

- Law enforcement and other responders have responsibility for protecting crime scenes, preserving physical evidence, and collecting and submitting the evidence for scientific examination

Class Activity

Scenario: You respond to a call of a non injury vehicle collision between 2 cars. Upon arrival both vehicles owners state that they parked their vehicle without colliding with the other vehicle.



Class Activity

Based on physical evidence alone, which vehicle was in motion at time of the collision and why?





Where do we find evidence?

- A crime scene is the space within which the crime occurred and the resulting changes in that space because of the crime

  **Underwater Crime Scene Investigation, 2003*

- Crime scene examinations focus on describing and documenting the space and the changes that occurred, and reconstructing the events from the evidence produced

Types of crime scenes:

There are two general types of crime scenes-Patent and Latent

- Patent scenes are those whose existence is obvious, for example, someone discovers the scene.
  - If evidence needs to be collected in these cases, who does that in your jurisdiction?

- Latent scenes are those whose location is hidden; such as evidence buried in the ground or submerged underwater
  - Do you know who is responsible for evidence collection in these cases? Most likely…you are



Why we need to get it right…

- If crime scene investigators do not act methodically, they risk contaminating or losing evidence.

- Approach a crime scene investigation as if it will be your only opportunity to preserve and recover evidence.

What evidence does for us...

- An investigator collects information from three sources: people, records and physical objects
  - Although the examination of the crime scene itself focuses on physical objects, information from people and records should be incorporated into the pre-search planning
    - This serves to establish the parameters of the search, and the information obtained from the search are then combined into the overall investigation to support or refute information from people and records

Where is the crime scene?





Underwater investigations

Underwater investigations are particularly difficult to solve for two reasons.

- The evidence is in a less than pristine condition, if it is still there at all. The act of going into the water changes the conditions and exposes the materials to degradation by the water itself and by the organisms that live in the water

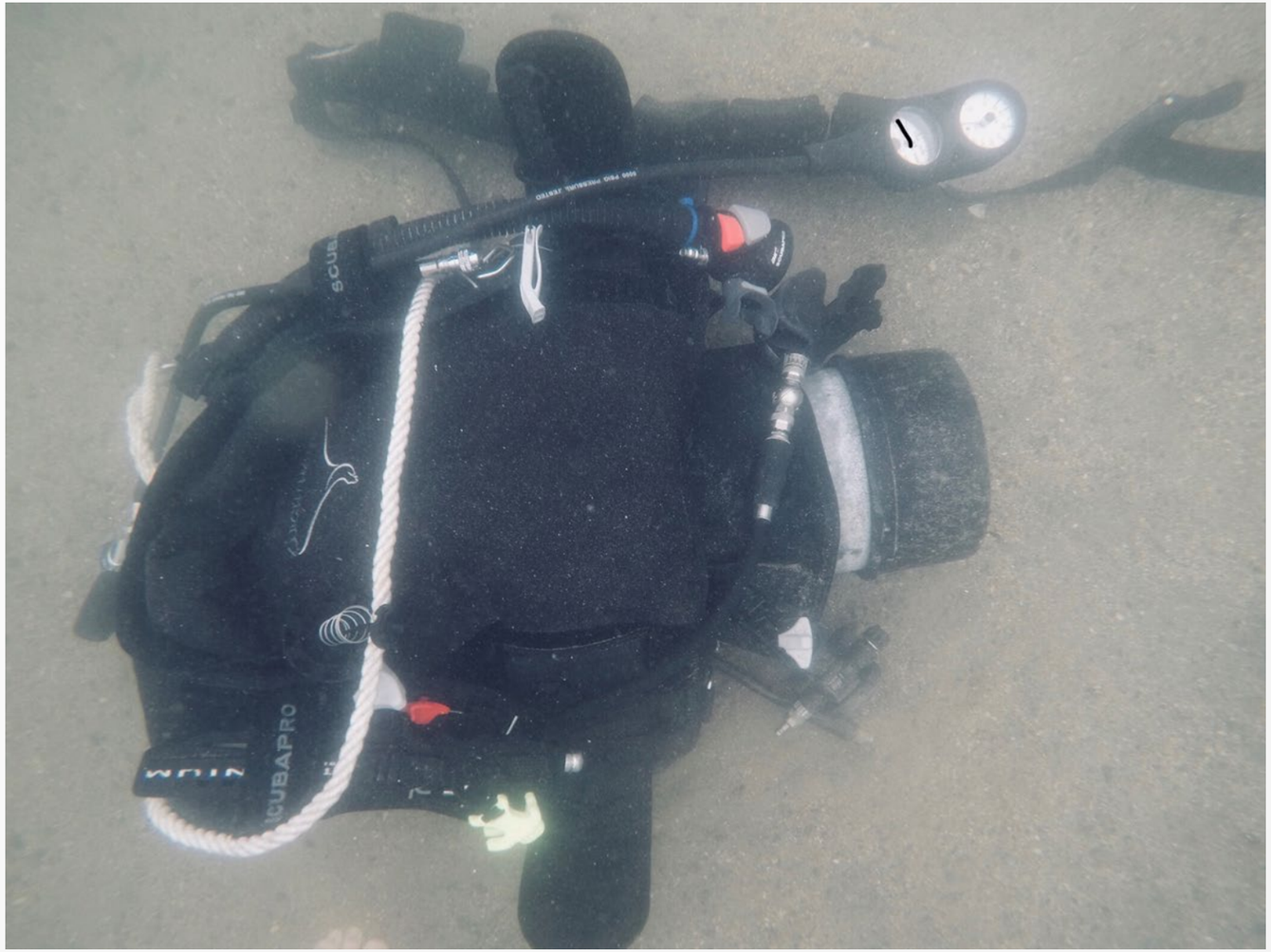
- The difficulties of working underwater can be extremely formidable

Class activity

Scenario: Your team has just been assigned to investigate a diving related death. A diver was reported to be found floating on the surface deceased, with all his SCUBA equipment visible below him resting on the bottom. There are no witnesses to his death

- Write the steps that need to be taken upon the discovery of a dead body. (Scene photo on next slide)
- Based on physical evidence alone determine what equipment malfunctions caused this divers death(hint there are 5).

Class Activity



Class Activity



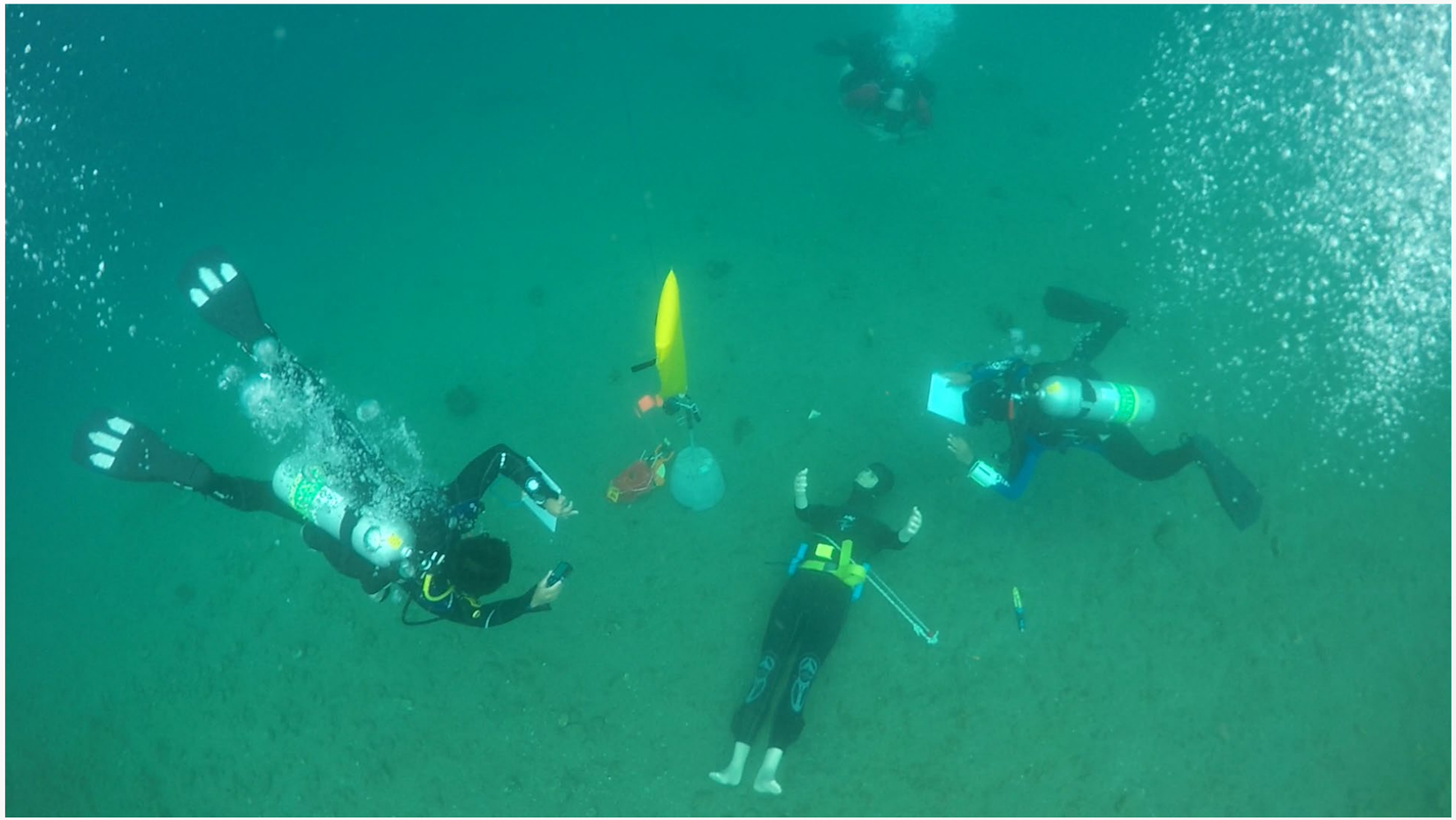








Documenting the Scene



Types of evidence:

Fragile or Transient Evidence

- Hairs, fibers, glass
- Control Samples
- Body fluids (blood, saliva)
- Latent fingerprints

Solid or Tangible Evidence

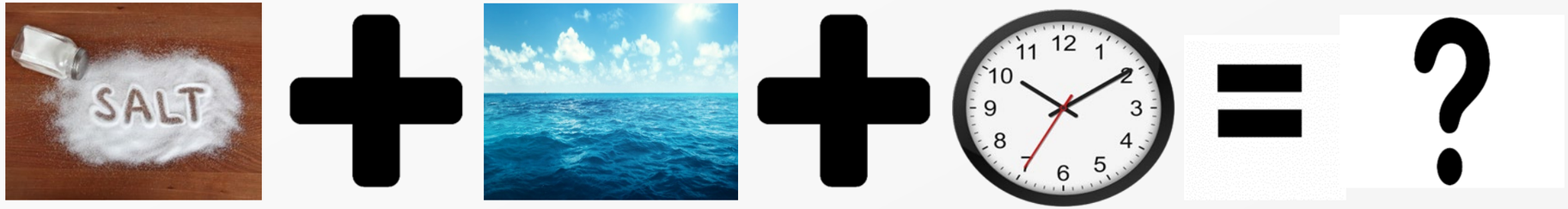
- Firearms
- Other weapons (knives, clubs)
- Bullets
- Drugs and paraphernalia

Placing an Evidence Marker



Does water affect evidence?

- Is it worth collecting?
- Doesn’t the salt water wash everything away?
- How could we possibly get anything of value?



Case Study

Mary Kathryn, and James Tullbane. "Detection of Latent Prints on Handguns After Submersion in Water."Evidence Technology Magazine, Vol. 9, number 5. 2011, pp. 22–29. 4 Nov.2017. Web.

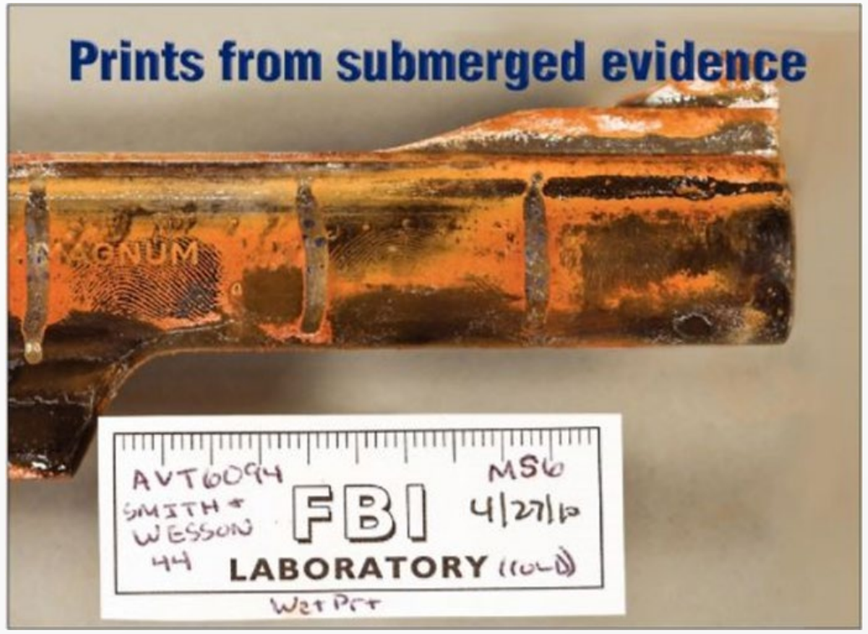
THE STUDY:

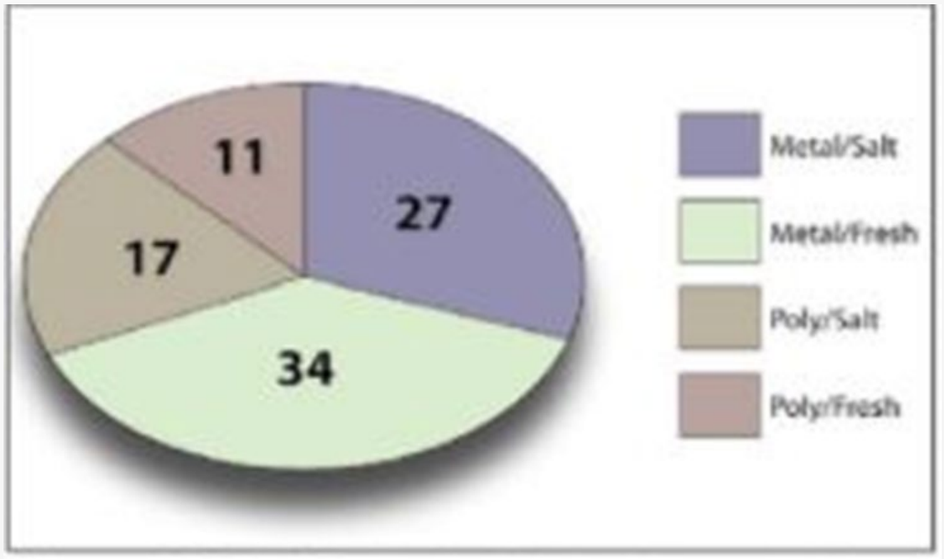
- Nine different trials were completed. Each trial consisted of firearms submerged in water for differing amounts of time, from 1 to 70 days. Print processing occurred on days 1, 2, 7, 14, 21, 28, 42, 56, and 70.
- In total, 72 weapons over a 70-day period were processed.
- A visual examination was conducted upon removal from water and in some instances prints were detected visually prior to processing. The guns were then processed immediately using multiple methods.

RESULTS:

- Latent prints were developed up to 70 days. The results indicate that regardless of method of development, processing handguns immediately after removal from water yields positive results.
- In cold-water trials over a 70-day period, 40 fingerprints were developed on metal handguns in saltwater, 39 prints were developed on metal handguns in freshwater, 12 prints were developed on polymer handguns in freshwater, and 11 were developed on polymer handguns in saltwater.
- In warm-water trials over a 70-day period, 34 fingerprints were developed on metal handguns in freshwater, 27 prints were developed on metal handguns in saltwater, 17 prints were developed on polymer handguns in saltwater, and 11 were developed on polymer handguns in freshwater.

Case Study





***Warm-water Trials**—The number of latent prints recovered.*

PORT of SAN DIEGO

QUESTIONS?

PORT of SAN DIEGO

San Diego Harbor Police DIVE TEAM

PORT of SAN DIEGO



San Diego Harbor Police Dive Team

SDHPD DIVE TEAM



- COMPRISED OF 20 HARBOR POLICE OFFICERS
  - 1 SUPERVISING LIEUTENANT
  - 1 PRIMARY SERGEANT
  - 3 SERGEANTS/ 4 CORPORALS
  - 12 OFFICERS

- ALL MEMBERS ON 24-HOUR STAND-BY AND ARE REQUIRED TO HAVE THEIR EQUIPMENT AVAILABLE WHILE ON DUTY

- TRAINING HELD YEAR ROUND IN ORDER TO MAINTAIN PROFICIENCY IN THE TEAM'S EXPANDING OPERATIONAL ROLE IN THE REGION

SDHPD DIVE TEAM

RESPONSIBILITIES:

ALL SURFACE AND SUB-SURFACE EMERGENCIES IN SAN DIEGO BAY

- 14 MILES IN LENGTH
- COVERS 12,000 ACRES & 18 SQUARE MILES
- DEPTH RANGES FROM 60’ FEET TO ½’ FOOT

INCLUDING SEARCH, RESCUE, RECOVERY, SUSPECT APPREHENSION, INVESTIGATIONS, EVIDENCE RETRIEVAL and SECURITY ASSESSMENTS



SDHPD DIVE TEAM

PERFOM RANDOM SECURITY SWEEPS ON HIGH VALUE TARGETS IN AND AROUND SAN DIEGO BAY IN SUPPORT OF HOMELAND AND MARITIME SECURITY





SDHPD DIVE TEAM

- SUPPORTS SAN DIEGO COUNTY AGENCIES IN SEARCH, RESCUE, AND RECOVERY OPERATIONS
- SDR ALERT
- POLICE, SHERIFF, FIRE, LIFEGUARDS, NAVY, COAST GUARD MSST, BORDER PATROL, CUSTOMS, ETC.





SDHPD DIVE TEAM

U.S. NAVY EXPLOSIVE ORDNANCE DISPOSAL (EOD)

- **SUPPORT EOD MISSION IN SAN DIEGO**



ACT AS FORCE MULTIPLIER FOR EOD IN HULL, PIER, BOTTOM SEARCHES

PERFORM SEARCHES AND IDENTIFY HAZARDOUS DEVICES IN CONJUCTION WITH EOD

SDHPD DIVE TEAM

SPECIALIZED EQUIPMENT





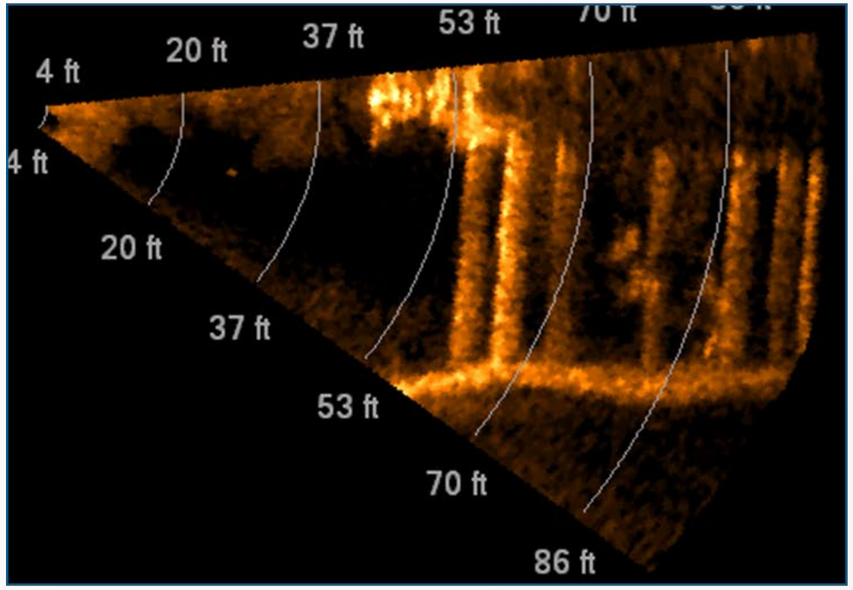
- SONAR
  - STARFISH (Side Scan)
  - ARTEMIS Pro (Handheld)
  - KONGSBERG (Tripod Mounted 360 Degree View)
  - GEMINI 750 (Pole Mounted)
- Diver Tracking System
- METAL DETECTOR
- ROV

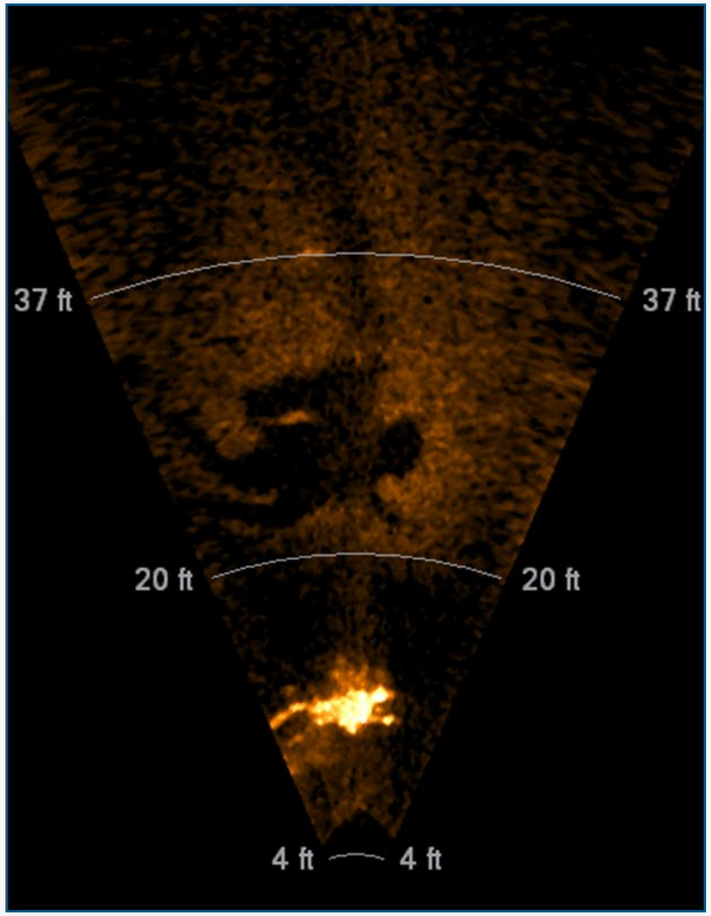


SDHPD DIVE TEAM

SPECIALIZED EQUIPMENT

- VESSEL MOUNTED SONAR





SDHPD DIVE TEAM

- Standard Operating Procedures (SOP)
  Policy 319
- Team Expectations
- Dive Reporting



QUESTIONS?

PORT of SAN DIEGO



DIVE MEDICINE/ PHYSIOLOGY

San Diego Harbor Police

Barotrauma

- Gas filled space
- Rigid walls
- Ambient pressure change
- Vascular penetration
- Enclosed space

Squeezes

- Middle ear
- External ear
- Mask
- Sinus
- Tooth
- Thoracic

Type I DCS

- Pain
- Marbling
- Swelling

P.O.I.S
(pulmonary over inflation syndrome)

- Subcutaneous emphysema
- Pneumothorax (simple & tension)
- A.G.E.
- Mediastinal emphysema

Arterial Gas Embolism

- Occurs within 10 minutes
- Pain only is never AGE
- Breath hold/valsalva on ascent
- 2-3 feet depth change

Type II DCS/AGE

- Unconsciousness
- Vertigo
- Weakness
- Paralysis
- Ears ringing
- Tingling
- Pins & needles
- Numbness
- Fatigue

Hypoxia

- Weakness
- Inability to perform
- Light headed
- Lack of concentration
- Unconsciousness
- Dizziness

CO 2 Toxicity

- Dypsnea
- Confusion
- Nausea
- Headache
- Unconsciousness
- Dizziness
- Pulse, rapid

CO Toxicity

- Tightness (forehead)
- Headache
- Nausea
- Confusion
- Unconsciousness
- Dizziness
- Death

N2 Narcosis

- Euphoria
- Overconfidence
- Disregard
- Judgement loss
- Unconsciousness

DCS/AGE Treatment

- 100% O2
- Advise dispatch/medics
- Notify chamber at UCSD
- Neurological exam
- Control diver/buddy gear
- Transport

Omitted Decompression

- Asymptomatic
- Observe for one hour/neuro exam
- Symptomatic
- O2/Neuro/Notify chamber
- Transport

Investigation

- Witness/dive buddy interviews
- Dive gear as evidence (also for air analysis)
- Neurological exam with report
- Dive profile-Table used
- If HPD-training & dive log

QUESTIONS?

PORT of SAN DIEGO



PORT of SAN DIEGO

San Diego Harbor Police
DIVE TEAM

Surface Rescue & In Water Custody

Sgt. Nicol and A/Sgt. Colon

Surface Rescue & In Water Custody

Considerations:

- Rescuer Experience
- Rescue vs. Recovery
- In-Water Custody Experience
- Risk vs. Benefit

DIVER SAFETY IS PARAMOUNT!

DROWNING

- 3,482 annual drowning deaths in U.S. (Avg. 9 per day)
- Leading cause of accidental death in U.S.
- 70% of recreational boating deaths are due to drowning (Primarily falls overboard and capsizing- not collision)



DROWNING

- Three stages of the drowning process:
  - ➢Distress
  - ➢Panic
  - ➢Submersion
- Physical/ psychological stress



SIGNS / SYMPTOMS OF DISTRESS

- **Head low in water:** Usually tilted back, facing up
- **Glassy, empty eyes:** “Thousand yard stare”
- **Clinging to fixed object:** Pier pilings, rip-rap, floating debris, etc.
- **Erratic, unusual behavior:** Range from flailing arms to total immobility
- **Hair in eyes:** Natural instinct is to sweep hair out of eyes



SIGNS OF DROWNING

- Indications the victim has gone beyond distress and is now in *imminent danger* of drowning:

  "**Double Arm Grasping":** Both arms slapping at the surface of the water simultaneously

  "**Climbing the Ladder":** Appears to be climbing up a ladder at/ below surface of water



https://binged.it/2uFiGux

Surface Rescue

Priority **#1**:

Rescuer Safety

- **Risk vs. Reward**
- Reach, Throw, then Go

Victim/ Scene Assessment

- Victim condition/ injuries/ demeanor
- Environmental hazards/ concerns
- Rescuer Equipment Selection







REACH – THROW – ROW - GO

REACH:

- Victim(s) are located close to the shoreline and the rescuer(s) can retrieve them by reaching with their persons, rescue pole or boat hook, an oar, a backboard, etc. without having to enter the water.

- Victim(s) must be conscious, alert, and able to grab and hold on to the reaching device for this method to be considered.



REACH – THROW – ROW - GO

THROW:

- If the victim is too far away to reach and a boat isn't handy, THROW the victim a PFD, life ring, etc. or anything else that will float.

- Victim(s) must be conscious, alert, and able to grab and hold on to the device for this method to be considered



REACH – THROW – ROW - GO

ROW:

- Victim(s) are too far away from the shoreline to be reached or to have a flotation device thrown to them. Rescuers must use a boat to retrieve the victim(s) without having to enter the water.

- Once close enough to the victim(s), rescuers can Reach, Throw, or lift them directly into the boat (whichever method is easiest and safest). Victim(s) may be conscious and alert or unconscious.



REACH – THROW – ROW - GO

GO:

- Rescuers must physically enter the water and swim to the victim(s) to retrieve them. This method may be used from the shoreline or from a boat depending on the circumstances.

- This method is typically used for unconscious victims but may also be used for conscious and alert victims that are in distress or unable to grab and hold on to a flotation device.



Basic Components of a Rescue

Basic Components of a Rescue

- Recognize and Respond
  - Equipment selection and entry
- Contact and Control
  - Proper approach and assessment
- Communicate and Save
  - Victim removal and health/ injury assessment

Types of Victims

- Alert/ Conscious
  - Verbal Direction may suffice; May assist in Rescue
- Weak/ Conscious
  - Verbal directions
  - Most likely will not be able to assist in rescue
- Unconscious
  - Verbal directions
  - May need immediate medical assistance

Types of Victims

- Panicked
  - Potential Dangers
- Aggressive/ Uncooperative
  - Potential Dangers
  - Evaluate Risk vs. Gain
- Multiple Victims
  - Back-up and floatation needed



Releases and Escapes



- Allow rescuer to escape grasp of panicking survivor.

- Remember that a panicking survivor will do anything to ensure she/he keeps her/his head above water. The key to these techniques is that the rescuer submerges deeply enough that survivor goes underwater.

- A properly performed escape will simply free the rescuer from the grasp of the survivor and require a re-approach; a properly executed release will result in the release of the survivor's grasp while the rescuer remains in control.

Front Head Hold Escape

1. **AIR - Take a quick breath of air.**

2. **TUCK - Tuck chin down and to the side.**

3. **DUCK- Rescue Diver extends arms outward, palm up, moving them upward rapidly several times which produces downward movement, and submerges the survivor and swimmer.**

Front Head Hold Escape

4. Without pause, the Rescue Diver places both hands on the front of survivor’s hips with the heels of the hands against the body, fingers extended and thumbs grasping the survivor's sides. By forcefully pressing and extending the arms, the Rescue Swimmer pushes the survivor's body back and up towards the surface. This leverage will loosen the survivor's grasp.

5. By tucking the chin inward and hunching the shoulders, the Rescue Diver’s head is freed. Survivor is then pushed away.

6. Rescue Swimmer swims clear of Survivor and surfaces to reassess the situation.

Front Head Hold Release

1. AIR 2. TUCK 3. DUCK

4. If the survivor's head is on the right of Rescue Swimmer's head, Rescue Swimmer brings right arm up and over encircling arm and places hand securely against survivor's right cheek, the little finger against the side of survivor's nose and thumb hooked under the jaw.

NOTE: If victim's head is at the rescuer's left side, the method is reversed.

Front Head Hold Release



4. If the survivor's head is on the right of Rescue Diver’s head, Rescue diver brings right arm up and over encircling arm and places hand securely against survivor's right cheek, the little finger against the side of survivor's nose and thumb hooked under the jaw.

NOTE If survivor's head is at the rescuer's left side, the method is reversed.

5. The remaining hand is brought up beneath the survivor’s other arm seizing it in a grip with the thumb just above the elbow on the pressure point.

6. In one continuous motion, the survivor's head is pressed out and around with the right hand while the left hand is lifting the survivor's arm over the Rescue Swimmer's head and sweeping it across the far side. This is a pressing movement and it is continued until the survivor's back is to the rescuer.

Front Head Hold Release

7. The left hand continues to hold the arm until the right hand can be shifted from the victim's face to the chest. The left hand releases the elbow and the victim is brought into a controlled cross-chest carry.

NOTE If victim's head is at the rescuer's left side, the method is reversed.

8. If victim places a scissors lock on the Rescue Diver with the legs, the scissors rarely is held after the head hold is released. However, if it is not released the Rescue Diver uses one hand between the ankles to unlock the crossed feet.

Rear Head Hold Escape

1. Air 2. Tuck 3. Duck

4. Rescue Diver brings the hands up to underside of each of the survivor's elbows. While keeping chin tucked in and hunching the shoulders, Rescue Diver pushes forcefully upward and to the either side freeing the head.

5. Survivor is then pushed back away. rescuer turns to face survivor, prepared to prevent subsequent grasps.

6. Rescue Swimmer swims well clear of survivor, surfaces, and decides which rescue procedures to use.

Rear Head Hold Release

REAR HEAD HOLD RELEASE:

1.Air 2. Tuck 3. Duck

4. Rescue diver places both hands on survivor’s wrist, either top or bottom, and pulls toward Rescue diver's hips, rotating the hand and holding the survivor’s wrist. The other hand slides up to the survivor's elbow.

Rear Head Hold Release

5. By twisting inward and down on the survivor's wrist and pushing the survivor's elbow upward, the grip is released. Rescuer slides survivor over his/her head until the survivor is in front of the rescuer with survivors fore arm straight across survivor’s back and survivor is in front of Rescue Diver.

6. From this position behind survivor, Rescue Swimmer shall release grip on the elbow while maintaining control of the wrist, reaching over the survivor with the free hand and then place survivor in controlled cross-chest carry.

Control / Tow Techniques

There are three standard survivor carry methods:

- Cross Chest
- Controlled Cross Chest
- Collar/Equipment Tow

Cross Chest Carry

The Cross Chest Carry should be used for responsive and unresponsive survivors.



1. From a position behind the victim:
    - Reach over survivor's shoulder and across the chest
    - Place hand under armpit of victim
    - Victim’s shoulder is tucked securely into rescue diver's armpit
    - Rescue Diver's arm firmly clamped against survivor's chest

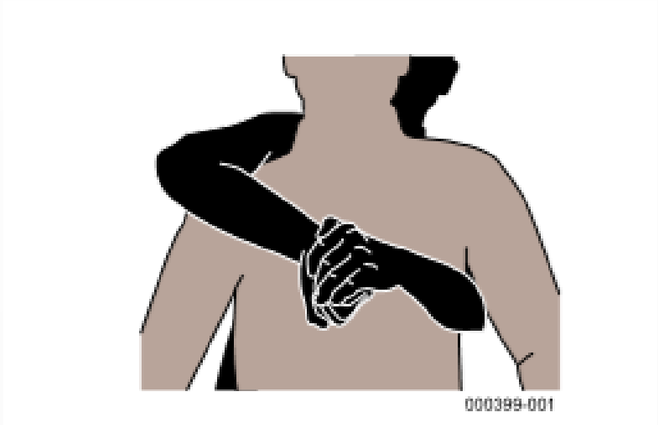
2. When survivor is on their back, the Rescue Diver turns to side placing hip directly against victim's back.

Controlled Chest Carry

The Controlled Cross Chest Carry should be used for an aggressive/panicked victim.

1. From a position behind the victim:
   - Reach over victim's shoulder and across the chest.
   - Place hand under armpit of Victim.
   - Interlock free hand with hand across chest
   - Victim's shoulder is tucked securely into rescue swimmer's armpit.
   - Rescue diver's arm firmly clamped against victim's chest.
2. When victim is on their back, the Rescue Diver turns to side placing hip directly against survivor's back.

Types of Grip



Seatbelt-Grip



S-Grip



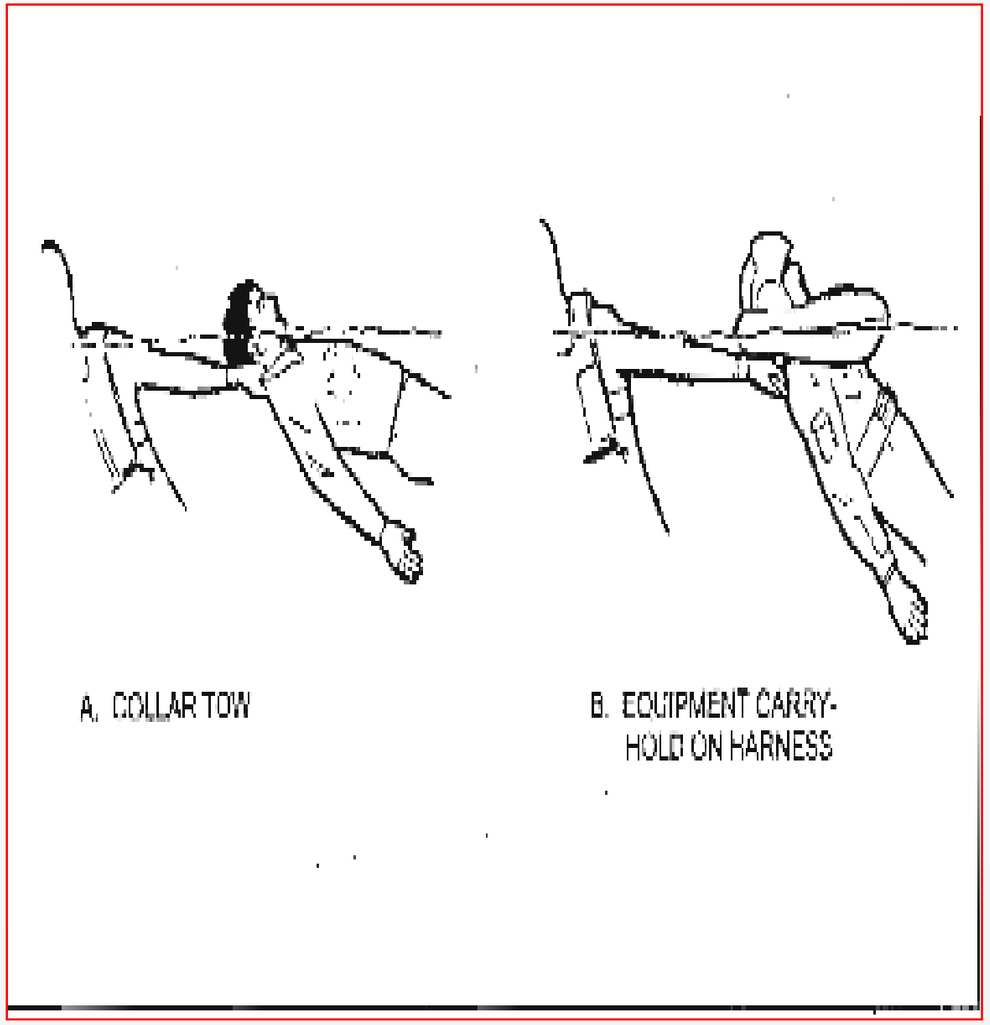
Gable-Grip

Collar or Equipment Carry

The Collar/Equipment Tow Carry should be used for responsive and unresponsive victims.

1. From a position behind the victim, grasp the survivor's flotation, shirt or dive equipment.

2. When victim is on their back, the Rescue Diver assumes the sidestroke position.



Front Surface Approach

The Front Surface Approach should be used for an unconscious victim face down in the water.

1. Approach victim with head out of water and eyes on victim.

2. Attempt to establish communication with victim.
   - If communication is establish Rescue Diver shall approach from rear and place victim in proper carry.
   - If communications are not established, Rescue Diver shall assess the situation and take necessary actions to safely approach the victim.

Front Surface Approach

3.Upon reaching a safe distance:

Execute a quick reverse.

Firmly grasp back of victim's wrist (right hand to left wrist, or left hand to right wrist).

- RS will firmly grasp survivor's triceps with free hand.
- From this position, use both hands to pull survivor's arm across rescue diver's body, rotating the survivor on their back.

4. When survivor is rotated on their back, RS shall:

- Gain control.
- Place in proper carry.
- Establish communication.
- Assess survivor's condition.

Rear Surface Approach

1. Approach survivor with head out of water and eyes on victim.

2. Attempt to establish communication with victim.

   - If communication is established:

     Rescue Diver shall approach from rear and place victim in proper carry

   - If communication is not established, RD shall assess the situation and take necessary actions to safely approach the victim.

Rear Surface Approach

3. Upon reaching survivor, Rescue Diver shall:
   - Swim over to survivor's back.
   - Secure victim in a controlled cross chest carry
   - Rotate survivor onto back.

4. When survivor is rotated on their back,

   RD shall:
      - Establish communication.
      - Assess victim's condition.

Victim Removal



Vessel

- Safety Considerations
- Stokes
- Rescue Litter

Dock

- Safety Considerations
- Access

SCUBA Rescue

Drowning:

55% of SCUBA diver fatalities

Diving Illness DCS/ AGE:

20% of SCUBA diver fatalities



SCUBA Rescue

Surface Emergency

- Out of Air Emergency
  - Orally Inflate BCD
- Rapid Ascent
  - Evaluate for Diving Illness
- Buoyancy
  - Weight Release, Orally inflate BCD

Could be the same as a swimmer emergency

SCUBA Rescue

Sub-Surface Emergency

- Out of Air Emergency
- Entanglement
- Equipment Failure



* Diver Rescue should follow the same basic components of a surface swimmer rescue

* *All Divers should be evaluated for Dive Illness*

Basic Elements and Assessment

Assessment:

- Concerns:
  - Victim/ Suspect safety
  - Suspect Intentions/ Behavior
  - Rescuer safety
  - Public Safety
  - Homeland Security: Navy/ Coast Guard facilities

TIME/ EQUIP/ TRAINING/PREPARATION
IS ON OUR SIDE

In-Water Custody/ Combative Subjects

Suspect Assessment

Suspect Behavior

Suspect Clothing/ Equipment

Weapon

Type of crime/ incident

Environment

- A. Temp, tide, area, season, time of day, etc.

Dive Team/ HPD resources available

Techniques

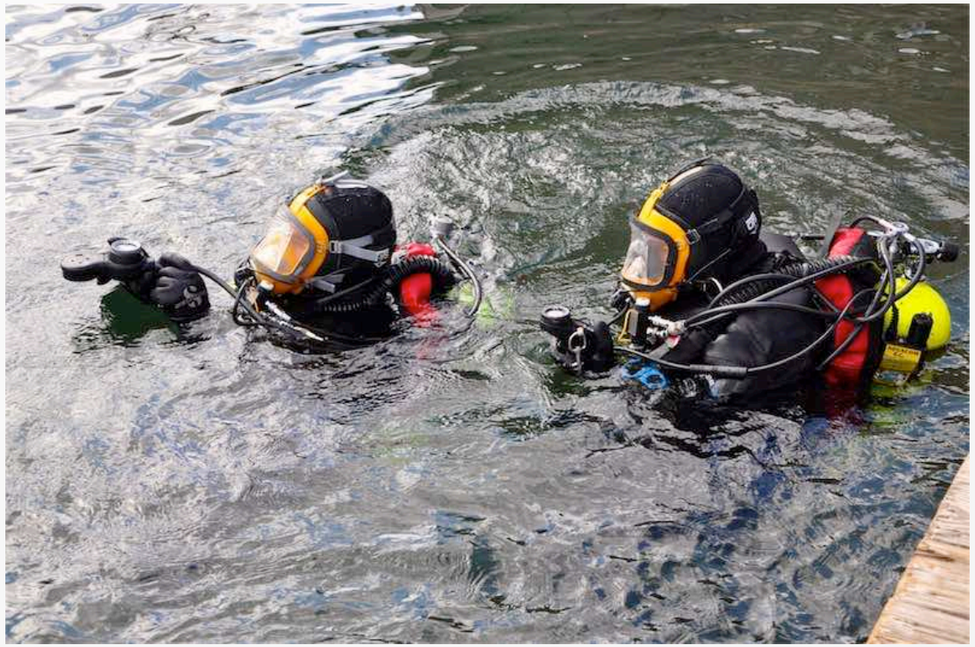
SAFETY first priority

Containment

Dive/ contact plan

- Intervention
  I. Contact
  II. Cover
  III. Diver

- Removal/ Exit



Techniques

De-Tac principles apply

Avoid handcuffing in water suspect

Direct suspect to keep hands at surface

Rescue buoy/ flotation to assist suspect to keep hands at surface

Techniques

Non-Intervention

I. Contain
II. Observe
III. Assess

Prepare to transition from suspect apprehension to victim rescue / apprehension

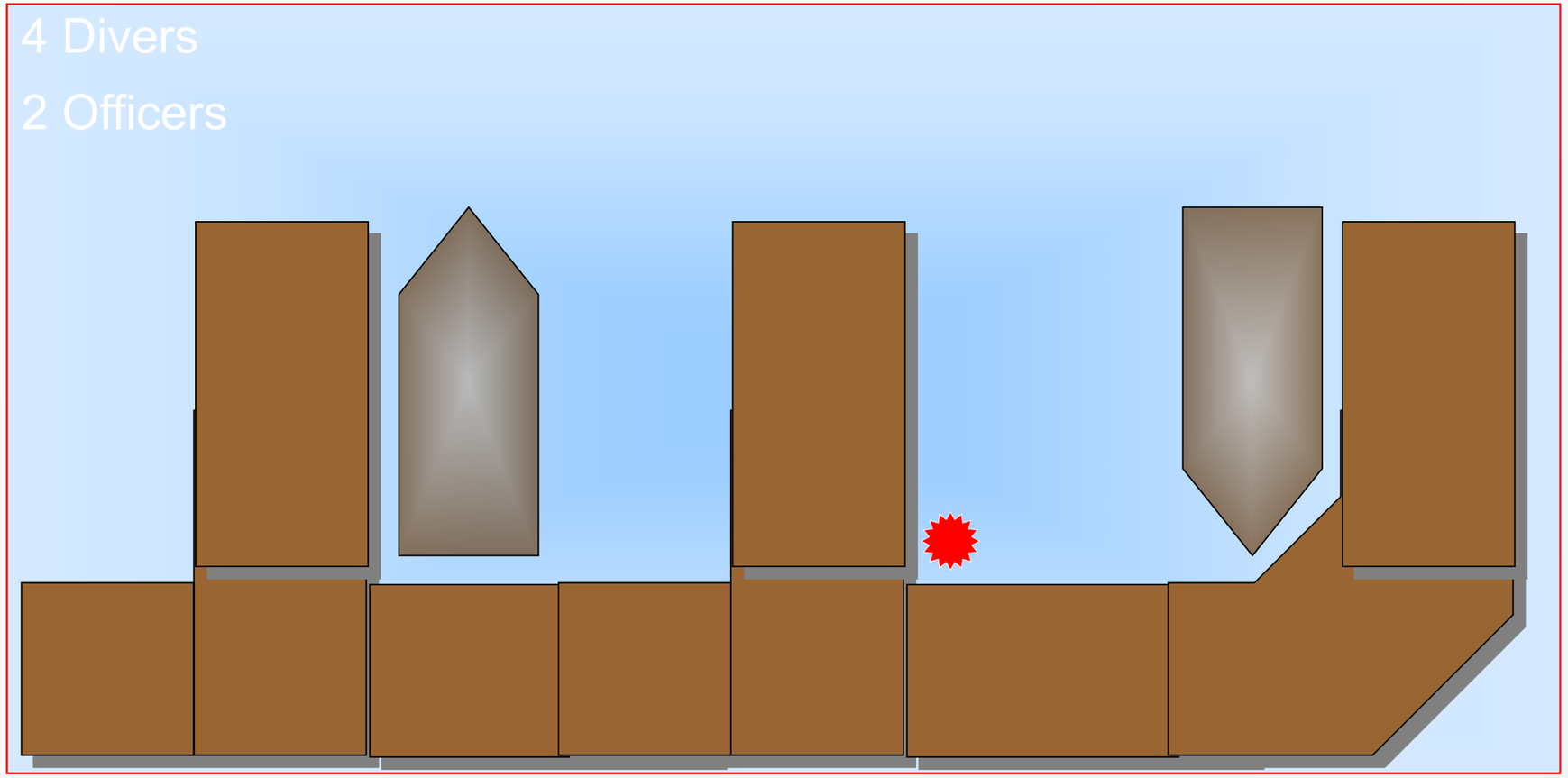
In-Water Search

In-Water Suspect Search

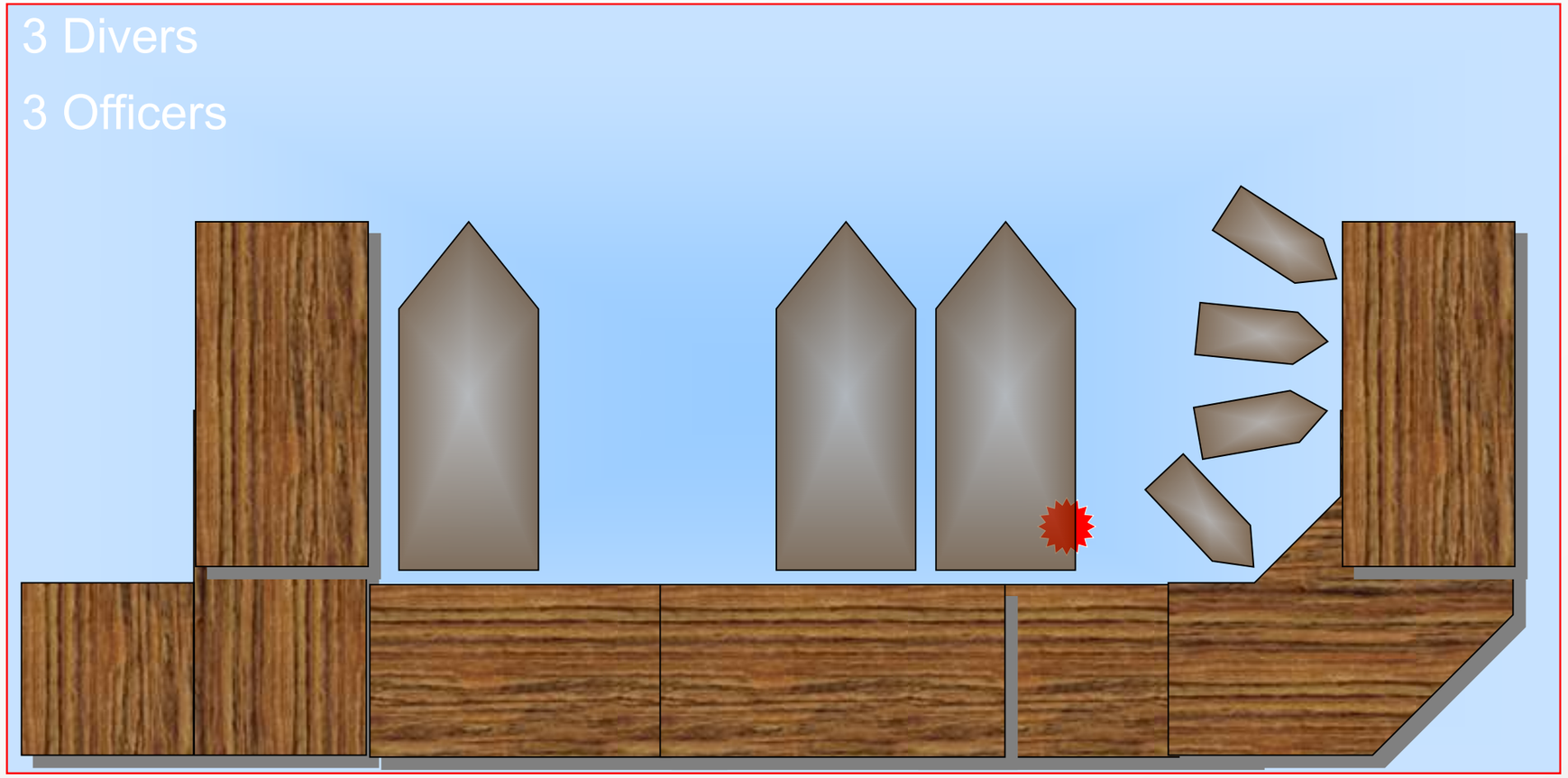
- Containment
- Clearing
- Two-man teams
- Landside units
- Communication
- Resources



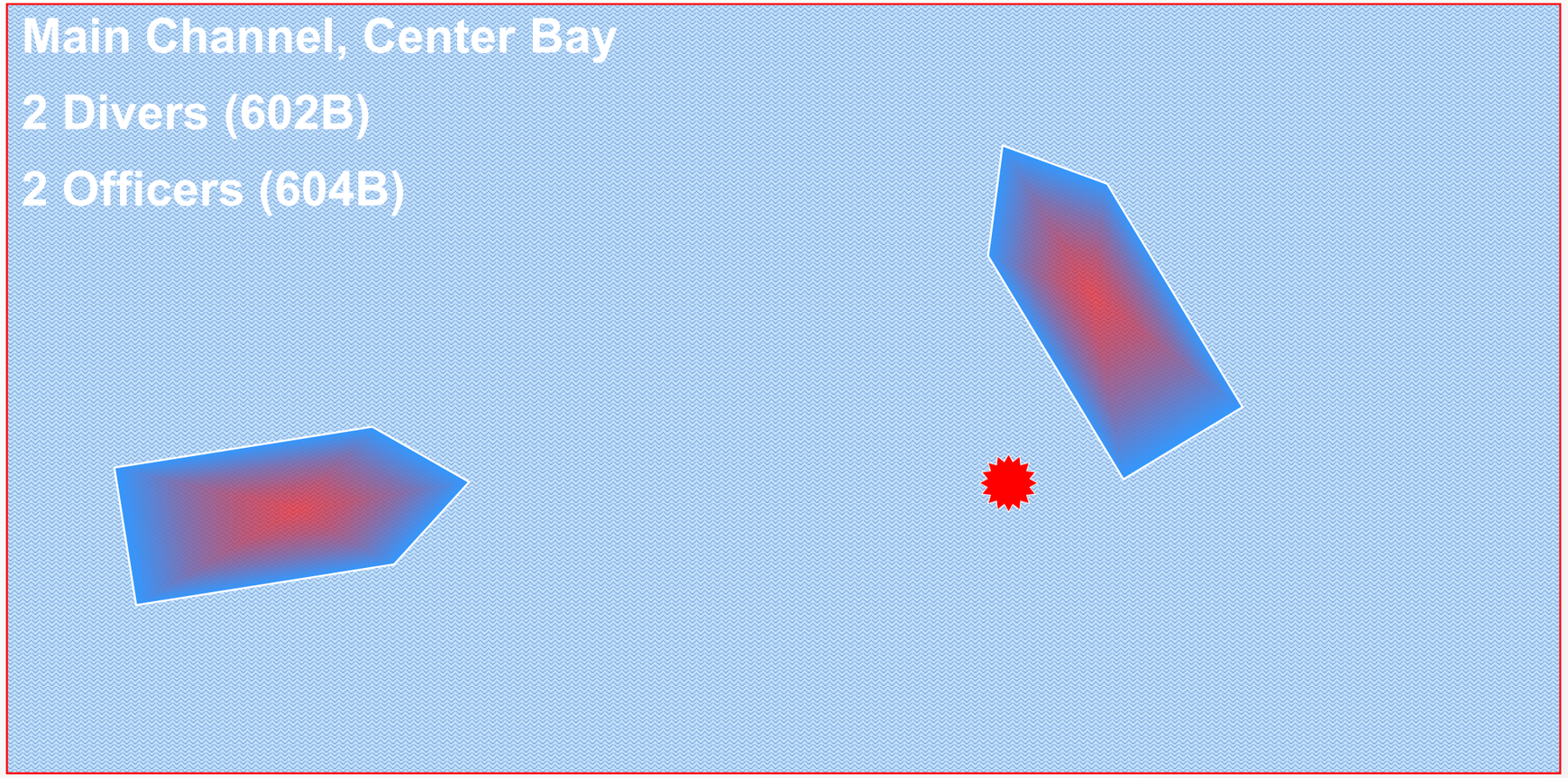
DOCK SEARCH



DOCK SEARCH



Suspect Retrieval



QUESTIONS?



PORT of SAN DIEGO

San Diego Harbor Police
DIVE TEAM

SEARCH PATTERNS

PURPOSE

To give the students a basic understanding of four prescribed underwater (UW) search techniques, and how to best use them.





Objective

The students will be able to size up a scene and determine the appropriate search, given the existing conditions, such as, but not limited to…

- Current
- Bottom contour
- Accessibility to the scene
- Staffing (Available Assets)
- The type of evidence to be located.

What does it take to make an effective search?

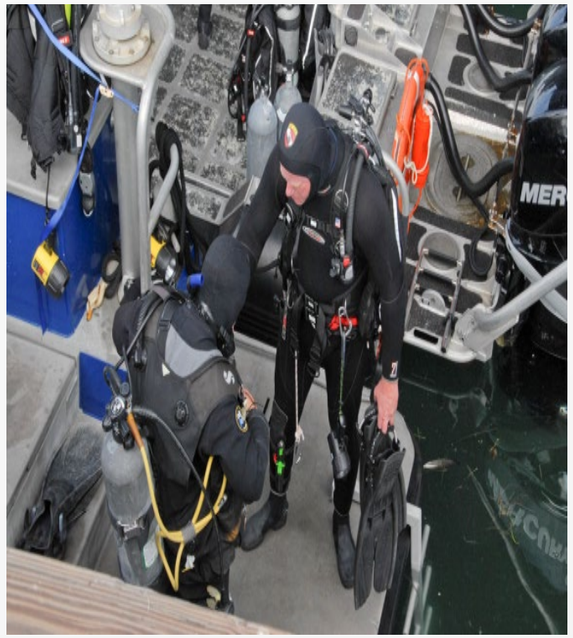
- Contain one or more fixed reference points or base lines
- Thorough, systematic, and at times, meticulous
- Relatively simple to execute using a known established pattern
- Starts at a known point, covers a known area and ends at a known point
- Allows for effective communication between divers and surface personnel
- Upon completion of the search, there should be a high degree of certainty that the object is not in the searched area

Who makes up a search team?



- Searchers (Diver)
  - Lead Diver, Secondary Diver, etc.
- Tender
- Safety Diver





Team Member responsibilities

LINE TENDER

- ❑ Controls the search patterns with the use of Line up marks, compass headings, physical monuments
- ❑ Maintains search line integrity
- ❑ Maintains established “fixed point” or “baselines”
- ❑ Always knows the location of the searcher(s)
  - e.g. bearing, distance

SEARCHER(S)

- ❑ Maintains search line tension by swimming at an angle away from tender/anchor
- ❑ Remains as close to bottom with as minimal disturbance as possible
- ❑ Ensures thorough search techniques and focusses on visually and/or physically searching the area being covered

SAFETY DIVER

During any search, diver safety is paramount. This is why the safety diver is one of the most important positions on a search team.

The safety diver should be one of the most experienced team members that works well under high stress conditions.

The safety diver should be as close to the tender and divers as possible and ready to respond the moment a diver emergency is declared. Like the tender, the safety diver should keep constant track of the diver(s) location throughout the search.

SEARCH PATTERN EQUIPMENT

- Line(s)
- Stuff bags
- Communications
- Buoys
- Search pattern weights
- Specialty equipment if needed



Search Communications



- Communication is an integral part of conducting a thorough search.
- Most searches are conducted without the use of electronic communication.
- Therefore, we use line signals to communicate between divers as well as with the tender and surface.

Search Communications

- It is imperative that predetermined line pulls are established before the start of dive operations.

- Equally as important, the tending line must remain tight and straight allowing clear communication from one end to the other.



LINE PULL SIGNALS

TENDER -> DIVER

- ONE PULL - OK?
- TWO PULLS – CHANGE DIRECTION
- THREE PULLS – RETURN TO SURFACE
- FOUR PULLS – DANGER ABOVE / STAY BELOW

DIVER -> TENDER

- ONE PULL - OK
- TWO PULLS – MORE LINE
- THREE PULLS - I FOUND IT
- FOUR PULLS – H.E.L.P.



LINE PULLS

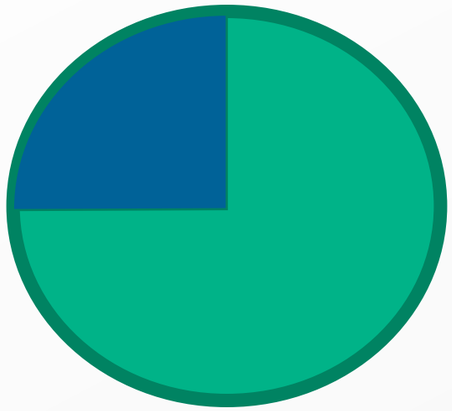
- Line Pulls should be deliberate long pulls with follow through

- **Do not double up line pulls**

  For example, if you ask for MORE LINE, MORE LINE you have just inadvertently signaled for ?

H.E.L.P.!!!

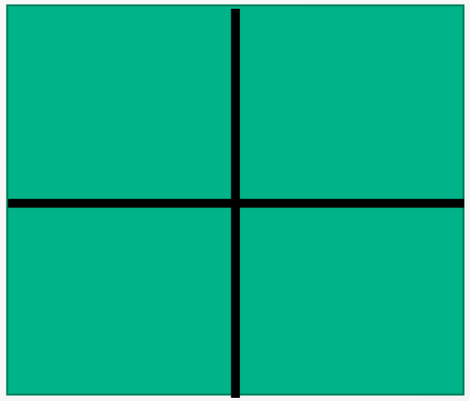
Searches can be broken down into three basic principles…



RADIAL



LINEAR



ZONE

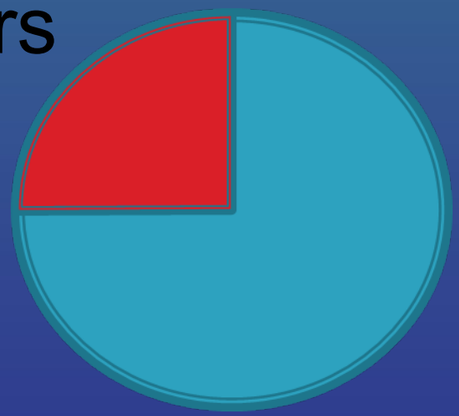
These three principles have been used to create several well established search patterns in public safety diving (PSD)…

1. Radial Searches

- Radial searches consist of a single FIXED point that the searching diver(s) pivot around using the primary search line.

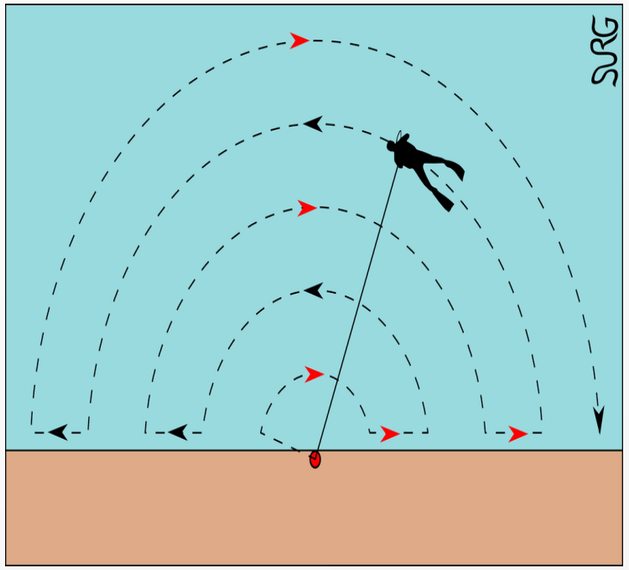
- This allows the diver(s) to search the designated area in a radial arc pattern.

- Radial searches are generally the most expedient search techniques requiring the least amount of divers and equipment.

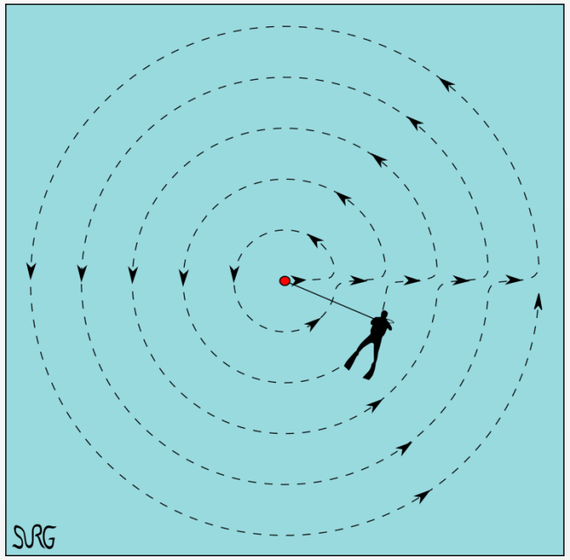


Two Types of Radial searches

ARC SEARCH



EXPANDING CIRCLE SEARCH

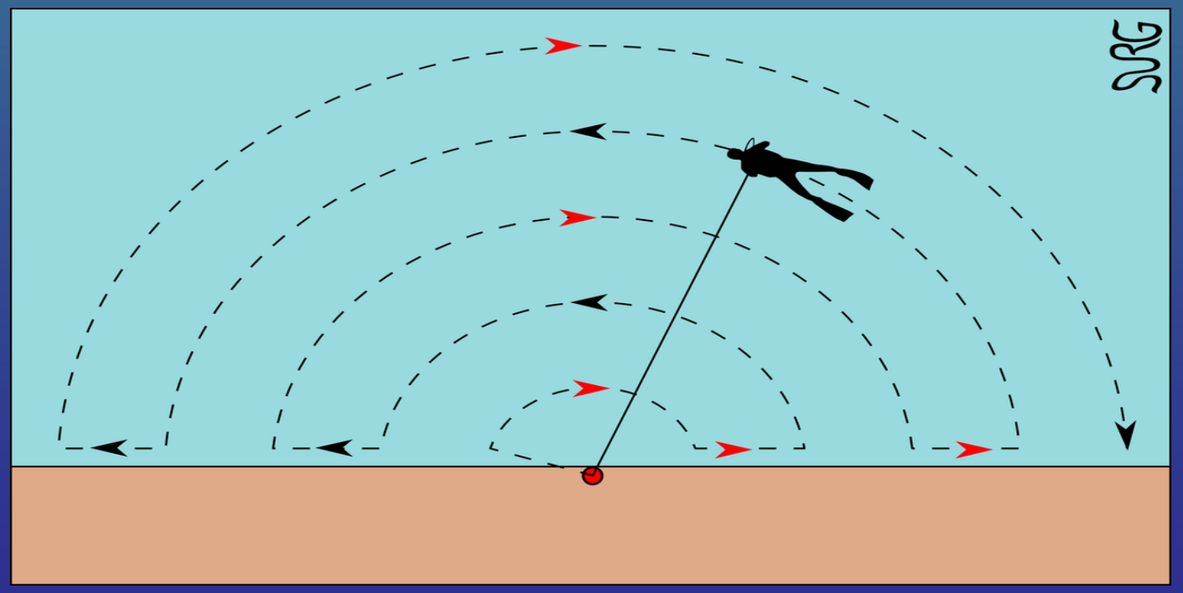


ARC SEARCH

The arc search consists of a single search line extending from a tender at the center of the arcs pivot point.

The searching diver(s) swims around the pivot point until the tender signals the end of the arc.

The searching diver then turns around, adjusting the distance from the pivot point, and then swims in the opposite direction completing a reciprocal arc.



ARC SEARCH



The arc search pattern is the most commonly used pattern in PSD.

It is arguably the fastest search technique to deploy focusing on a specific area

It can be used as an expanding or shrinking search pattern

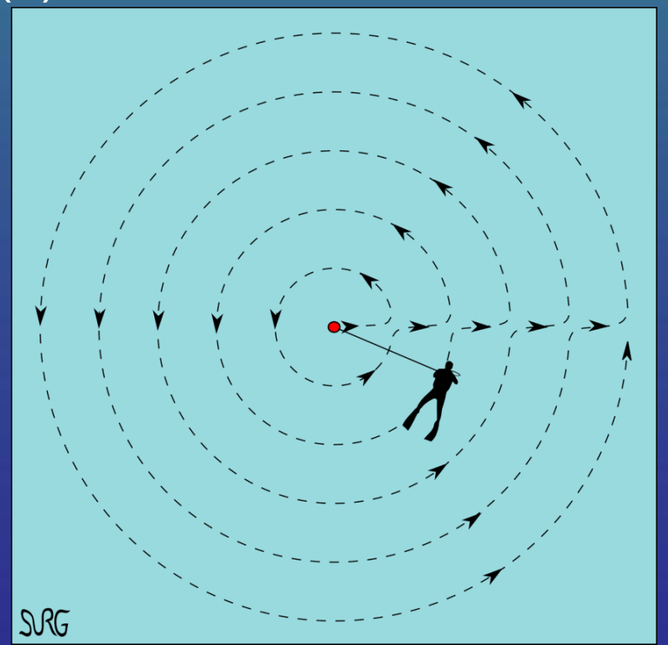
Can be tended from shore, pier, or vessel (if anchored properly)

The Arc Search is ideal in searching for medium to large items ranging from fire arms to vehicles

EXPANDING CIRCLE SEARCH

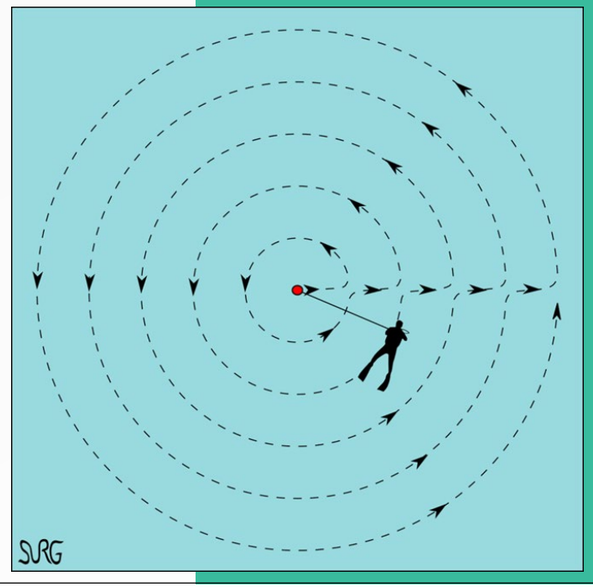
- The expanding circle search consists of a single search line extending from a tender/anchor at the center of the circles pivot point.

- The searcher(s) swim in a 360° circle around the pivot point.



EXPANDING CIRCLE SEARCH

- Upon completing each rotation, the tender signals the searcher
- The searcher then swims away from the center enlarging the radius of the circle
- Then swims another larger concentric circle.





EXPANDING CIRCLE SEARCH

- Expanding circle searches are conducted in open water
- They are good for rapidly covering a large area
- They are limited, if not problematic, when swimming in medium to strong currents
- Most effective when used with an anchor system as the pivot to allow tender to focus on managing the line and compass headings

2. Linear Searches

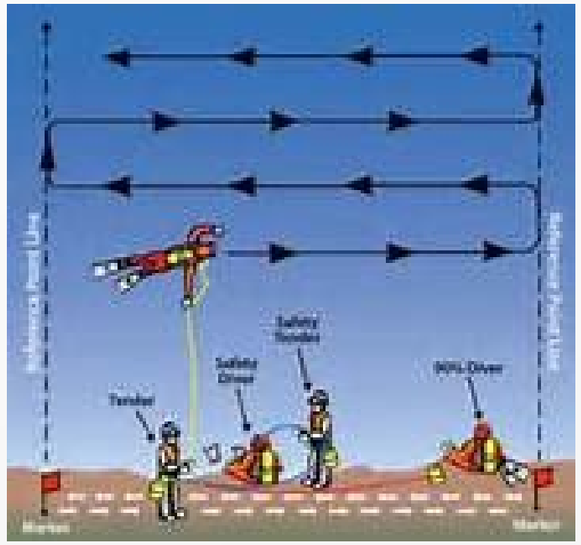
- Linear searches consist of using one or more fixed base lines which the searching diver(s) swim Parallel to.

- Although linear searches require additional setup and equipment over radial searches, they are often more thorough and systematic.

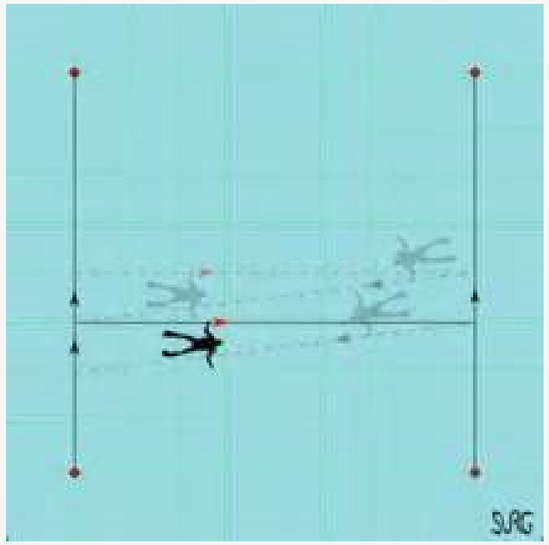


Two Types of Linear Searches

PARALLEL SEARCH



JACKSTAY SEARCH



PARALLEL SEARCH

- Parallel Searches consist of a single straight baseline onshore which the tender follows between two predetermined points.
- The diver and tender travel parallel to each other along the length of the baseline.
- Once the length of the baseline has been travelled, the tender extends the search line (based on visibility). They both then travel a reciprocal coarse along the baseline.

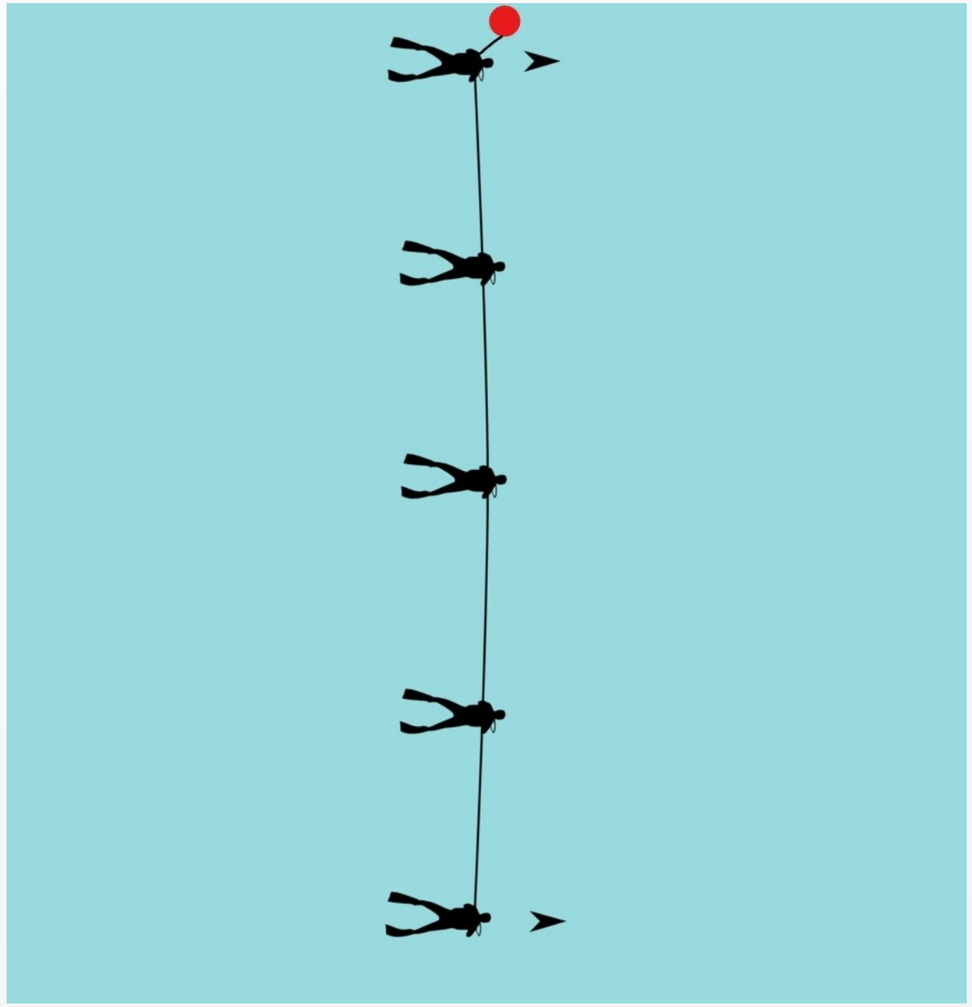


PARALLEL SEARCH

- Parallel searches are good for covering large unobstructed areas
- Ideal for locating small to large objects
- Require more time to stage
- Can be from shorelines, docks, and piers

Necklace Search

- Utilized by HPD dive team for hull / pier / piling searches.
- Operates similar to a parallel search but runs vertically with multiple divers on the line evenly spaced throughout the water column based upon visibility.
- Most often tended by a surface swimmer / diver who controls the line and buoy and helps to guide divers around possible obstacles, i.e. Yokohama Fenders, etc.
- Divers are attached to primary search line by individual “buddy lines”.
- Bottom diver sets pace.
- Multiple passes may be required for extended depths.

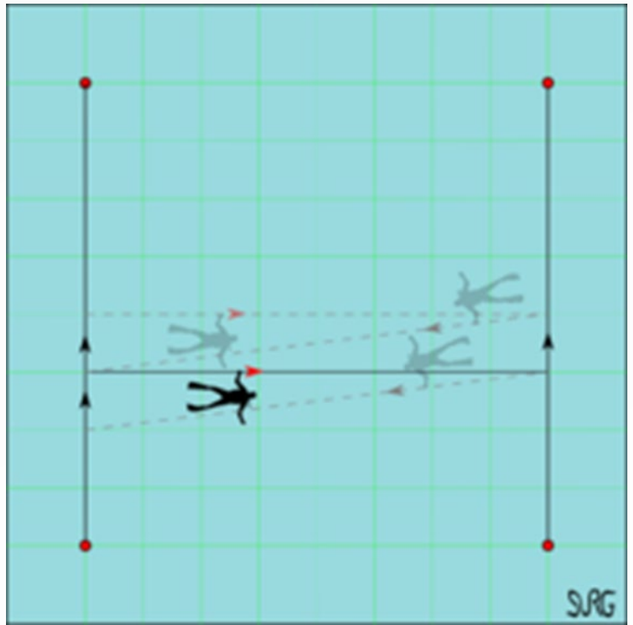




JACKSTAY SEARCH

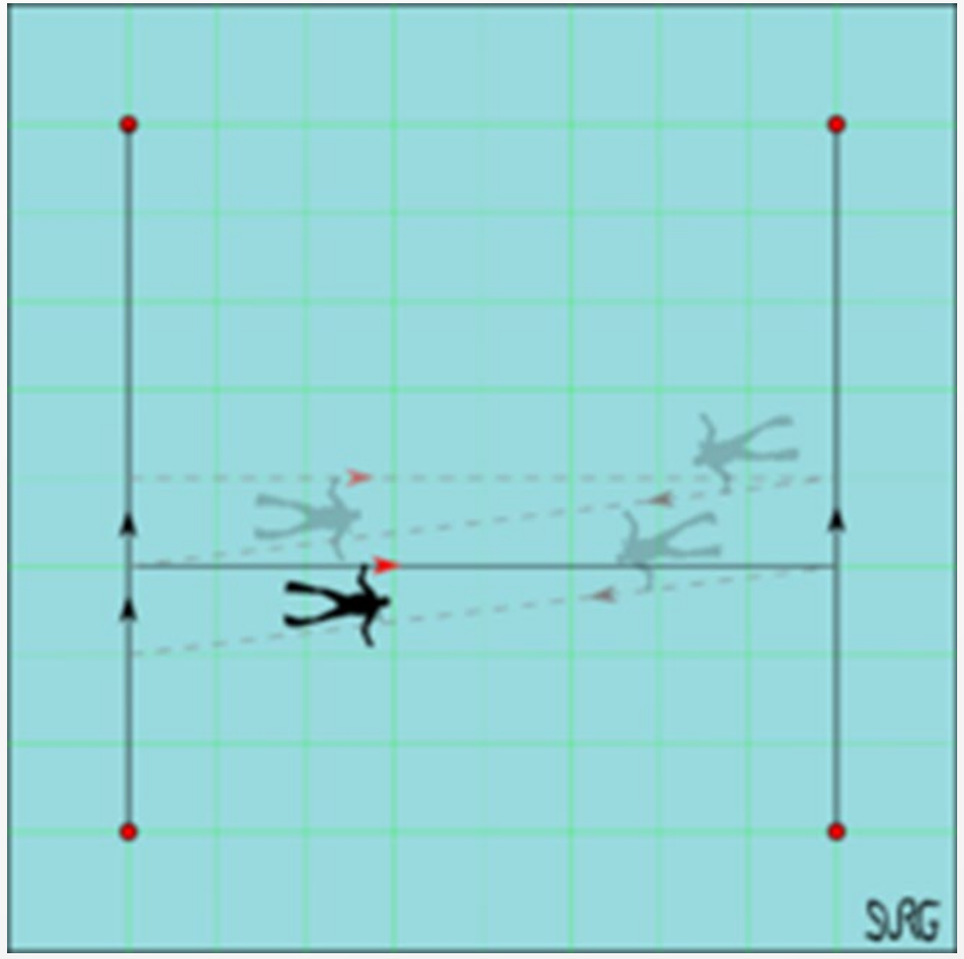
- Jackstay searches are intended for open water and the primary search line is not tended.

- A Jackstay search is comprised of two subsurface baselines set parallel to each other



JACKSTAY SEARCH

- The search line runs from one baseline to the other.
- The divers swim along the search line from one baseline to the other searching the area between baselines.
- Upon reaching the end of the search line, the divers advance that end along the baseline and then search returning to the other baseline.
- This process is repeated allowing the search line to advance incrementally down the baselines.



JACKSTAY SEARCH

- Jackstays require the most equipment and preparation
  (2) baselines, (1) search line, (1) tending line
- They are best for large unobstructed areas and work in open water and on shorelines
- A Jackstay is a very thorough search pattern due to the amount of search area overlap
- A Jackstay variant can be conducted without baselines by just advancing a single search line and using compass headings



3. Zone (Quadrant) Searches

a.

b.

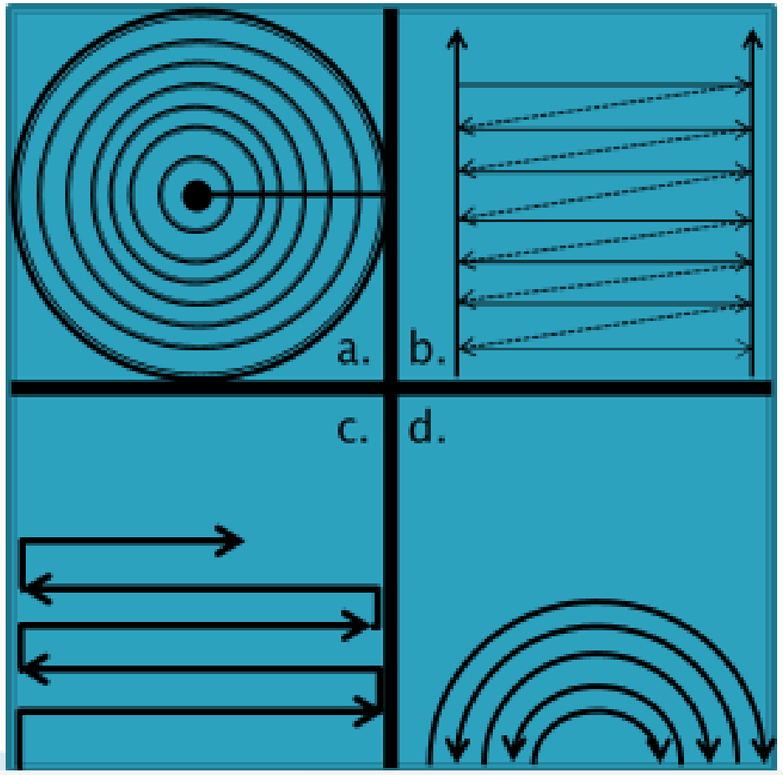
c.

d.

ZONE SEARCH

A Zone search is simply a way of breaking down a large search area into smaller more manageable search areas.

Divers can employ any of the previously listed search techniques within the smaller search “Zones”.



SUMMARY

- Without specific controlled patterns working from fixed points and baselines, a search is merely wandering around in hopes of finding something.

- The use of patterns and fixed reference points not only allows you to search more thoroughly, but also allows you to better document the locations of discovered items and leave a scene with confidence in your search.

PORT of SAN DIEGO

San Diego Harbor Police DIVE TEAM

Essentials of Fire Fighting,
5th Edition

Chapter 1 — Firefighter Safety and Health

Firefighter I



Chapter 2 Lesson Goal

- After completing this lesson, the student shall be able to apply firefighter safety and health practices following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. List ways to prevent firefighter injuries.
2. Discuss National Fire Protection Association standards related to firefighter health and safety.
3. Discuss Occupational Safety and Health Administration regulations.

(Continued)

Specific Objectives

4. Summarize the IFSTA Principles of Risk Management.
5. List the main goals of a safety program.
6. Discuss firefighter health considerations and employee assistance and wellness programs.

(Continued)

Specific Objectives

7. List guidelines for riding safely on the vessel.
8. Describe ways to maintain safety in training.

(Continued)

Specific Objectives

9. Discuss emergency scene preparedness.
10. Discuss emergency scene safety.
11. Summarize general guidelines for scene management including highway incidents, crowd control, and cordoning off emergency scenes.

(Continued)

Specific Objectives

12. Explain the importance of personnel accountability.
13. Summarize basic interior operations techniques.
14. Describe emergency escape and rapid intervention.

(Continued)

Specific Objectives

15. Respond to an incident, correctly mounting and dismounting an Harbor Police Vessel. (Skill Sheet 1-1)

Ways to Prevent Injuries

- Conducting effective training
- Maintaining company discipline and accountability
- Following established SOPs

(Continued)

Ways to Prevent Injuries

- Using personal protective clothing and equipment
- Maintaining high levels of physical fitness

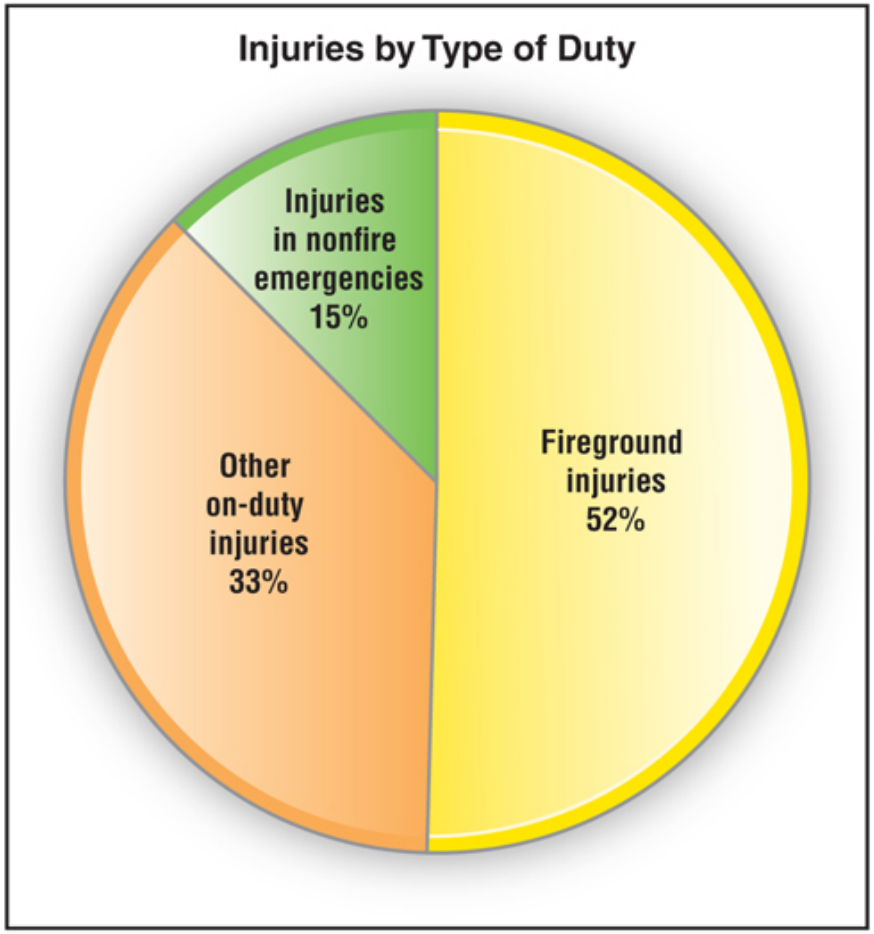


DISCUSSION QUESTION



What do you think causes the greatest number of firefighter injuries?

Firefighter Injuries



NFPA® Standards

- Relate to firefighter safety and health
- Consensus documents; not law unless adopted by governing body
- Many U.S. and Canadian governing bodies have adopted some NFPA® standards; others have not

NFPA® 1500

- Most comprehensive firefighter safety and health standard
- Specifies fire department safety and health program minimum requirements
- Applied to any fire department or similar organization

(Continued)

NFPA® 1500

- Fire departments should:
  - Recognize safety and health as official objectives
  - Provide as healthy and safe work environment as possible

(Continued)

NFPA® 1500

- Promotes safety throughout the fire service
- Minimum standard; can be exceeded



NFPA® 1500 Topics

- Safety and health-related policies and procedures
- Training and education
- Fire apparatus, equipment, and driver/operators
- Protective clothing and protective equipment

(Continued)

NFPA® 1500 Topics

- Emergency operations
- Facility safety
- Medical and physical requirements
- Member assistance and wellness programs
- Critical incident stress management program

NFPA® 1500 — Safety and Health-Related Policies and Procedures

- Fire departments must:
  - Develop an organizational plan, risk management plan, safety and health policy
  - Define roles and responsibilities
  - Establish safety and health committee
  - Keep records
  - Appoint a health and safety officer

(Continued)

NFPA® 1500 — Safety and Health-Related Policies and Procedures

- Safety and health program must:
  - Address anticipated hazards
  - Include provisions for dealing with nonemergency issues
  - Include SOPs

NFPA® 1500 — Training and Education

- Goal must be to prevent occupational deaths, injuries and illnesses
- **Training** — Developing and maintaining job skills
- **Education** — Learning new information, concepts, and procedures

(Continued)

NFPA® 1500 — Training and Education

- Train and educate personnel to consider safety in all activities
- Safety must be reinforced

NFPA® 1500 — Fire Apparatus, Equipment, and Driver/Operators

- Safety and health must be primary considerations for apparatus
  - Meeting requirements for vehicle's intended role
- All vessel operators must be trained

(Continued)

NFPA® 1500 — Fire Apparatus, Equipment, and Driver/Operators

- If noise levels exceed 90 decibels (85 dB in Canada), hearing protection must be worn.

NFPA® 1500 — Protective Clothing and Protective Equipment

- Departments must provide at least one set of protective clothing and protective equipment
- Protective clothing
  - Helmet
  - Hood and/or shroud
  - Coat
  - Pants

(Continued)

NFPA® 1500 — Protective Clothing and Protective Equipment

- Protective clothing
  - Safety shoes or boots
  - Gloves
  - Goggles or safety glasses
  - Personal alert safety system (PASS) device

(Continued)

NFPA® 1500 — Protective Clothing and Protective Equipment

- Protective equipment
  - SCBA
  - SAR
  - Other respiratory protection
  - May refer to body armor

NFPA® 1500 — Emergency Operations

- Requires an incident management system
  - Most use NIMS-ICS
  - Risk management
  - Personnel accountability

(Continued)

NFPA® 1500 — Emergency Operations

- Limits emergency operations to those that can be safely conducted



(Continued)

NFPA® 1500 — Emergency Operations

- NFPA® 1500 requires
  - Rapid intervention
  - Rehabilitation
  - Limiting exposure to violence
  - Postincident analysis

(Continued)

NFPA® 1500 — Emergency Operations

- Both NFPA® 1500 and NFPA® 1561 contain specific requirements regarding accountability

NFPA® 1500 — Medical and Physical Requirements

- Candidates must be medically evaluated
- Prohibits firefighters under the influence from participating
- Physical performance standards

(Continued)

NFPA® 1500 — Medical and Physical Requirements

- Annual medical verification for fitness for duty
- Establishment of job-related fitness standards and fitness program
- Confidential health database

(Continued)

NFPA® 1500 — Medical and Physical Requirements

- Infection control program
- Designated department physician
- Reporting and documenting injuries and exposures

NFPA® 1500 — Member Assistance and Wellness Programs

- Member assistance program
  - Substance abuse
  - Stress
  - Personal problems
- Wellness program

DISCUSSION QUESTION



What other NFPA® standards relate to firefighter safety and health?

OSHA Regulations

- Came from the Williams-Steiger Occupational Safety and Health Act in 1970
- OSHA operates under the U.S. Department of Labor

(Continued)

OSHA Regulations

- Sets two duties for employers
  - Furnish a place of employment free from recognized hazards likely to cause death or serious injury
  - Comply with OSHA standards
- Federal OSHA regulations
  - Apply to federal employees and private-sector employees

(Continued)

OSHA Regulations

- Federal OSHA has no jurisdiction over local and state public-sector firefighters
  - OSHA-approved state plans cover them
  - State plans may differ; must provide equivalent protection
  - Agencies may choose to follow OSHA standards

OSHA Regulations: Title 29 of the CFR

- Contains federal OSHA regulations
- Fire departments and other agencies follow specific OSHA regulations



IFSTA Principles of Risk Management — Development

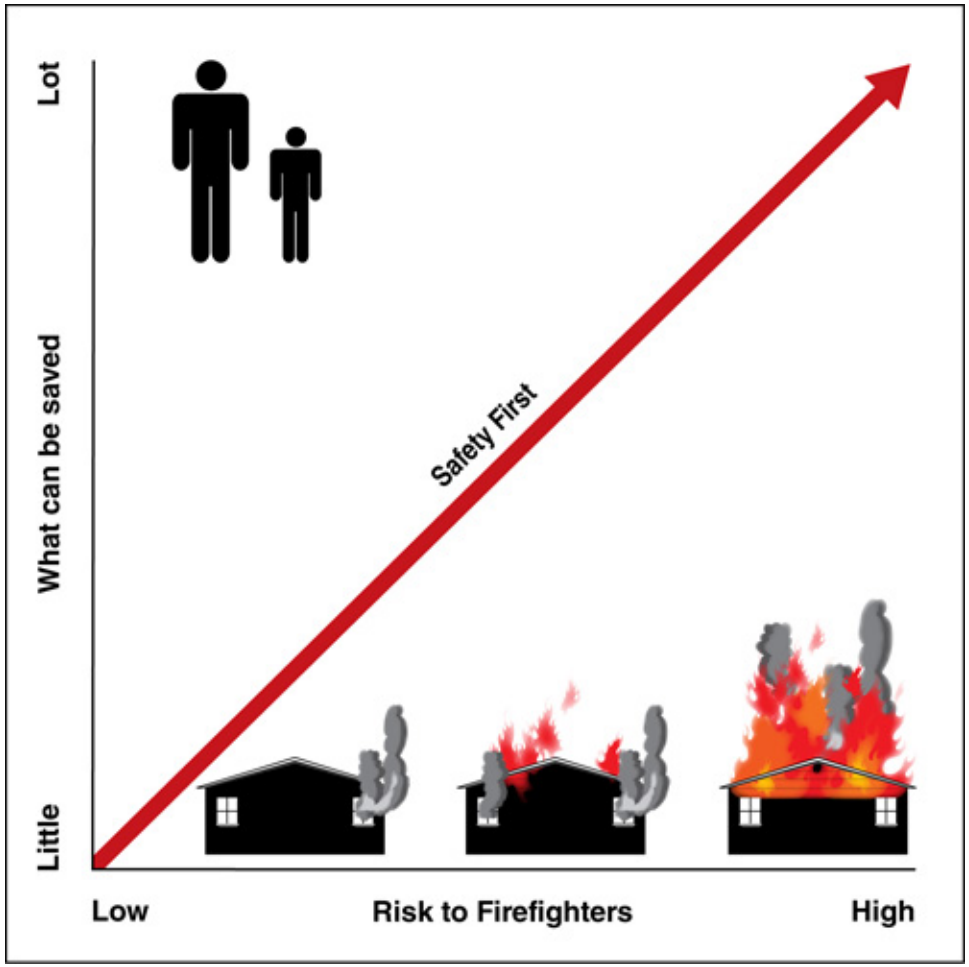
- NFPA® 1500 requires incident management systems to include a risk management plan
- Risk management plan
  - Established set of criteria
  - Tactical decisions can be made

(Continued)

IFSTA Principles of Risk Management — Development

- Considered three prominent plans
  - Phoenix, AZ
  - NFPA® 1500
  - "Ten Rules of Engagement for Structural Fire Fighting" (IAFC)

IFSTA Principles of Risk Management



IFSTA Principles of Risk Management — Key Points

- Team integrity is vital to safety
- No property is worth the life of a firefighter
- Firefighters should not be committed to interior operations in vessels known or believed to be unoccupied

DISCUSSION QUESTION



Why do you feel these principles are important to the fire service?

Fireground Priority

- Highest priority is for firefighters to protect their lives and those of their fellow firefighters
  - If a firefighter is injured, unable to help others, other firefighters must respond to the injured firefighter

Safety Program Goals

- Prevent human suffering, deaths, injuries, illnesses, and exposures to hazardous atmospheres and contagious diseases

(Continued)

Safety Program Goals



- Prevent damage to or loss of equipment
- Reduce incidence and severity of accidents and hazardous exposures

DISCUSSION QUESTION



What do you do to help maintain your personal health?

Firefighter Health Considerations

- Stay informed about job-related health issues.
- Wear PPE and respiratory protection.
- Clean PPE.
- Follow hepatitis B vaccination recommendations.

(Continued)

Firefighter Health Considerations



- Use precautions to avoid exposure to bloodborne pathogens.
- Use proper lifting techniques.

(Continued)

Firefighter Health Considerations

- Use lifting tools or get assistance with heavy objects.
- Clean, disinfect, and store tools and equipment used in patient care.
- Maintain a regular exercise program.

(Continued)

Firefighter Health Considerations

- Maintain a diet low in cholesterol, fat, and sodium.
- Maintain blood pressure and cholesterol levels.
- Eliminate tobacco products.
- Have regular physicals and checkups.

Employee Assistance Program (EAP)

- Offers confidential assistance
  - Alcohol and drug abuse
  - Personal and interpersonal problems
  - Stress
  - Depression
  - Anxiety
  - Divorce
  - Financial problems

Wellness Program

- Health-related problems
  - Nutrition
  - Hypertension
  - Cessation of tobacco use
  - Weight control
  - Physical conditioning

Availability of EAP and Wellness Programs



- Available to all members and their families
- Include appropriate referrals

(Continued)

Availability of EAP and Wellness Programs

- Provide counseling and education on health concerns
- Allow easy, confidential access to help
- Distribute pamphlets and flyers
- Make services available to family

Critical Incident Stress Management (CISM)

- A critical incident stress debriefing should be part of the CISM program



(Continued)

Critical Incident Stress Management (CISM)

- Process of managing stress starts before through prebriefing
- If working more than one shift in stressful conditions, go through a minor debriefing

Safety in the Fire Station — Personnel Safety

- Improper lifting techniques cause
  - Back strains
  - Bruises, sprains, and fractures
  - Damaged equipment

(Continued)

Safety in the Fire Station — Personnel Safety

- Correct lifting techniques
  - Keep the back straight; lift with the legs
  - Do not lift or carry heavy or bulky objects without help



(Continued)

Tool and Equipment Safety

- Accidents can happen if firefighters are not properly trained.
- Poorly maintained tools and equipment can be dangerous.
- NFPA® 1500 stresses tool safety.
- Always use appropriate PPE.

Hand and Small Power Tool Safety

- Wear appropriate PPE.
- Remove loose clothing and keep long hair clear of operating tool heads.
- Remove jewelry.
- Select the appropriate tool.
- Follow manufacturer's instructions.

(Continued)

Hand and Small Power Tool Safety

- Inspect tools before use.
- Do not use badly worn or broken tools.
- Provide adequate storage space and return tools after use.
- Inspect, clean, and put all tools in a ready state before storing.

(Continued)

Hand and Small Power Tool Safety

- Consult with manufacturer before modifying any tool.
- Use intrinsically safe tools in flammable atmospheres.
- Do not remove safety shields or compromise built-in safety devices.

Power Tool Safety

- Grinders, drills, saws, and welding equipment are common
- If improperly used can cause serious or life-threatening injury



(Continued)

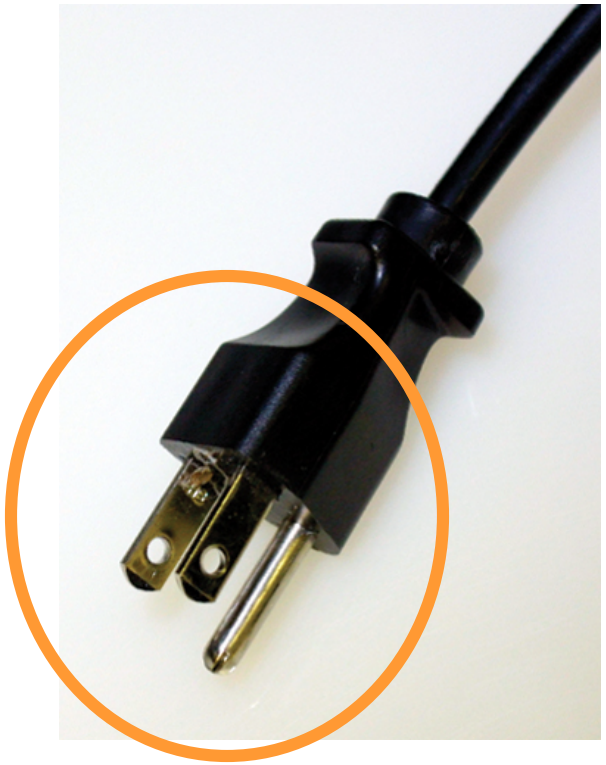
Power Tool Safety

- Only firefighters who have read and understand manufacturer's instructions should use power tools.
- Tool repairs must be made by a trained and authorized person.

(Continued)

Power Tool Safety

- Keep accurate records of repairs.
- Any electrical tool not marked "double insulated" should have a three-prong plug



Safety in Training

- Always wear appropriate protective gear.
- Refer trainees with symptoms to a physician prior to participation.
- Take into account environmental conditions.

(Continued)

Safety in Training

- Do NOT allow horseplay or unprofessional conduct.



Safety in Training — Live Fire Exercises

- Must be conducted according to NFPA® 1403
- Key requirements of NFPA ® 1403
  - Site preparation
    - Clear site of potential hazards

(Continued)

Safety in Training — Live Fire Exercises

- Key safety requirements of NFPA ® 1403
  - Student-to-instructor ratio of 5:1 may not be exceeded
  - Must be a designated safety officer and an instructor-in-charge
  - Cannot use human beings as victims

(Continued)

Safety in Training — Live Fire Exercises

- Key safety requirements of NFPA® 1403
  - Fires may not be set in egress routes
  - Uniforms and PPE must conform to NFPA® standards

(Continued)

Safety in Training — Live Fire Exercises

- Key requirements of NFPA® 1403
  - Prerequisite training — All participants must have had basic fire training
  - Water supply — Adequate supply must be provided; separate for attack and backup lines

(Continued)

Safety in Training — Live Fire Exercises

- Key requirements of NFPA® 1403
  - Training plan — Must be prepared and a briefing held



(Continued)

Safety in Training — Live Fire Exercises

- Key requirements of NFPA® 1403
  - Fuel — Must have known burning characteristics
  - Ventilation — Means must be provided to prevent uncontrolled flashover and backdraft

Maintain and Service Equipment

- Equipment for fire training
  - Must be in good condition
  - Frequently wears out sooner
  - Should be inspected before each drill

(Continued)

Maintain and Service Equipment

- Records and testing
  - Records must be maintained on all equipment for training
  - Training equipment should be tested according to:
    - Manufacturer's instructions
    - Applicable standards

Emergency Scene Preparedness

- Accidents or injuries at emergencies
  - Often caused by a series of events
  - Can be prevented by being in a ready state

Actions for Preparedness: Beginning Work Shift

- Be in the proper uniform, physically rested, and mentally alert
- Ensure all tools and equipment are in place and working
- Ensure PPE is in proper location.

(Continued)

Actions for Preparedness: Beginning Work Shift

- Ensure SCBA is fully functional.
- Ensure EMS equipment is checked and restocked.

Actions for Preparedness: In the Fire Station

- Firefighters must never put themselves in a position to delay response.
- When alarm sounds, stay calm and listen to dispatch
- Quickly and calmly mount apparatus

Actions for Preparedness: Any Stage of an Emergency

- If a firefighter is out of balance, he or she must correct the situation before going on to the next stage
- Firefighters must never operate in a manner that makes them a part of the emergency or creates a new one.

Emergency Scene Safety

- Incident Commander (IC)
  - Officer of the first-arriving unit begins to control incident by assuming Command and using an incident management system

(Continued)

Emergency Scene Safety

- Initial IC must size up critical factors
  - Life safety hazards
  - Nature and extent of emergency
  - Vessel type, arrangement, and access
  - Resources
  - Special hazards

(Continued)

Emergency Scene Safety

- IC must determine overall incident strategy
  - Offensive operations
  - Defensive operations



(Continued)

Incident Action Plan

- IC develops IAP and bases operations around completion of tactical priorities
- Tactical priorities in a vessel fire
  - Firefighter safety
  - Rescue
  - Fire control
  - Loss control

(Continued)

Incident Action Plan

- Priority objectives are reflected in benchmarks of completion
  - Personnel Accountability Report (PAR)
  - All Clear
  - Under Control
  - Loss Stopped

Offensive Fire Operations

- Based around a controlled, aggressive interior search and fire attack
- Companies must be assigned according to fireground organizational structure
- Must work with the IAP

(Continued)

Offensive Fire Operations

- Crew members inside hazard zone must be within contact with each other at all times.
  - Voice
  - Vision
  - Physical

(Continued)

Offensive Fire Operations

- Companies must have at least one portable radio on correct tactical channel.
- After primary All Clear and Under Control are complete, efforts must be focused on controlling loss.

Defensive Operations

- Based on:
  - Determining boundaries of hazard zone
  - Potential collapse zone
  - Keeping companies out of these boundaries
- Highest priority on all defensive fires is firefighter safety.

Minimizing Risks

- Work within the IAP.
- Adequately assess the situation and maintain situational awareness.
- Wear appropriate PPE.
- Work together as a team.
- Follow all departmental SOPs.

(Continued)

Minimizing Risks

- Maintain communications with team members and Command.
- Do a risk/benefit analysis for every action.
- Employ safe and effective tactics.
- Use a personnel accountability system.

(Continued)

Minimizing Risks

- Have one or more RICs standing by.
- Set up Rehab.
- Use appropriate emergency escape techniques.
- Maintain company discipline and team integrity.

Personnel Accountability

- Every department must use some system of accountability that tracks personnel in the hazard zone



(Continued)

Personnel Accountability

- Accountability is vital
  - Sudden and unexpected change in fire behavior
  - Structural collapse
- Personnel accountability systems
  - Passport system
  - SCBA tag system

Interior Operations Techniques

- Scan the outside of the vessel before entry.
- Wear full PPE including SCBA.
- Take appropriate tools and equipment.
- Maintain team integrity.

(Continued)

Interior Operations Techniques

- Remain in radio contact.
- Take a hoseline or tag line.
- Pay attention to surroundings.

(Continued)

Interior Operations Techniques

- Increase chances for survival
  - Maintain situational awareness.
  - Know protocol for Mayday.

Emergency Escape

- Involves breaking through doors, using emergency escape hatches, windows, or walls to escape life-threatening situations.



(Continued)

Emergency Escape

- Situations can occur when:
  - Sudden and unexpected change in fire behavior
  - Structural collapse
- May also be necessary if a firefighter becomes lost or disoriented and is in danger of running out of air

Rapid Intervention

- NFPA® and OSHA regulations state that whenever firefighters are in an IDLH atmosphere:
  - Must work in teams of two or more
  - At least two fully trained and equipped firefighters must be outside

(Continued)

Rapid Intervention

- Outside team must be ready at a moment's notice
- Known as the "two-in/two-out" rule



(Continued)

Rapid Intervention

- RIC members may be assigned other duties but must be able to fulfill primary function.

Summary

- Firefighters are sometimes put at some risk during training and emergency operations. It is the firefighters' responsibility to maintain their physical and mental readiness to handle these situations.

(Continued)

Summary

- During fires and other emergencies, firefighters may be ordered into inherently dangerous situations, and to protect themselves they must be aware of the hazards and risks involved.

(Continued)

Summary

- Firefighters must always remember that along with their department they are responsible for their own safety. And firefighters must remember the most fundamental of all firefighter safety rules: Everyone looks out for everyone else.

Review Questions

1. What are three ways to prevent firefighter injuries?
2. What NFPA® standard specifies the minimum requirements for a fire department safety and health program?
3. What are the three IFSTA Principles of Risk Management?

(Continued)

Review Questions

4. What are three guidelines that can help firefighters maintain their personal health?
5. What can firefighters do to help prevent slips, trips, and falls in the fire station?

(Continued)

Review Questions

6. What are two safety rules for hand tools and small power tools?
7. What NFPA® standard must live fire training exercises meet?

(Continued)

Review Questions

8. What is one type of personnel accountability system?
9. What are two basic interior operations techniques?

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Scott Airpak In-Service Training











NFPA 1981, 2013 Edition Changes

NFPA 1981, 2013 Edition – “Standard on Open-Circuit Self-Contained Breathing Apparatus for Emergency Services”

- Changing Primary EOSTI (low air alarm) from 25% to 33%
  - HUD – 100%, 75%, 50%, 33%
- EBSS “Buddy Breathing” Standard
  - A universal low-pressure connection will not be required
- Quick-Connect Regulator Fitting Change
  - To ensure HUD connection at all times





NFPA 1981, 2013 Edition Facepiece Requirements

- Flame and Heat Test Requirements

<u>High Heat and Flame Resistance Performance</u>

Soak @ 500° F for 5 minutes

10 Second flame exposure

6 in drop test

System has to stay positive for 24 minutes following these tests, regardless of the cylinder size

Breathing rate = 40 L/min @ 24 breaths/min

<u>Radiant heat Resistance Performance</u>

Expose mask to radiant heat load of 15 kW/m2 for 5 min

System has to stay positive for 24 minutes regardless of the cylinder size

Breathing at 40 L/min @ 24 breaths/min



NFPA 1982, 2013 Edition Changes

- NFPA 1982, 2013 Edition – "Standard on Personal Alert Safety Systems for the Fire Service"
  - Universal Sounding PASS
    - To have more consistent alarm sounds on the fire ground



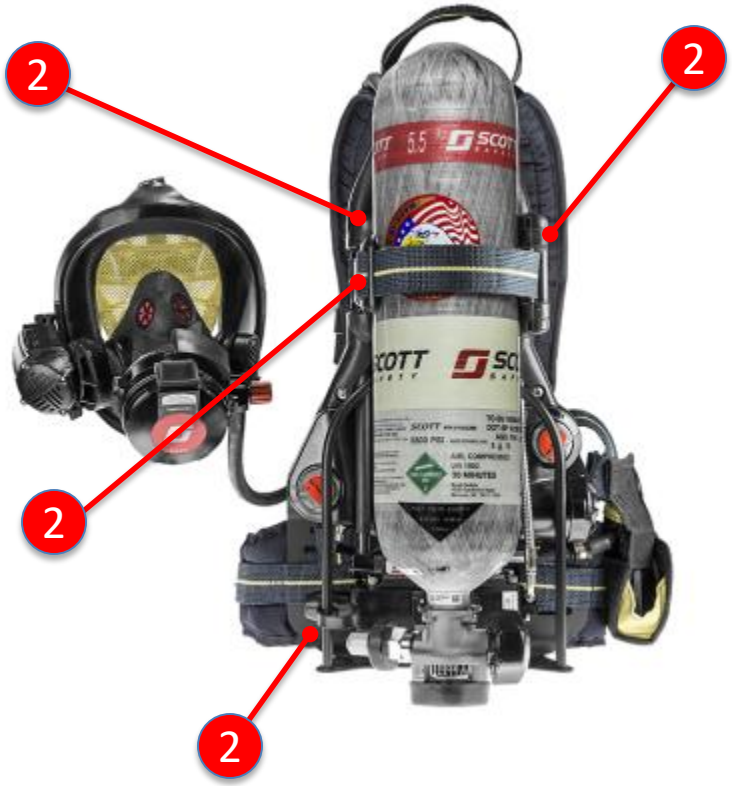
AirPak X3



- Weight management/ Enhanced Backpack design
- New Shoulder Strap Configuration
- External HUD
- Redundancy of Safety Features
- Steamlined Design
- Console Design – Large Sweep Guage
- Buddy Lights

Air-Pak X3 - Safety

Number	Safety	Features	Benefits
1	**Redundancy**	- Pressure Reducer - Drag Rescue Loop (DRL) - Piezos - Vibralert - Dual EBSS	Redundancy of safety features gives firefighters the confidence their equipment will not fail
2	**Streamlined Design**	- Hose / Wire Management - Cylinder Latch - Cylinder Strap Tri-Slide - UAC / RIC Fitting	Minimizes chances of wires or other objects getting caught on the Air-Pak
3	**Console Design**	- Large sweep gauge	Easy reading of cylinder pressure remaining



Air-Pak X3 – Comfort – Features & Benefits

Number	Comfort	Features	Benefits
1	**Weight Management**	Pressure reducer placed at waist	Less stress on shoulders Optimized center of gravity
2	**Ergonomic Design**	Design focused on backplate contours	Reduced pressure points along back
3	**New Shoulder Strap configuration**	Articulating shoulder strap assembly Sewn Drag Rescue Loop (DRL)	Mirrors movement of wearer during reaching and other exercises Resistant to shoulder pad rolling







Carbon Cylinders

- Lightest cylinder on market
- Hydrostatic testing every 5 years
- 15 year life service life



5500 PSI Cylinders



- 30’ Cylinder 1200L
- Small package almost a 10% reduction in weight!



- 45’ Cylinder 1800L
- .7 lb reduction in weight.
- 2” reduction in height
- Similar to a 4.5 – 30 min.



- 60’ Cylinder – 2400 L
- 4500 PSI 45 minute package.
- 1.15 lb. reduction in weight.
- .5” in reduction in cylinder diameter



- 75’ Cylinder 3000L
- An industry first
- Only .25 inch longer than a 4.5 – 60 min.

Carbon Cylinders

Description		Duration	Capacity		
Part Number	Pressure	Minutes (at 40 lpm)	Litres	SCF	H20 (in3)
ALUMINUM					
804101-01	2216	30	1274	45	523
CARBON_WRAPPED					
804840-01	2216	30	1274	45	523
804721-01	4500	30	1274	45	285
804722-01	4500	45	1841	65	418
804722-01A	4500	45	1841	65	416
804723-01	4500	60	2464	87	550
200930-01	5500	30	1274	45	233
200969-01	5500	45	1841	66	349
200972-01	5500	60	2464	87	465
200975-01	5500	75	3115	111	581
CARBON_WRAPPED ST7					
804722-11	4500	45	1841	65	418
SNAP-CHANGE CARBON-WRAPPED CYLINDERS					
200131-01	2216	30	1274	45	523
200128-01	4500	30	1274	45	285
200129-01	4500	45	1841	65	418
200129-01A	4500	45	1841	65	416
200130-01	4500	60	2464	87	550
200967-01	5500	30	1274	45	233
200970-01	5500	45	1841	66	349
200973-01	5500	60	2464	87	465
200976-01	5500	75	3115	111	581

Cylinder Valve

Ratchet Design

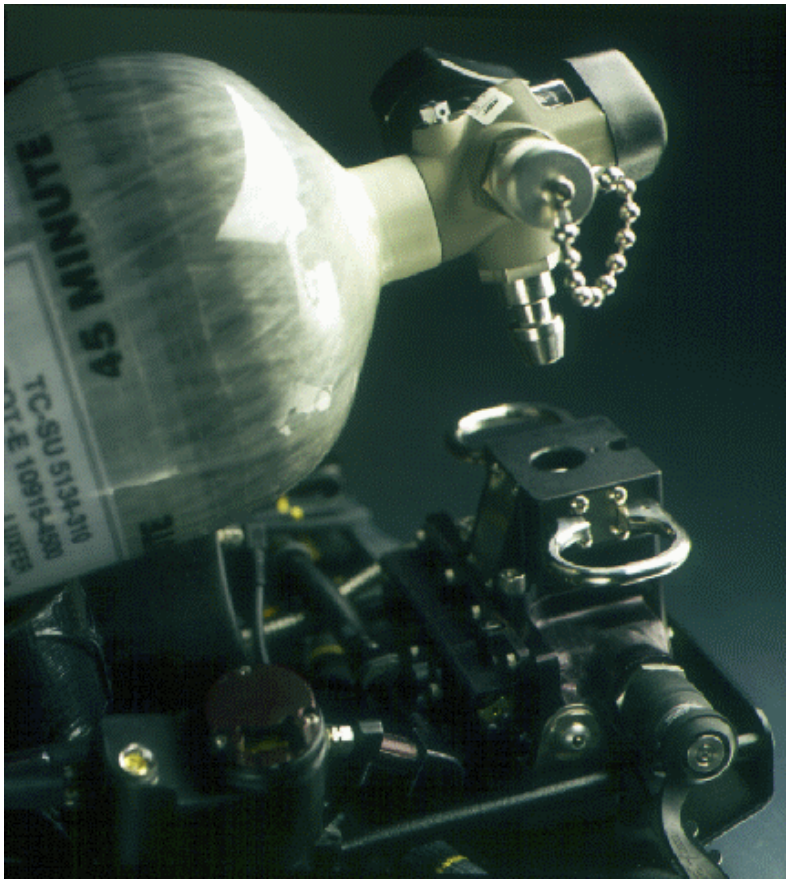
Tri-Lobe Handwheel



Snap Change Cylinder

- A quick and simple insertion into the reducer is all that is required for the X3 to ready for action.

- Once the stainless steel snout has been inserted, turn the hand wheel to start the air flow into the pressure reducer. 50 psi engages 2 stainless steel rods to lock the cylinder in. It takes 7000 lbs of shear force to break the lock.



Snap Change Cylinder

- With the redesign of the cylinder valve allows for the elimination of a high pressure hose.
- A CGA threaded connection was added for filling. The CGA has a check valve so you do not need to open the hand wheel to fill the cylinder, speeding up the cylinder charge time and less wear on the the hand wheel and valve.
- The CGA threads are protected by a rubber cap.



Redundant Pressure Reducer



- Brain of The SCBA
- High pressure reduction from 4500 or 5500 to 100 PSI
- Dual Path Redundant Pressure Reducer Protection against Debris Induced Failure
- Automatic Bypass – automatic backup
- 30 + year safety record, no NIOSH documented failures

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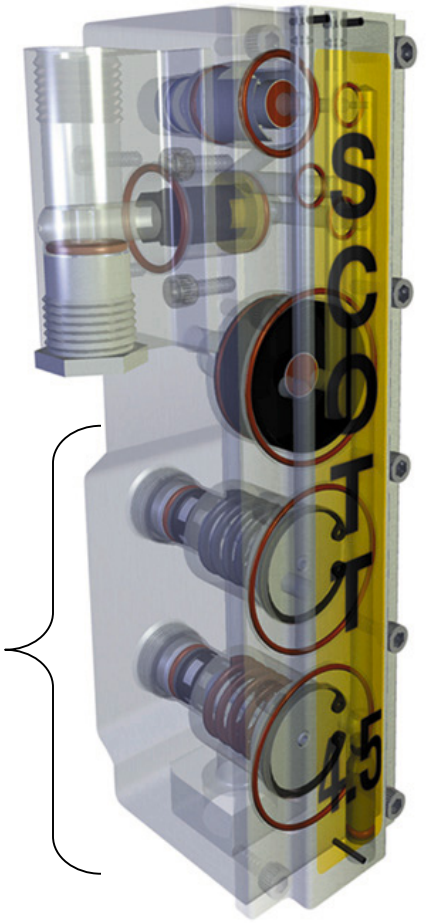
- The Air-Pak® is the ***only SCBA*** with two inter-connected **redundant** pressure reducers.
    - Developed with NASA in 1976 with no reported complete failures to date
    - A reduction in primary pressure triggers an automatic transfer to the back up reducer to provide the user an uninterrupted air flow.
    - The Vibralert® will activate, alerting the user to go to a safe breathing area.

“Two In One”
Redundant



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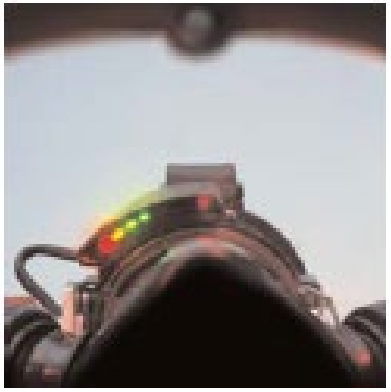
Specifications
Mask Mounted Regulator (E-Z Flo +)



- One Firefighter Gloved Hand Operation
- Redundant Locking System
- Easy Inhalation and Easy Exhalation
- Low Profile
- Regulator Can Be Cleaned
- Take regulator apart to show simplicity
- Vibralert

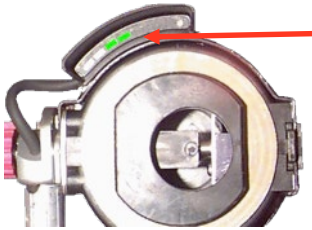
Mask Mounted Regulator (E-Z Flo +)



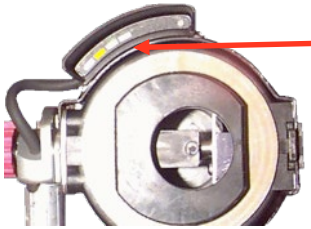


- Vibralert Primary EOS indicator – Tactile feel and low frequency audible alarm
- Philadelphia Fire Department
- HUD – Hard wired Heads-Up Display, secondary EOS indicator

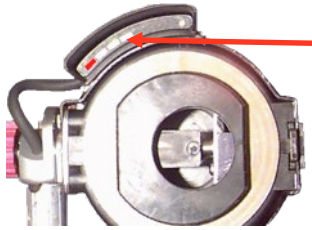
Heads-Up Display (HUD)



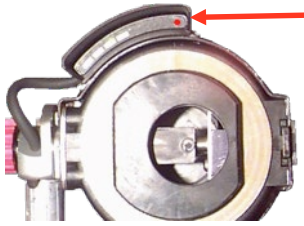
Full bottle indication, two (2) green LED's. one (1) green LED indicates ¾ bottle



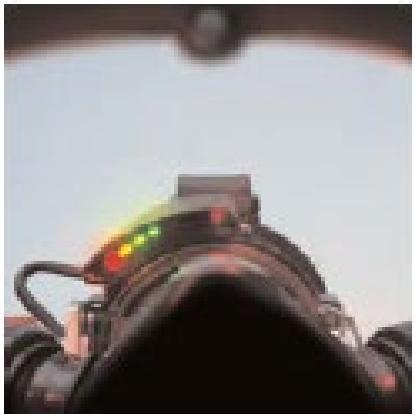
Half bottle indication, one (1) yellow LED, flashing at one (1x) time per second.



1/3 bottle indication, one (1) red LED, flashing at ten (10x) time per second.



Low battery indicator light location, one (1) red LED.



Introducing the AV-3000 HT Facepiece



- Top Down Convertibility
- Sure Seal Reverse Reflex Design, High PF's
- Redesigned and Enhanced Communications
- Hi-Temp polycarbonate lens
- Hi-Temp Bezel
- 5 Piece harness
- Kevlar Headnet
- Excellent Peripheral and Downward Vision

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SureSeal System for the AV3000® Facepiece:



TOP DOWN CONVERTIBILITY™

CBRN APPROVED MODELS

1) Smaller Kevlar head harness eliminates bunching for greater comfort and fit

2) Buckles are strategically positioned to not interfere with head suspension in helmets and avoid torque on the seal

3) The mounting seal provides a wide, low profile landing area for reliable PPE interface

4) Reverse reflex technology offers a flexible U-shaped design for comfort and dependability

5) Reflective positioning tab for proper alignment and quick donning

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AV-3000 HT Facepiece Features & Benefits

High visibility inhalation valves for easy inspection and added safety

New open bracket with robust attachment for added safety

Right or left side mounting for user preference



High temp polycarbonate lens and high temp nylon bezel for added durability and enhanced wearer safety

Redesigned ducts for improved voice intelligibility, with or without communication devices

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AV-3000 HT Facepiece – Innovative AND Smart



- Backward compatible – Customers can purchase AV-3000 HT and retain NFPA approvals with ‘02 or ‘07 SCBA
- Forward compatible – Customers can purchase AV-3000 HT facepieces now for use with their ‘02 or ‘07 SCBA, and upgrade to 2013 Ed. SCBA later

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Integrated PASS

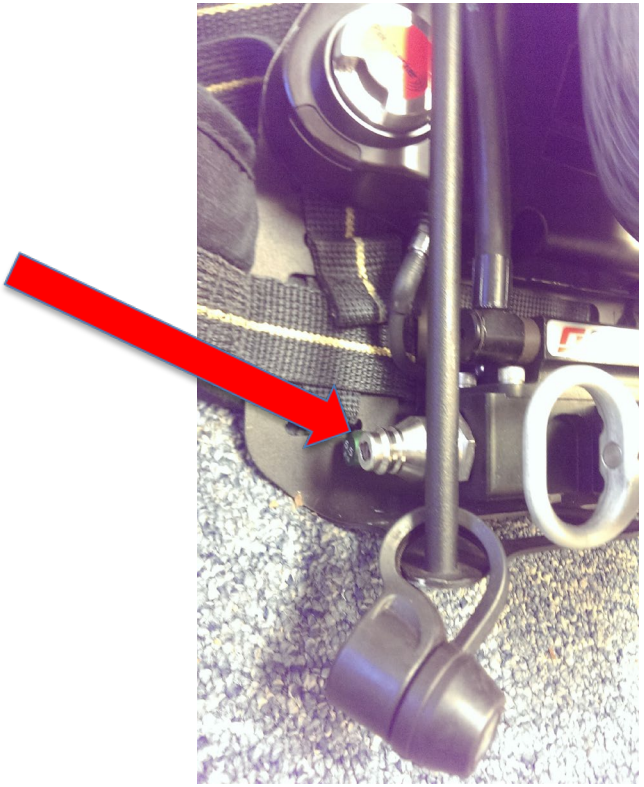


- Infrared Motion detector at the hips
- Pre-Alert in the HUD
- Easy to operate with firefighter gloved hands.
- Angled LED backlit analog gauge console
- LED status indicators
- Photo sensing Diodes- auto dimmer switch
- One battery source

RIC Universal Air Connection (UAC)

- No change from the Scott 4.5 SCBA System
- The RIC/UAC allows air to be supplied to a down or trapped firefighter by either a Scott RIT-PAK™II or another compressed air source.





New Console Design



Angled Large Analog Sweep Gauge

LED Backlit

Big recessed buttons for firefighter gloved hands

Photo Sensing Diode for the HUD's intensity

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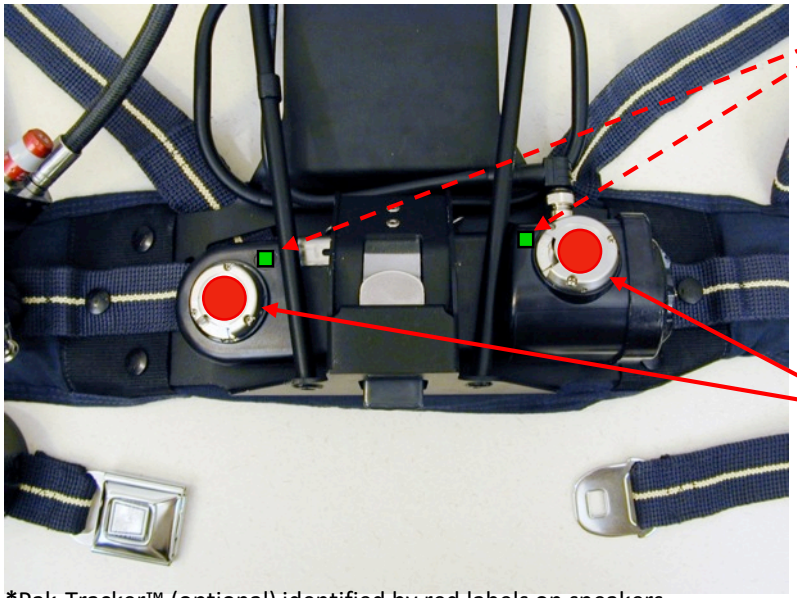
Air-Pak X3 – Safety Fire Fighter Status Indicator



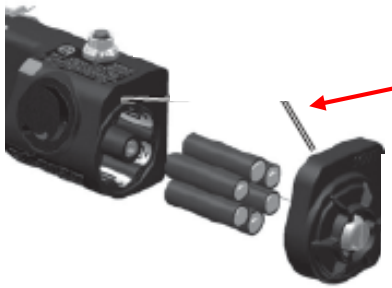
1

Number 2	Fire Fighter Status Indicator	Features	Benefits
	Status Light	"Buddy Lights"	Optimized positioning for improved visibility
	Non-Verbal Communication	"External HUD"	Unspoken team communication about air status

Pak-Alert SE® 7 – Sensor Module:



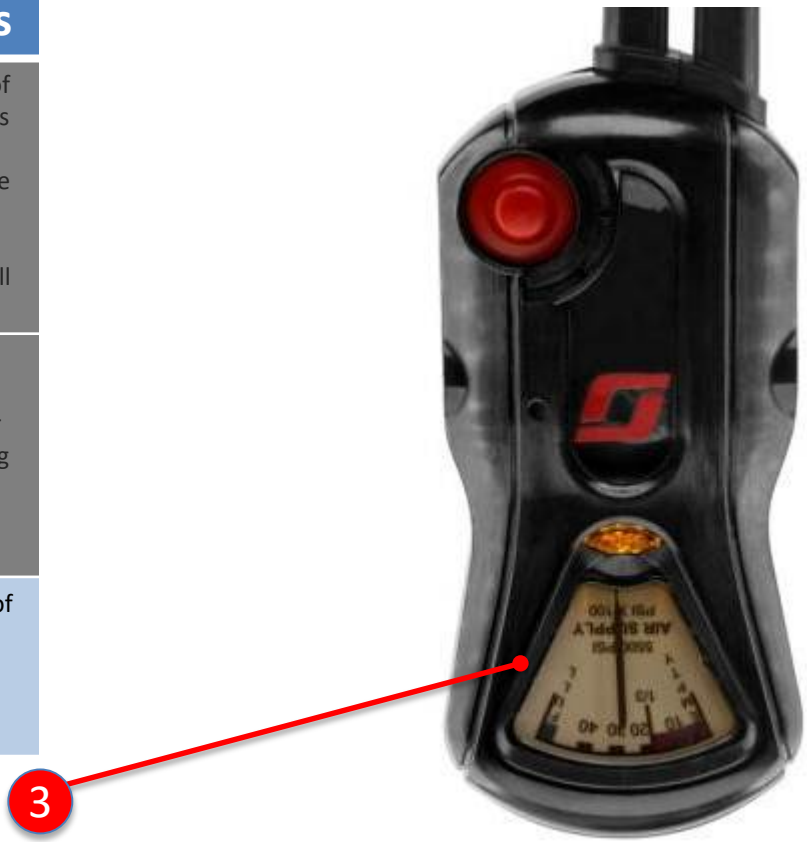
*Pak-Tracker™ (optional) identified by red labels on speakers



- Dual Status “buddy” Indicator Lights
  - Flashing Green – Normal Operation
  - Flashing Red – PASS Activation
  - Flashing Orange – Low Air Operation
- Dual Alarm Activation
  - Manual
  - No Motion
- Dual Sound Emitting Speakers*
  - Pre-Alarm – 70 to 105 dBA incrementally at left ear
  - Full-Alarm – 95 to 100 dBA @ 9.9 Ft. (3m)
- Single Battery Source
  - 6 “AA” Batteries
  - Ease of Replacement
  - Identification Polarity Labels for Alignment

Air-Pak X3 - Safety

Number	Safety	Features	Benefits
1	**Redundancy**	- Pressure Reducer - Drag Rescue Loop (DRL) - Piezos - Vibralert - Dual EBSS	Redundancy of safety features gives firefighters the confidence their equipment will not fail
2	**Streamlined Design**	- Hose / Wire Management - Cylinder Latch - Cylinder Strap Tri-Slide - UAC / RIC Fitting	Minimizes chances of wires or other objects getting caught on the Air-Pak
3	**Console Design**	- Large sweep gauge	Easy reading of cylinder pressure remaining



LED Status Indicator Lights

- Green indicates the unit is operating in normal mode.
- Red indicates Pass Device pre-alarm or Alarm.
- . Amber strobe indicates that the unit has gone into low air alarm, set at 1/3 bottle pressure.



Dual EBSS



1. Permanently Attached Hose
2. Hip to Hip Connection gives users 5-6’ of room
3. Two users breathe down the Pak with the lowest cylinder pressure first, then EBSS auto transfers to the Pak with the highest amount of air and both breathe off of it
   - so that there is no lost air
   - so that air is used from the potentially malfunctioning unit first
4. “Tool in the toolbox” for entanglement issue
5. Dual certified for “buddy breathing” and airline applications.

Scott's Top Down Convertibility



EPIC 3 Voice Amplifier



- Auto Shut Off
- 50 Hour Run Time
- Directional Speaker
- Breath and Feedback Detects
- Audible on off and low battery indication
- 30 Minute tumble test
- Upgradeable to RI and Talkaround “Crew Talk”
- IP66 Direct Jet of water and IP67 water submersion certified

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EPIC Communication System
Mask Mounted Regulator

Mask Brackets

- Creates a quick connect location to the voice emitter on the face piece

- AV-2000 / AV-3000 / AV-3000 Sure Seal (2002/2007)
  - Available - Closed bracket only
    - factory installed w/ Face piece purchase
    - Field Install Kit

- AV-3000 HT
  - Open Bracket (2013)
    - factory installed w/ Face piece purchase – **right or left side optio**n
    - Field Install Kit
  - Closed Bracket (2002/2007)
    - Field install only



Open Style



Closed Style



EPIC 3 Communication System - Overview

The EPIC 3 communication system

- a state of the art communication system for use in a multitude of applications.

  - EPIC – Enhanced Performance Integrated Communications
  - 3 – Three in one communication system
    - **Voice Amplifier**
    - **Radio Interface (RI) – coming Spring 2015**
    - **Talk Around – coming Spring 2015**

      “Crew Talk”



EPIC 3 RI Communication System – Radio Interface

- Has all of the same features as the EPIC Voice Amplifier
  - Directional speaker
  - Auto Shutoff
  - Easy to clean speaker
  - 3 AAA batteries
- NFPA and NIOSH approved accessory
- 50 hours of battery life
- Auto Shutoff after 20 Min of non-use…



EPIC 3 RI Console

- **Two Versions available**

- **Wireless high temp console**
  - Same features as the lapel mic, plus:
    - Also has a Bluetooth link that allows interface with the EPIC 3 RI or other Bluetooth accessories such as jaw bone
    - UL and ATEX approved intrinsic safety
    - Attaches to a variety of portable radios
- **Remote PTT** – Paddle and Ring options
- **Battery life info**
  - Over a year of operation connected to an energized radio
  - ~30 hours of continuous Bluetooth link

- **High temp Lapel Mic**
  - No wireless interface
  - Test to NFPA Heat and flame test
  - Test to NFPA high heat and flame
  - Very rugged



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EPIC Communication System – Radio Interface

- Also has a Bluetooth link that allows this amplifier to be used with **the EPIC3 RI console** and other standard Bluetooth devices like cell phones and Jawbone.
  - May be used as a stand alone amplifier
  - When linked, allows for remote communications via the EPIC 3 console or other Bluetooth devices
  - Speaker is positioned near the users ear to improve ability to hear incoming radio traffic
  - Speaker has no moving parts



EPIC Communication System – Talk Around

- **Multiple Channel standalone radio system**
  - Programmable channels
  - User selectable channels
- **Range greater than 300 ft.**
- **Variants include RI and/or Amplifier functionality**
  - When combined w/ RI
    - Radio communications come into the console
    - Talk around communications come to the RI Speaker



Pak-Tracker™ Firefighter Locator System

The system locates a downed or trapped firefighter

- **Utilizes high frequency 2.4GHz RF: more directional signal**
- **Greater than 1100 feet line of sight search distance**
- **SCBA Integrated or Stand-alone system can be used**



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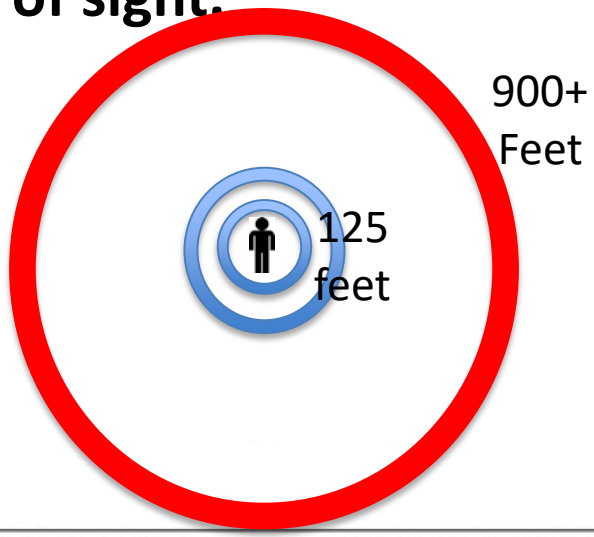
Pak-Tracker™ Firefighter Locator System Technologies

- Low Radio Frequency – **100** feet line of sight, signals are in half circle fluxes
- Sonar - **125** feet line of sight, signal is absorbed by smoke and drywall.
- **High Radio Frequency – 1100+ feet line of sight.**





Pak-Tracker™ Downed Firefighter Locator System

Hand-Held Receiver (HHR)

- Large two line LCD
- Displays two transmitting ID's
- Monitor & scroll thru 36 PT's
- Signal strength indicators 0-99 numeric and graph



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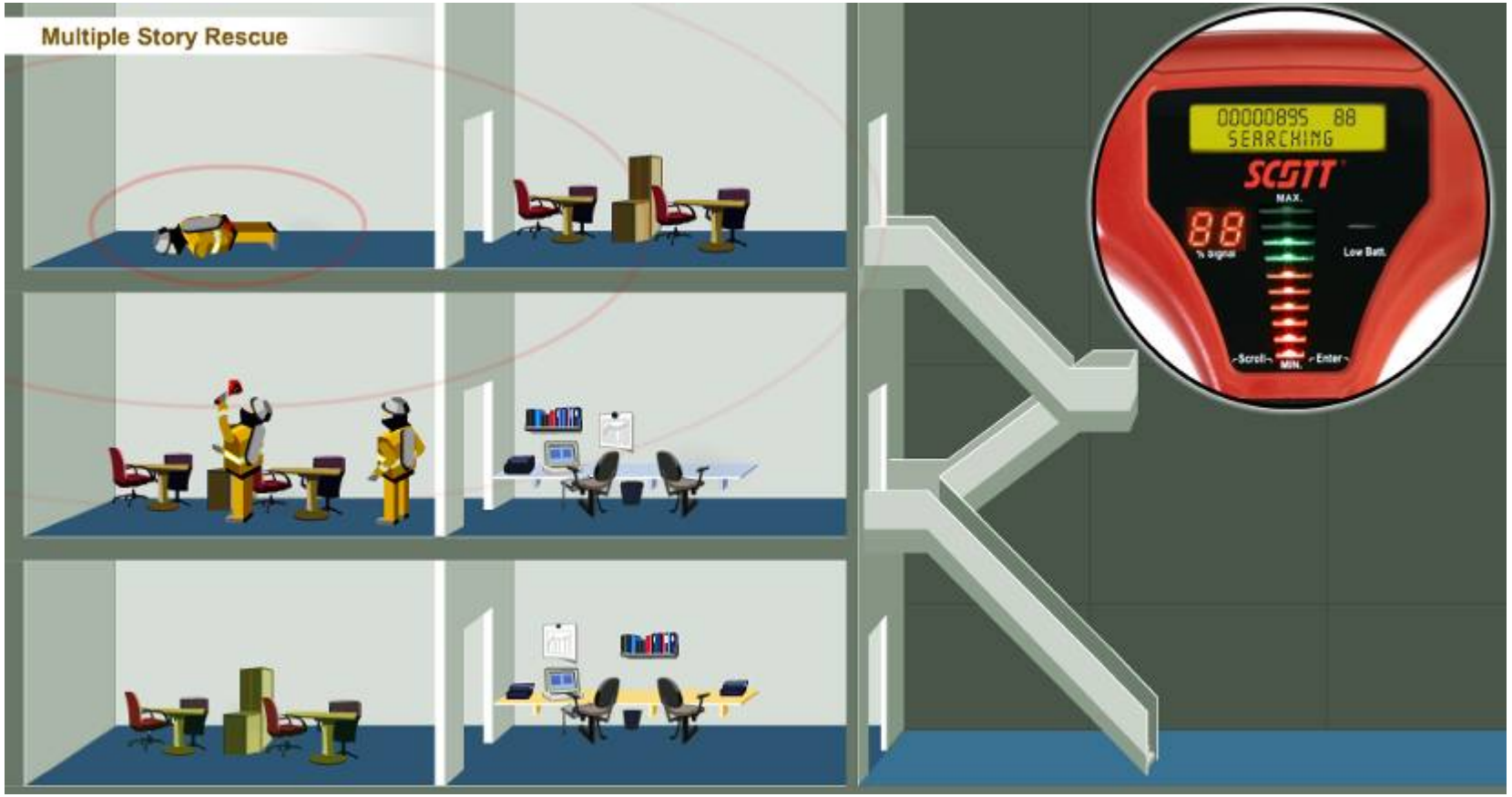
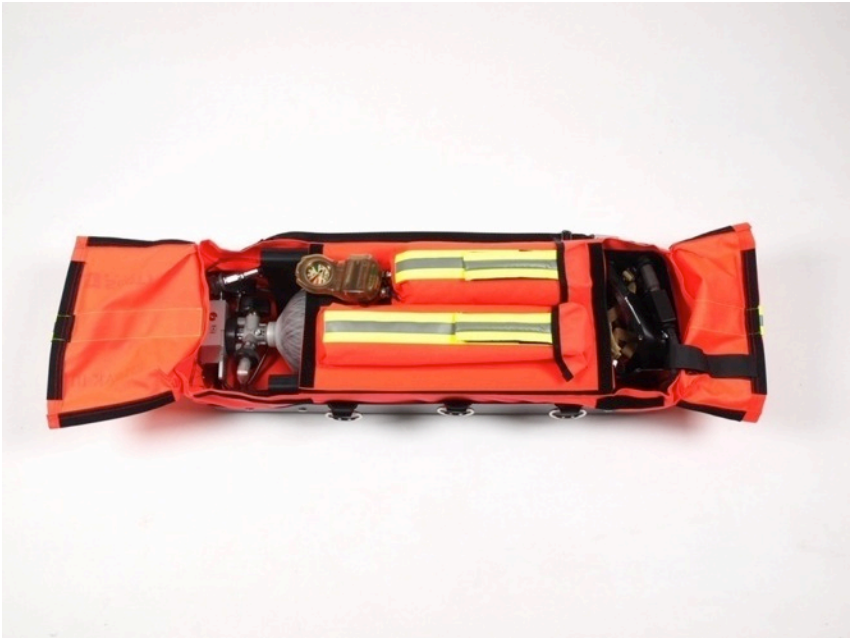
Pak-Tracker™


Multiple Story Rescue
00000895 88
SEARCHING
SCOTT
MAX.
88
% signal
Low Batt.
Scroll
MIN.
Enter

RIT –PAK III

Rapid Intervention Crew / Universal Air Connection (RIC / UAC)

- The RIT-PAK III allows the user to take advantage of two options; low pressure direct connection and high pressure equalization.
- With the RIT-Pak III the user can customize the low pressure manifold side / Dual EBSS connection with 2 additional end user defined competitive connections.



RIT-PAK III

Rapid Intervention Crew / Universal Air Connection (RIC / UAC)

- The low pressure manifold Dual EBSS has an additional 2 customizable ports for interoperability



RIT PAK III

Rapid Intervention Crew / Universal Air Connection (RIC / UAC)

- The Console with Pressure Indicator Lights
- Identifying the cylinder pressure as full, ¾, ½ and ¼ .
- At ¼ the Audible Low- Pressure alarm activates.
- It runs on 2 AA batteries.



RIT PAK III

Rapid Intervention Crew / Universal Air Connection (RIC / UAC)

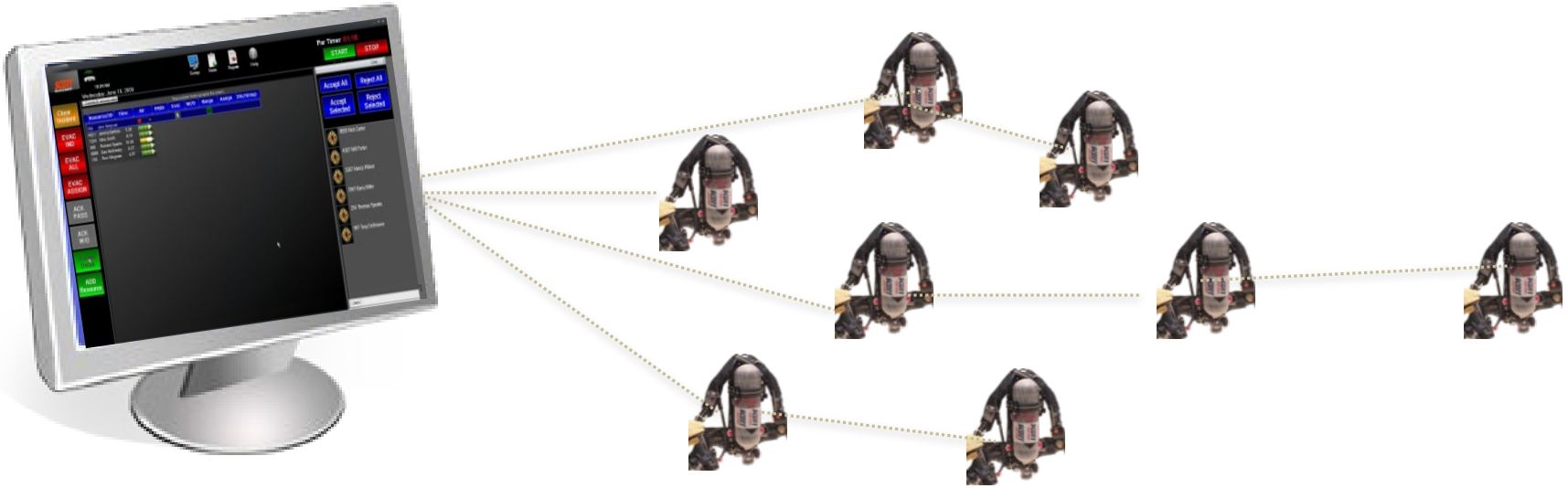
- The Facepiece is a modified AV-3000 with SureSeal for a downed firefighter or victim



SEMS® II

Electronic Management System

- **Patented Mobile Mesh Network Technology**
  - **MESH NETWORK**
  - **SELF HEALING** to allow each transmitter to automatically find the best path to the base station, resulting in reduced “breaks” in the mesh network.
  - **Range of 3500 ft.** (line of sight) from the base station to a single SCBA

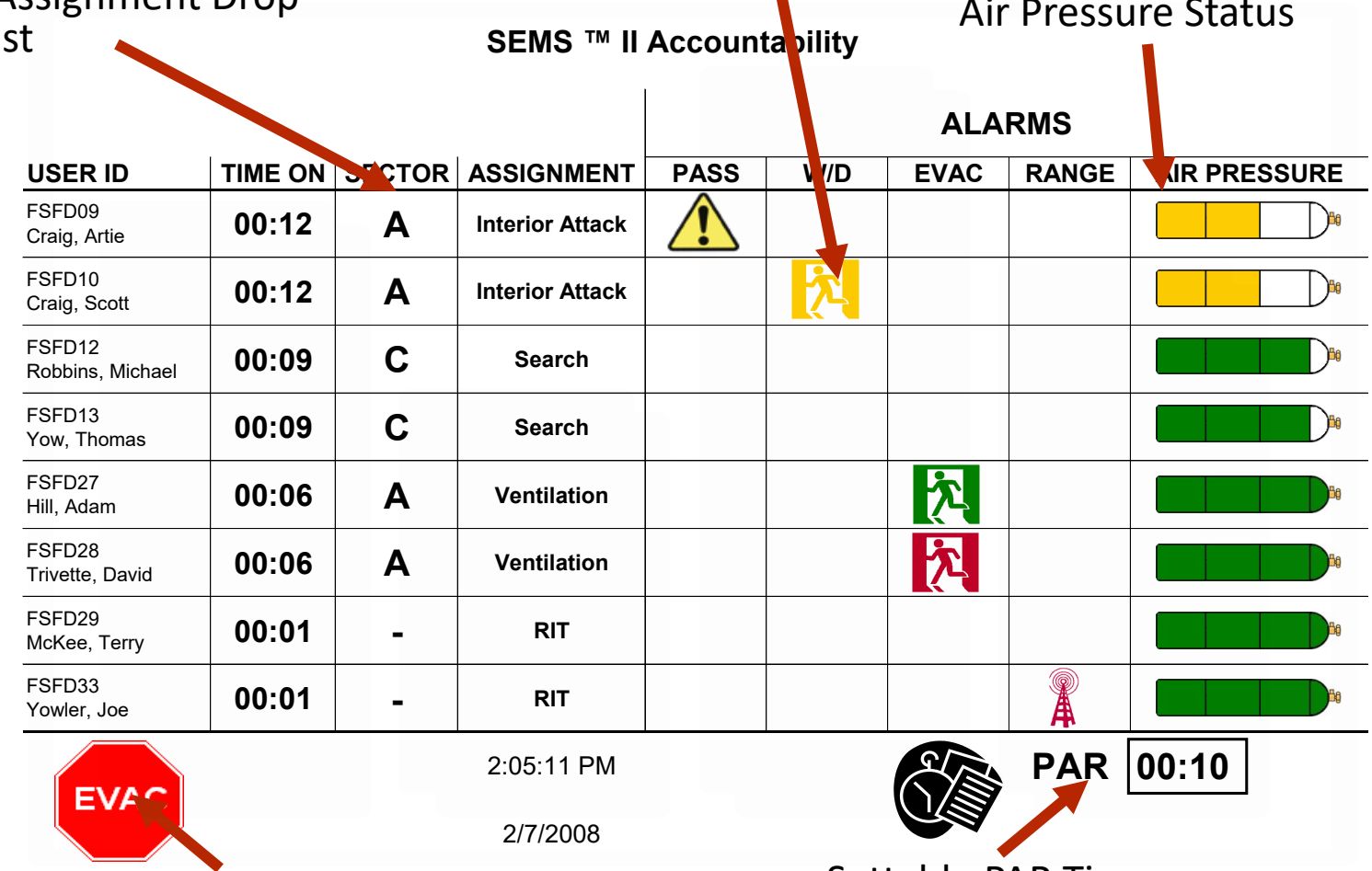


Screen Dashboard

Customizable Sector/Assignment Drop-down List

Alarms

Air Pressure Status



Large EVAC Button

Settable PAR Timer

Final layout subject to change

SEMS II Scott Advanced Accountability Suite



SEMS II Console



USB Gateway



SEMS II Repeater

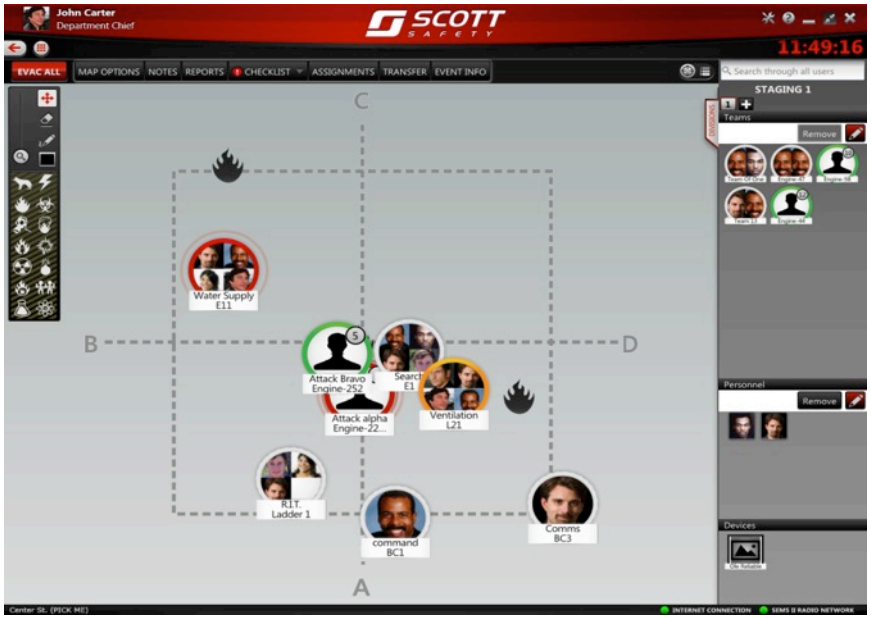




RFID Tally's



Tag Reader



Accountability Software



Queue Interface

© 2013 Scott Safety

Responding To Our User's Needs
NAVSEA Project

Navy's Rationale for choosing Scott

"The Scott Aviation SCBA clearly offers the most technically superior unit.

"The evaluation has determined Scott Aviation meets all critical attributes. In addition, the Scott Aviation SCBA also meets all the important and desirable attributes and has many outstanding design features such as an exceptional low air alarm, dual mode audible and vibratory alarm, redundant first stage regulator, extremely user friendly operational controls, and it did not have any features that scored unsatisfactory.

"No trade-offs were made in this assessment since the Scott Aviation SCBA also has the lowest 15-year life cycle cost which consists of unit price, maintenance cost and warranty. The Scott Aviation warranty is the most comprehensive and this unit is considered to be the best value for the Government."

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MADE IN USA







Scott proudly declares that both the Scott Air-Pak 75 and Air-Pak NxG7 SCBA's carry the "Made in USA" approvals.

MADE IN THE USA

- What does it mean to be made in the USA?



According to the Federal Trade Commission (FTC), “Made in USA” means that “all or virtually all” of the product has been made in the United States. That is, all significant parts, processing and labor that go into the product must be of U.S. origin. Products should not contain any - or only negligible - foreign content.

Thank You

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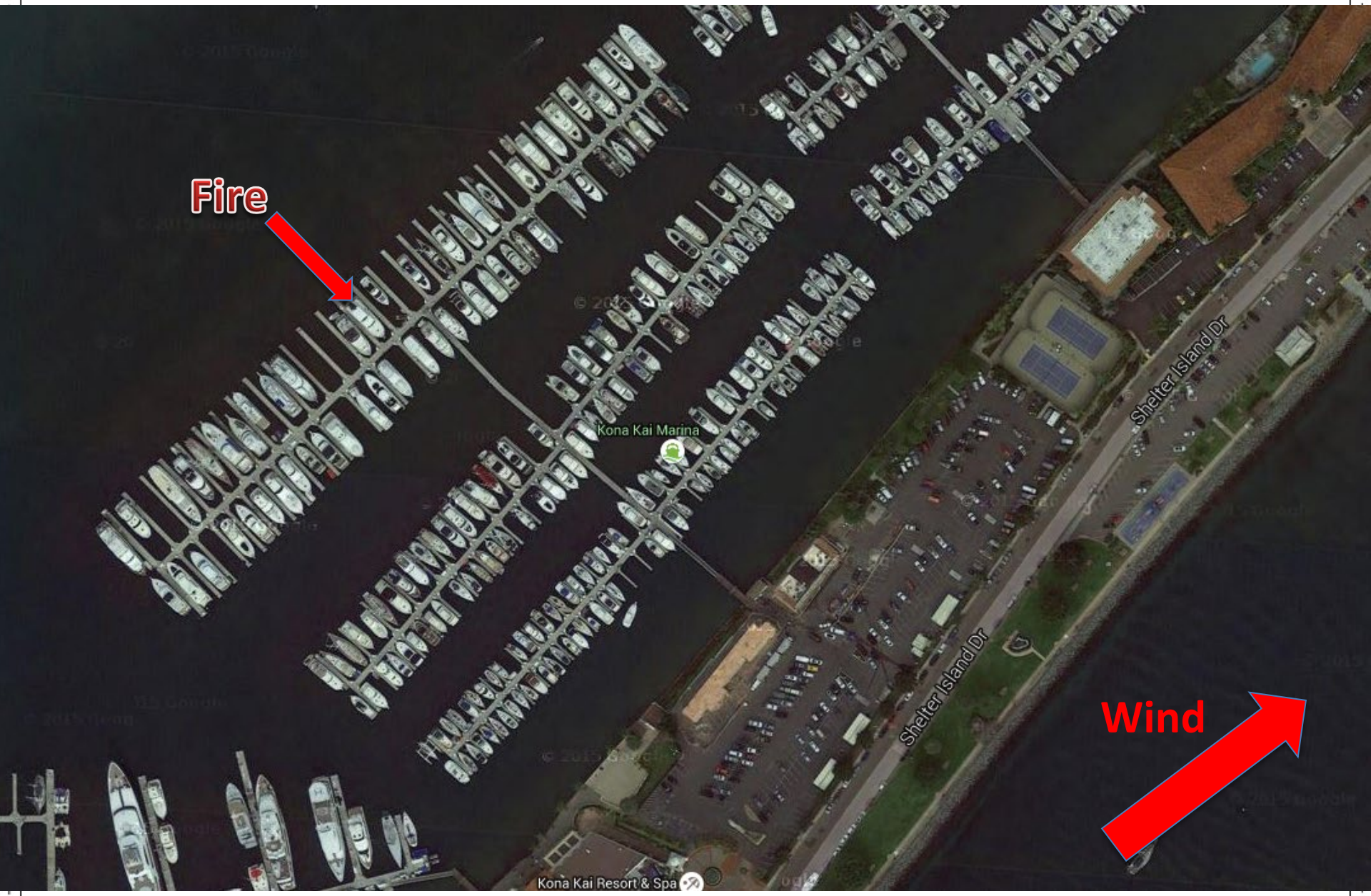

Fire
Kona Kai Marina
Shelter Island Dr
Shelter Island Dr
Wind
Kona Kai Resort & Spa


Pier 32 Gangway
Fire
Pier 32 Marina dock 100
Pier 32 Marina dock 200
Pier 32 Marina dock 300
Pier 32 Marina dock 400
Pier 32 Marina dock 500
Pier 32 Marina dock 600
Wind

Essentials of Fire Fighting,
5th Edition

Chapter 2 — Firefighter Personal Protective Equipment

Firefighter I



Chapter 5 Lesson Goal

- After completing this lesson, the student shall be able to identify, use, and maintain various articles of clothing and equipment following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. Describe the purpose of protective clothing and equipment.
2. Describe characteristics of protective clothing and equipment.
3. Summarize guidelines for the care of personal protective clothing.

(Continued)

Specific Objectives

4. List the four common respiratory hazards associated with fires and other emergencies.
5. Distinguish among characteristics of respiratory hazards.

(Continued)

Specific Objectives

6. Describe physical, medical, and mental factors that affect the firefighter's ability to use respiratory protection effectively.
7. Describe equipment and air-supply limitations of SCBA.

(Continued)

Specific Objectives

8. Discuss effective air management.
9. Distinguish among characteristics of air-purifying respirators, open-circuit SCBA, and closed-circuit SCBA.
10. Describe basic SCBA component assemblies.

(Continued)

Specific Objectives

11. Discuss storing protective breathing apparatus.
12. Summarize recommendations for the use of PASS devices.
13. Describe precautionary safety checks for SCBA.

(Continued)

Specific Objectives

14. Discuss general donning and doffing considerations for SCBA.
15. Summarize general items to check in daily, weekly, monthly, and annual SCBA inspections.
16. Summarize safety precautions for refilling SCBA cylinders.

(Continued)

Specific Objectives

17. Discuss safety precautions for SCBA use.
18. Describe actions to take in emergency situations using SCBA.
19. Discuss operating in areas of limited visibility while wearing SCBA.

(Continued)

Specific Objectives

20. Discuss exiting areas with restricted openings under emergency conditions while wearing SCBA.
21. Don PPE and SCBA for use at an emergency. (Skill Sheet 5-I-1)
22. Doff PPE and SCBA and prepare for reuse. (Skill Sheet 5-I-2)

(Continued)

Specific Objectives

23. Inspect PPE and SCBA for use at an emergency incident. (Skill Sheet 5-I-3)
24. Perform emergency operations procedures for an SCBA. (Skill Sheet 5-I-7)

(Continued)

Specific Objectives

25. Exit a constricted opening while wearing standard SCBA. (Skill Sheet 5-I-8)
26. Change an SCBA cylinder — One-person method. (Skill Sheet 5-I-9)
27. Change an SCBA cylinder — Two-person method. (Skill Sheet 5-I-10)

(Continued)

Protective Clothing

- Helmet
  - Protects head from impact
  - Protects head from scalding water, products of combustion
- Protective hood
  - Protects portions of face, ears, neck not covered by helmet or coat collar



(Continued)

Protective Clothing

- Protective coat/trousers
  - Protect trunk, limbs against cuts, abrasions, burn injuries
  - Protect from heat/cold
  - Provide limited protection from corrosive liquids



(Continued)

Protective Clothing

- Gloves
  - Protect hands from cuts, abrasions, burns
- Safety shoes/boots
  - Protect feet from burns, puncture wounds
- Eye protection
  - Protects wearer's eyes from hazards

(Continued)

Protective Clothing

- Hearing protection
  - Limits noise-induced hearing loss
- Self-contained breathing apparatus (SCBA)
  - Protects face, lungs from heat, smoke, toxic products of combustion and airborne contaminants

(Continued)

Protective Clothing

- Personal alert safety system (PASS)
  - Provides audible means by which a lost, trapped, or incapacitated firefighter can be located

DISCUSSION QUESTION



How do you feel about wearing personal protective clothing and equipment?

Helmet Characteristics

- Benefits
  - Prevents hot water, embers from reaching ears and neck
  - Protects head from impact
  - Protection from heat, cold
  - Secondary protection of face/eyes with faceshield
  - Colored helmets, removable shields provide I.D.

(Continued)

Helmet Characteristics



- Structural fire fighting helmets must have ear flaps or neck covers
- Chin straps ensure helmets stay in place upon impact
- For secondary face/eye protection, faceshields are attached to helmet

Eye Protection Characteristics

- Several styles of safety glasses, goggles available
- Frames, lenses should meet ANSI Standard Z87.1 for severe exposure to impact, heat



Hearing Protection Characteristics

- Most common use is for firefighters who ride apparatus exceeding maximum noise exposure levels
- Intercom/ear protection systems provide dual benefit
- Earplugs/earmuffs may be used



Protective Hood Characteristics



- Typically made of fire-resistant material
- Provide higher level of protection than facepiece alone when used in conjunction with SCBA
- Facepiece-to-face seal is important

Turnout Coat Characteristics



- NFPA® 1971 requires
  - Outer shell
  - Moisture barrier
  - Thermal barrier
- Barriers
  - Trap insulating air
  - Provide limited protection

(Continued)

Turnout Coat Characteristics

- Features that provide additional protection/ convenience









(Continued)

Turnout Coat Characteristics

- Should be cleaned to manufacturer's specifications, reflective trim maintained to NFPA® standards

Turnout Pant Characteristics



- Integral part of protective ensemble, only NFPA®-compliant lower-extremity covering
- Considerations in protective coats apply to trousers

(Continued)

Turnout Pant Characteristics

- Options may increase durability
- Must fit properly
- Should be cleaned according to manufacturer's specifications; reflective trim maintained to NFPA® standards

Hand Protection Characteristics

- Protect against heat, steam, cold penetration; provides resistance to cuts, punctures, liquid absorption
- Must allow dexterity, tactile feel
- Must fit properly



Foot Protection Characteristics

- Available in variety of styles, materials
- Must fit well
- Protects from potential hazards
- Firefighters should have
  - Protective boots
  - Safety shoes



(Continued)

Foot Protection Characteristics

- Many safety boots incorporate steel for extra protection
- Most rubber fire fighting boots have insulation

DISCUSSION QUESTION



Why should firefighters never wear clothing made of synthetic materials, such as nylon or polyester, when fighting a fire?

DISCUSSION QUESTION



Why is it important that the manufacturer's recommendations for the care and maintenance of personal protective clothing be followed whenever cleaning or repairing protective clothing?

Considerations for Use and Limitations of PPE

- Removing liner of turnout coat compromises effectiveness
- Wearing PPE may increase risk of heat stress
- Firefighters may suffer burns with no warning

(Continued)

Considerations for Use and Limitations of PPE

- Structural PPE provides no CBRNE protection
- Decreased ability to feel ambient heat
- Damaged PPE causes greater risk
- Using appropriate PPE is only way to be properly protected

Care of Personal Protective Clothing

- Must be maintained according to manufacturer's specifications
- If contaminated, should not be worn until properly laundered according to manufacturer's recommended procedure

(Continued)

Care of Personal Protective Clothing

- Care of helmets
- Cleaning considerations



DISCUSSION QUESTION



How should contaminated protective clothing be washed and handled?

Respiratory Hazards



District Chief Chris E. Mickal, NOFD Photo Unit

- IDLH atmospheres
- OSHA considers the interior of a burning building to be an IDLH atmosphere

(Continued)

Respiratory Hazards

- Four common hazards
  - Oxygen deficiency
  - Elevated temperatures
  - Smoke
  - Toxic atmosphere (with and without fire)

Oxygen Deficiency

- Combustion process consumes oxygen while producing toxic gases
- Deficiencies can occur in below-grade locations, chemical storage tanks, etc.
- Oxygen-deficient atmosphere — One containing less than 19.5 percent oxygen

(Continued)

Oxygen Deficiency

- Some departments are equipped to monitor atmospheres, measure hazards directly
- Where monitoring is impossible or readings questionable, SCBA should be worn

Elevated Temperatures

- Exposure to heated air can damage respiratory tract
- Excessive heat taken quickly into lungs can cause serious decrease in blood pressure, failure of circulatory system

(Continued)

Elevated Temperatures

- Inhaling heated gases can cause pulmonary edema, which can cause death from asphyxiation
- Tissue damage from inhaling hot air is not immediately reversible; prompt medical treatment needed

Smoke

- Consists of oxygen, nitrogen, carbon dioxide, carbon monoxide, carbon particles, other products
- Particles enable condensation of gaseous products of combustion
- Some particles in smoke irritating; others lethal

Toxic Atmospheres Associated With Fire

- Inhaled toxic gases may have several harmful effects on human body
- Some gases cause impaired lung function
- Other gases pass into bloodstream and impair oxygen-carrying capacity of red blood cells

(Continued)

Toxic Atmospheres Associated With Fire

- Type, amount of toxic gases released at fire vary according to
  - Nature of combustible
  - Rate of heating
  - Temperature of evolved gases
  - Oxygen concentration
- Carbon monoxide

Toxic Atmospheres Not Associated With Fire

- Many industrial processes use extremely dangerous chemicals
- Because presence is likely, require use of SCBA
- Hazardous materials
- Common calls may also require SCBA
- When in doubt, wear SCBA

Physical Factors Affecting Use of Respiratory Protection

- Physical condition
- Agility
- Facial features

DISCUSSION QUESTION



What is the impact of poor physical condition on SCBA use?

Medical Factors Affecting Use of Respiratory Protection

- Neurological functioning
- Muscular/skeletal condition
- Cardiovascular conditioning
- Respiratory functioning

Mental Factors Affecting Use of Respiratory Protection

- Adequate training in equipment use
- Self-confidence
- Emotional stability



Limitations of SCBA Equipment

- Limited visibility
- Decreased ability to communicate
- Increased weight
- Decreased mobility

Limitations of SCBA Air Supply

- Physical conditions of user
- Degree of physical exertion
- Emotional stability of user
- Condition of apparatus
- Cylinder pressure before use
- Training/experience of user

DISCUSSION QUESTION



How can training and experience be a limited factor for SCBA use?

Air Management

- Air supply left after low-air alarm sounds may not allow enough exit time
- Comply with accountability system in use, maintain situational awareness, manage air supply
- Responsibility for safety rests with firefighter

Basic Elements to Effective Air Management

- Know point of no return
- Know how much air is available
- Make conscious decision to stay or leave when air down to 50 percent

Decision to Stay or Leave

- Made by supervisor and is team decision except for catastrophic event
- Firefighter should never leave team in hazard zone unless supervisor permits

Checks to Maximize Air Supply

- Beginning of shift
- When donning SCBA and opening cylinder valve
- While working
- During egress from hazard zone
- When refilling/replacing cylinder

Air-Purifying Respirators

- Used in atmospheres containing normal levels of oxygen but contaminated with airborne particulates
- Most basic type — Surgical-type filter mask
- More sophisticated models have air-purifying filter, canister, or cartridge



Self-Contained Breathing Apparatus (SCBA)

- Must be used in atmospheres that are oxygen-deficient, contaminated with smoke or other toxic materials
- Two types
  - Open-circuit
  - Closed-circuit

(Continued)

Self-Contained Breathing Apparatus (SCBA)

- Closed-circuit SCBA, open-circuit airline equipment most often used in shipboard operations, extended haz mat incidents, some rescue operations
- Open-circuit airline equipment

SCBA Harness Assembly

- Rigid frame with straps to hold air cylinder on firefighter's back
- Adjustable shoulder straps
- Waist straps
- Common problem — Failure to buckle waist straps



SCBA Air Cylinder Assembly

- Cylinder, valve, pressure gauge, PASS device
- Main weight of breathing apparatus
- Various cylinder sizes, capacities, features offered
- Cylinder weight increases physical stress



SCBA Regulator Assembly

- High-pressure hose with low-pressure alarm, bypass valve, pressure-reducing device
- Reduces pressure of cylinder air to slightly above atmospheric pressure, controls flow of air to meet respiratory requirements of wearer

(Continued)

SCBA Regulator Assembly

- When wearer inhales, pressure differential created in regulator
- Depending on model, will have control valves for normal/emergency operations
- Remote pressure gauge shows air pressure remaining in cylinder, mounted in position visible to user

(Continued)

SCBA Regulator Assembly



- According to NFPA® 1981, all new SCBA must be equipped with rapid intervention crew universal air connection (RIC UAC)

Facepiece Assembly



- Facepiece lens, exhalation valve, low-pressure hose; sometimes includes voice amplification, head harness, helmet mounting bracket

(Continued)

Facepiece Assembly

- Provides some protection from facial/ respiratory burns, holds in cool air
- Lens made of clear safety plastic, mounted in flexible rubber facepiece
- Mask held snugly against face by head harness

Methods of Storing Protective Breathing Apparatus

- Methods vary; departments will use most appropriate method to facilitate donning
- Placed on apparatus in many ways
- If placed in seat mounts, donning should be possible without unbuckling seat belt



PASS Devices

- Use mandatory under NFPA® 1500
- Designed to alert others that a firefighter has stopped moving and may be in distress



Recommendations For Use of PASS Devices

- Use only those meeting NFPA® 1982
- Maintain according to manufacturer's instructions; test daily
- Conduct realistic training
- Retrain semiannually

(Continued)

Recommendations For Use of PASS Devices

- Check SCBA, PASS devices when coming on duty or before use
- Train rescuers to listen for distress sound
- Silence PASS device to facilitate communication when firefighter located

PASS Device Warning

Alarm signals produced may be significantly reduced at temperatures as low as 300°F (150°C).

SCBA Precautionary Safety Checks

- Check air cylinder gauge — No less than 90 percent of cylinder capacity
- Check remote and cylinder gauge to ensure reading within 100 psi (700 kPa) of each other



(Continued)

SCBA Precautionary Safety Checks

- Check harness assembly, facepiece to ensure all straps fully extended
- Operate all valves to ensure proper function
- Check PASS device



Donning SCBA Lying on Deck

- Both methods require SCBA to be positioned in front of firefighter with all straps extended, ready to don
  - Over-the-head method
  - Coat method

Donning From Seat Mount

- Firefighters can don SCBA en route
- Should only be done if can safely be performed while vessel is underway
- Hardware
  - Spring clamp

(Continued)

Donning From Seat Mount

- Makes checking equipment more convenient
- Necessitates more care when exiting vessel

Donning the SCBA Facepiece

- Steps for most SCBA similar
- One difference — Some use rubber harness with adjusting straps while others use mesh skullcap with adjusting straps



General Considerations — Donning the SCBA Facepiece

- No hair should come between skin, sealing surface
- Chin should be centered in chin cup, harness centered at rear of head
- Facepiece straps should be tightened
- Facepiece should be checked for proper seal, operation

(Continued)

General Considerations — Donning the SCBA Facepiece

- Positive pressure should be checked
- Hood must be worn over facepiece harness or straps; all exposed skin must be covered and vision unobscured
- Helmet should be worn with chin strap secured

Doffing SCBA

- Firefighters should make sure they are out of contaminated area and SCBA is no longer required
- Discontinue flow of air from regulator to facepiece
- Disconnect low-pressure hose from regulator or remove regulator from facepiece (MAY STILL BE HOT!!)

(Continued)

Doffing SCBA

- Remove facepiece
- Remove backpack assembly while protecting regulator (BEWARE OF HOT SURFACES!)
- Close cylinder valve
- Relieve pressure from regulator in accordance with manufacturer's instructions

(Continued)

Doffing SCBA

- Extend all straps
- Refill, replace cylinder
- Clean, disinfect facepiece

DISCUSSION QUESTION



Why should a firefighter check their SCBA daily?

SCBA — Daily/Weekly Care

- Should include checks of
  - Cylinder pressure
  - All gauges
  - Low-pressure alarm
  - All hose connections
  - Facepiece
  - Harness system
  - All valves
  - Built-in PASS devices

(Continued)

SCBA — Daily/Weekly Care

- General considerations
  - Breathing apparatus should be cleaned, sanitized immediately after use
  - Facepiece should be thoroughly washed
  - Dry facepiece
  - Damaging actions



SCBA — Monthly Care

- Inspections should include removing equipment from service and checking
  - All components for deterioration
  - Leaks around valves, hose connections
  - Operation of all gauges, valves, regulator, exhalation valve, low-air alarm

SCBA — Annual Care

- Should be done in accordance with manufacturer's recommendations
- Requires special training
- Service provider must be able to disassemble apparatus into basic components and conduct tests using specialized tools

(Continued)

SCBA — Annual Care

- Air cylinders must be stamped or labeled with date of manufacture, date of last hydrostatic test
- Always empty cylinders before returning them for servicing, testing



Safety Precautions — Filling Air Cylinders

- Filled from cascade system
- Filled directly from compressor purification system





(Continued)

Safety Precautions — Filling Air Cylinders

- No matter how they are filled, same precautions apply
  - Place in shielded fill station
  - Prevent from overheating by filling slowly
  - Ensure completely full but not overpressurized

Precautions for SCBA Use

- All firefighters must be fit-tested annually or when new facepieces issued
- Firefighters should closely monitor how they feel while wearing SCBA; rest when fatigued

(Continued)

Precautions for SCBA Use

- Air-supply duration varies
- After entering contaminated area, do not remove breathing apparatus until away from contaminated area
- While in IDLH atmosphere
  - Work in teams of two or more
  - Check air supply status frequently

Emergency Situations Using SCBA

- Important considerations for emergencies created by malfunctioning protective breathing apparatus
  - Conservation of air
  - Immediate withdrawal from hazardous atmosphere

(Continued)

Emergency Situations Using SCBA

- Using SCBA when regulators malfunction
  - Intermittently open, close bypass valve
  - Because air is bypassing regulator, it is under full cylinder pressure, so bypass valve should be closed after each breath and opened each time another is needed



(Continued)

Emergency Situations Using SCBA

- Recommended actions in event of SCBA malfunction
  - Follow departmental SOP
  - Do not panic
  - Withdraw to clear atmosphere

(Continued)

Emergency Situations Using SCBA

- If separated from team and lost or disoriented
  - Declare Mayday
  - Follow departmental SOP
  - Stop and think
  - Hold breath and listen
  - Remember ways to find a way out
  - Lie flat on floor close to wall

(Continued)

Emergency Situations Using SCBA

- If separated from team and trapped
  - Follow departmental SOP
  - Use portable radio to declare Mayday
  - Activate PASS device
  - Escape through any available opening
  - Use personal escape rope if window available

(Continued)

Emergency Situations Using SCBA

- If separated from team and trapped
  - Control the door
  - Place flashlight on floor with light shining toward ceiling
  - Slow breathing as much as possible

(Continued)

Emergency Evacuation Signals

- Used when IC decides all firefighters should abandon building or hazard zone
- All firefighters must be familiar
- Two common ways
- Evacuation signal triggers personnel accountability report

Areas of Limited Visibility

- Moving
  - Crawling
  - Crouched or "duck" walk
- Likely IDLH atmosphere
  - Operate in teams of two or more
  - Have some sort of tag line



Exiting Areas With Restricted Openings

- Restricted opening — One that is too small to pass through while wearing SCBA in normal manner
- May be necessary to slip out of harness assembly while leaving facepiece in place, exit, then put assembly back on

Considerations When Exiting Restricted Areas

- Maintain contact with belt-mounted regulators
- Loosen straps as necessary
- Reduce profile by removing backpack harness straps if necessary
- Push SCBA in front as necessary

Summary

- Firefighters must have the best protective clothing and equipment available.
- Even if departments furnish firefighters with the latest protective gear and it is used consistently and conscientiously, safety is not guaranteed because safety clothing and equipment have limitations.

(Continued)

Summary

- Firefighters must be thoroughly trained in the use of their protective gear and must be capable of maintaining their protective clothing and equipment so that they are ready when needed.

Review Questions

1. What structural clothing is required by NFPA® 1971?
2. List two guidelines for the proper care and maintenance of helmets.
3. What are the four common respiratory hazards associated with fires and other emergencies?

(Continued)

Review Questions

4. What factors affect firefighters' ability to use respiratory protection effectively?
5. When should firefighters check their air supply?
6. What are the four basic SCBA component assemblies?

(Continued)

Review Questions

7. What are PASS devices designed to do?
8. What checks should be made immediately prior to donning SCBA?
9. What should the daily/weekly check of protective breathing apparatus include?

(Continued)

Review Questions

10. What actions are recommended if a firefighter should become separated from team members?

Essentials of Fire Fighting

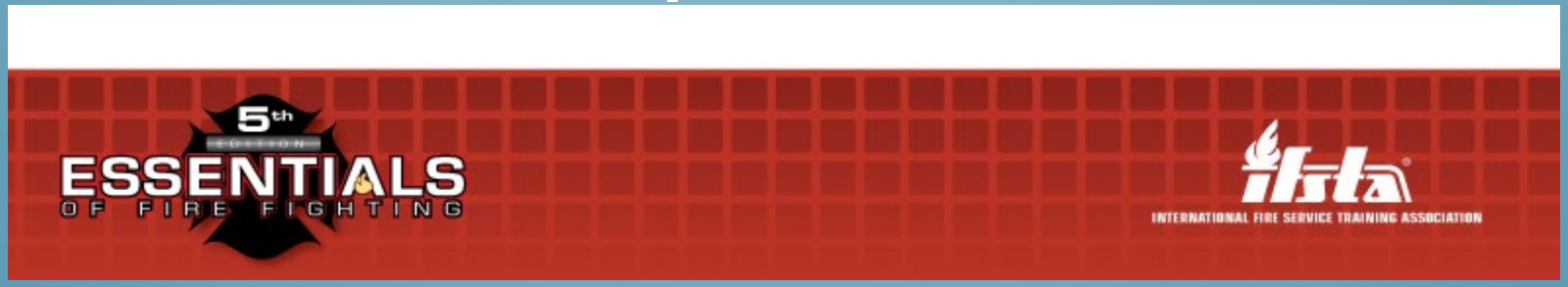
5th Edition for the

San Diego Harbor Police

Fire Hose / Nozzles

Fire Tools

Fire Pump Apparatus and Operations



LESSON GOAL

- *After completing this lesson, the student shall be able to use, care for fire hose, couplings, hose appliances, tools, make various hose packs and utilize the fire pump and its apparatus according to the San Diego Harbor Police SOP.*

SPECIFIC OBJECTIVES

1. *Fire hose sizes.*
2. *Describe types of fire hose damage and practices to prevent such damage.*
3. *Discuss general care and maintenance of fire hose & couplings.*
4. *Characteristics of hose appliances and tools.*
5. *Discuss preconnected hose loads for attack lines.* (*High Rise Pack*)

(Continued)

SPECIFIC OBJECTIVES

6. *List general safety guidelines that should be followed when advancing a hose line into a burning structure / vessel.*
7. *Discuss procedures for advancing hose and progressive hose lay.*
8. *Describe techniques for operating hose lines.*

(Continued)

SPECIFIC OBJECTIVES

9. *Make a High rise pack*

(Skill Sheet 3-3)

11. *Couple a hose.*

(Skill Sheet 3-1)

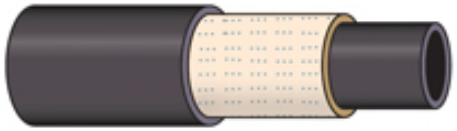
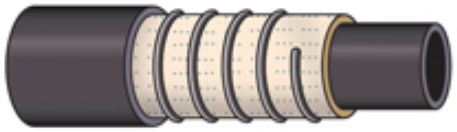
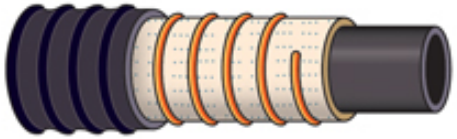
(Continued)

FIRE HOSE

- *Produced in different diameters, each for specific purposes*
- *Size refers to outside diameter*
- *Most commonly cut, coupled into pieces of 25, 50 or 100 feet.*

(Continued)

FIRE HOSE

Type	Hose Construction	Description
Booster Hose ¾- or 1-inch (20 mm or 25 mm)		• Rubber Covered • Rubber Lined • Fabric Reinforced
Woven-Jacket Hose 1- to 6-inch (25 mm to 150 mm)		• One or Two Woven-Fabric Jackets • Rubber Lined
Impregnated Single-Jacket Hose 1½- to 5-inch (38 mm to 125 mm)		• Polymer Covered • Polymer Lined
Noncollapsible Intake Hose 2½- to 6-inch (65 mm to 150 mm)		• Rubber Covered • Fabric and Wire (Helix) Reinforced • Rubber Lined
Flexible Noncollapsible Intake Hose 2½- to 6-inch (65 mm to 150 mm)		• Rubber Covered • Fabric and Plastic (Helix) Reinforced • Rubber Lined

FIRE HOSE

- *Most modern hoses use a synthetic fiber like polyester or nylon filament. The synthetic fibers provide additional strength and better resistance to abrasion.*
- *Sizes / lengths HPD uses:*
- *285’ of 1 ¾” fire hose:*
  - *100’ high-rise pack x 2*
  - *85’ ready line*
- *200’ of 2 ½” fire hose:*
  - *50’ ready flake pack x 2*
  - *50’ flat load x 2*
- *25’ of 4” fire hose, coiled*

NFPA® STANDARDS

- *NFPA® 1961, Standard on Fire Hose, lists specifications for fire hose*
- *NFPA® 1963, Standard for Fire Hose Connections, lists specifications for fire hose couplings and screw threads*

(Continued)

FIRE HOSE DAMAGE — MECHANICAL

- *Slices, rips, abrasions on coverings*
- *Crushed/damaged couplings*
- *Cracked inner linings*
- *Certain practices prevent damage*



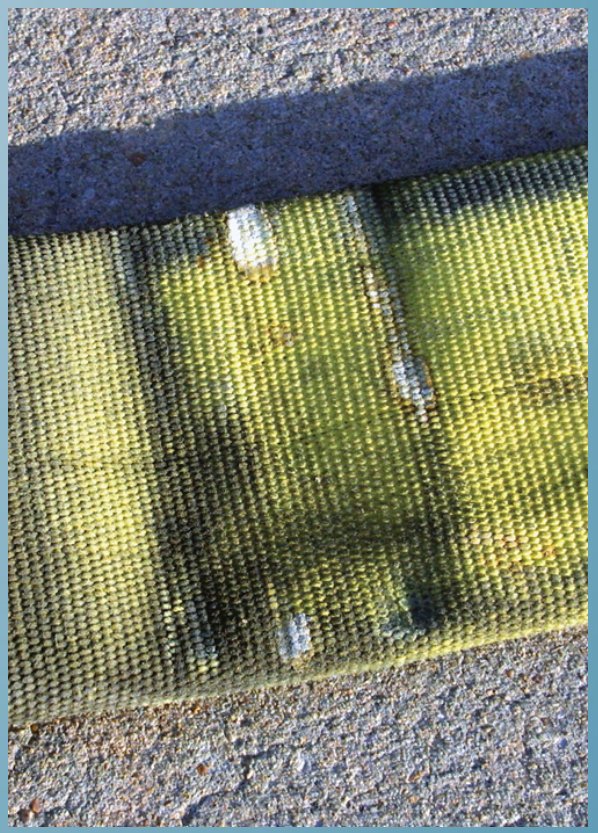
FIRE HOSE DAMAGE — THERMAL

- *Excessive heat/direct flame contact can char, melt, weaken outer jacket and dehydrate rubber lining*
- *Inner linings can be dehydrated when hose hangs to dry too long*

FIRE HOSE DAMAGE — ORGANIC

- *Rubber-jacket hose not subject to damage caused by living organism, but this is a problem on hose with woven jacket of natural fiber if stored wet*

- *Mildew, mold rot fibers of hose jacket, causing hose to rupture under pressure*



(Continued)

FIRE HOSE DAMAGE — CHEMICAL

- *Chemicals, chemical vapors can damage outer jacket on hose or cause rubber lining to separate from inner jacket.*
- *When hose exposed to petroleum products, paints, acids, alkalis, may be weakened.*

(Continued)

FIRE HOSE DAMAGE — CHEMICAL



- Runoff water from fire may carry foreign materials that can damage hose
- Certain practices prevent damage

WASHING HOSE

- *Method depends on type of hose*
  - *Hard rubber booster hose, hard intake hose, rubber-jacket collapsible hose*
  - *Woven-jacket fire hose*



(Continued)

WASHING HOSE

- *When jacket exposed to oil*
  - *Wash with mild soap/detergent using common scrub brush*
  - *Make sure oil completely removed*
  - *Thoroughly rinse with clear water*
- *Hose washing machines*
  - *Can make care, maintenance easier*
  - *Wash almost any size fire hose up to 3 inches (77 mm)*
  - *HPD use scrub brush and soap if needed.*

(Continued)

DRYING HOSE

- *Woven-jacket must be thoroughly dried before being reloaded on apparatus*
- *Should be in accordance with SOP, manufacturer's recommendations*

STORING HOSE

- *After hose has been brushed, washed, dried, should be rolled and stored in suitable racks unless it is to be placed back on vessel.*



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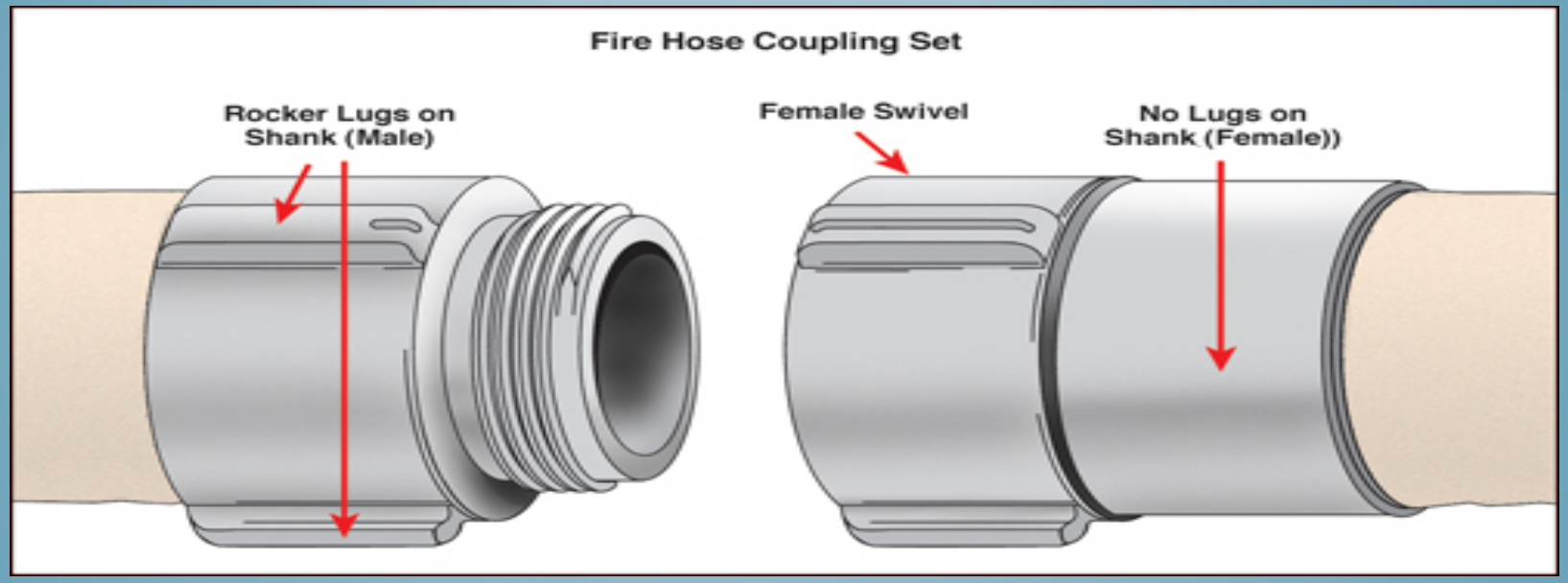
(Continued)

STORING HOSE

- *Hose rack*
  - *Located on the outside of the mechanics building at SIS.*
  - *Is freestanding on concrete & may be attached to wall*
  - *Can be moved if necessary*
  - *Also use railing along gangway down to dock.*

THREADED FIRE HOSE COUPLINGS



- *Consist of two major components*
  - *Male — External threads*
  - *Female — Internal threads*

(Continued)

THREADED FIRE HOSE COUPLINGS

- *Lugs*
  - *Aid in tightening, loosening couplings*
  - *Aid in grasping coupling when making, breaking coupling connections*
  - *Types*



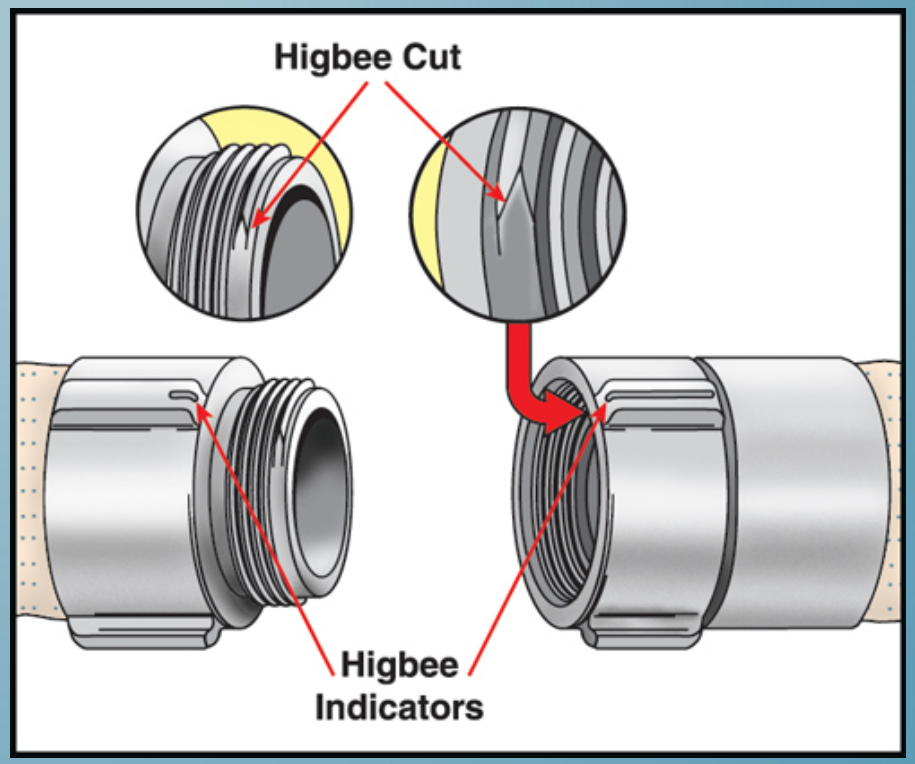




(Continued)

THREADED FIRE HOSE COUPLINGS

- *Higbee cut*
  - *Special type of thread design*
  - *Eliminates cross-threading*
  - *One rocker lug on each half has small indentation to mark where Higbee cut begins*



RULES FOR CARE OF FIRE HOSE COUPLINGS



- *Avoid dropping/dragging*
- *Do not permit vehicles to run over hose*
- *Inspect couplings when hose washed / dried*
- *Remove gasket, twist swivel in warm, soapy water*

(Continued)

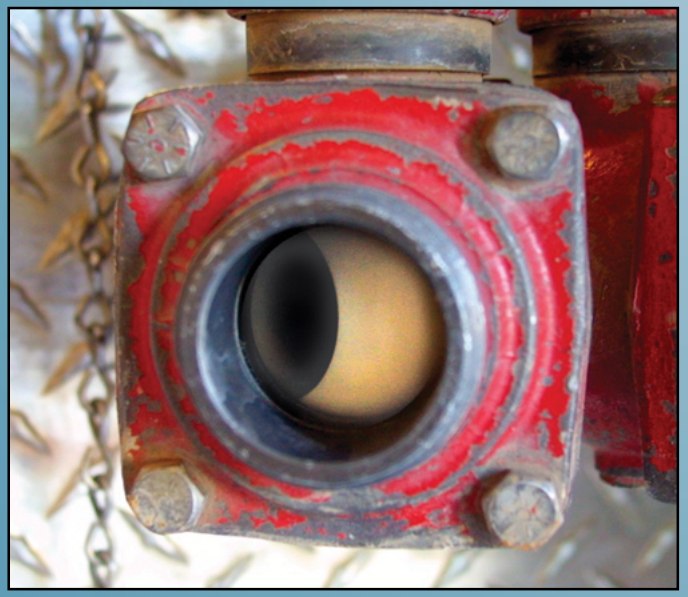
RULES FOR CARE OF FIRE HOSE COUPLINGS

- *Clean threads to remove tar, dirt, gravel, oil*
- *Inspect gasket, replace if cracked/ creased*



HOSE APPLIANCES

- *Any piece of hardware used with fire hose to deliver water*



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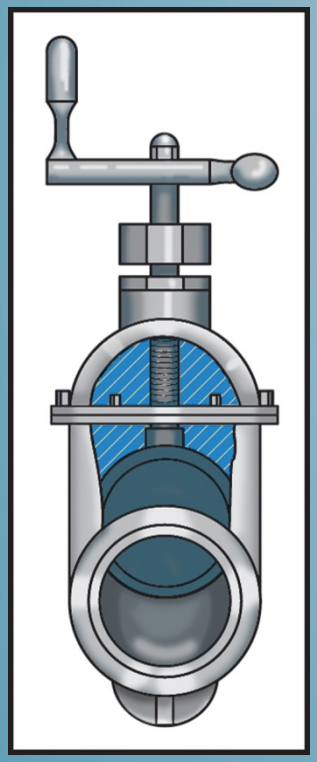
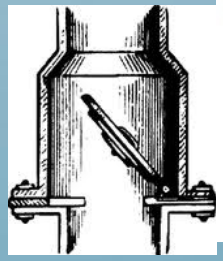
HOSE APPLIANCES



- *Valves*
  - *Control flow of water in hose lines, at hydrants, at pumpers*
  - *Ball valves*
  - *Butterfly valves*
  - *Clapper valves*
  - *Gate valves*









(Continued)

HOSE APPLIANCES

- *Valve devices*
  - *Allow number of hose lines operating on fire ground to be increased/decreased*
  - *Wye appliances*
  - *Siamese appliances*





(Continued)

HOSE APPLIANCES "FITTINGS"













(Continued)

HOSE APPLIANCES

- *Intake strainers (Eductor)*
  - *Devices attached to drafting end of hard intake to keep debris from entering fire pump*
  - *Guidelines for use*



HOSE TOOLS

- *Hose roller*
  - *Prevents damage to hose that can occur when dragged over sharp corners such as roof edges, windowsills*



(Continued)

HOSE TOOLS

- *Hose jacket*
  - *Can be installed on ruptured section of hoseline to temporarily close rupture*



(Continued)

HOSE TOOLS

- *Spanner*
  - *Used to tighten/loosen couplings*
  - *May have other built-in features*



(Continued)

HOSE TOOLS





- *Hydrant wrench*
  - *Used to remove caps from hydrant outlets, open hydrant valves*
  - *Equipped with pentagonal opening fitting most standard hydrant operating nuts*
  - *May be equipped with spanner*



(Continued)

HOSE TOOLS





- *Rubber mallet — Strike lugs to tighten/loosen couplings*
- *Hose bridge/ramp*
  - *Helps prevent damage to hose*
  - *Should be used where hose laid across street*
  - *Can be positioned over small spills*
  - *Can be used as chafing blocks*



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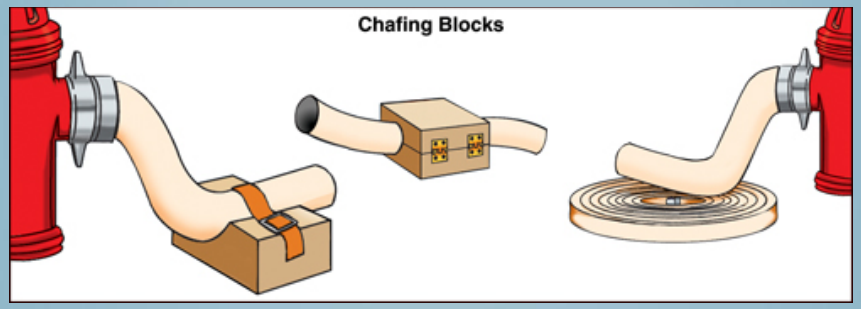
(Continued)

HOSE TOOLS



- *Chafing blocks*
  - *Used to protect fire hose where subjected to rubbing from vibrations*
  - *Useful where intake hose comes in contact with pavement, dock, etc.*
  - *May be wood, other rolled hose, ??*

(Continued)

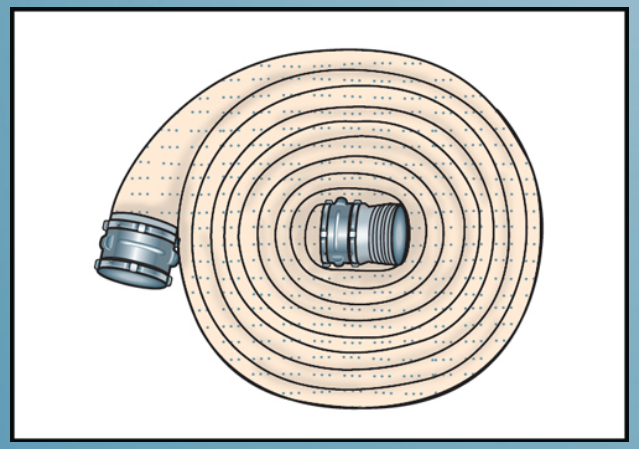
HOSE TOOLS

- *Hose strap, hose rope, hose chain*
  - *Used to carry, pull fire hose*
  - *Provide more secure means to handle pressurized hose when applying water*



STRAIGHT ROLL

- *Simplest*
- *Starts at one end, usually male coupling; to complete roll hose toward other end*
- *When complete, female end exposed and male protected in center of roll*



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STRAIGHT ROLL

- *Used in situations*
  - *When loaded back on vessel at fire to save deck space*
  - *When returned to quarters for washing*
  - *When placed in storage*
- *Easy loading*

HOSE LOADING GUIDELINES

- *Check gaskets, swivel before connecting couplings*
- *Keep flat sides of hose in same plane when two sections connected*
- *Tighten couplings hand-tight*
- *Remove kinks, twists when bent to form loop in hose bed or "pre-connect box"*

(Continued)



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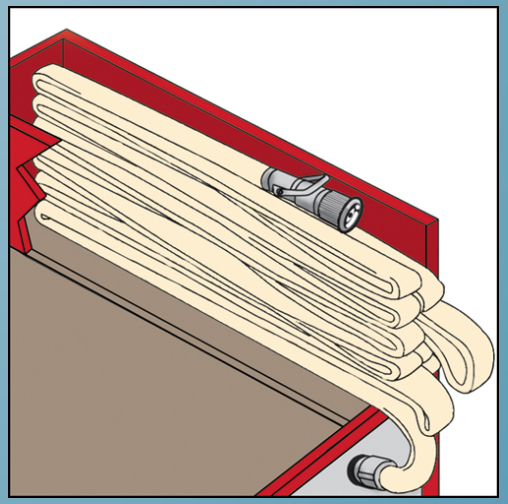
PRECONNECTED FLAT LOAD

- *Similar to flat load for large supply hose except*
  - *Preconnected*
  - *Loops provided to aid in pulling from bed*
  - *Preconnect box on deck - 85'*

  one 10'

  one 50'

  one 25' w/break-apart nozzle



- *Preconnected flat load - 100'*

  2 ½ Preconnected bound with harness

ADVANCING HOSELINES

- *Difficult when deploying up or down stairways, from standpipes, up ladders, deep into vessels*
- *Estimation of needed length*
- *Difficulty with too many 90° corners*
- *Easier when uncharged*

GUIDELINES WHEN ADVANCING HOSELINE INTO BURNING STRUCTURE

- *Bleed air from charged hose lines before entering*
- *Position nozzle operator, all members of hose team on same side of hose line*
- *Check doors for heat before opening*



(Continued)

GUIDELINES WHEN ADVANCING HOSELINE INTO BURNING STRUCTURE

- *Stay low, avoid blocking ventilation openings*
- *Chock self-closing doors open*
- *Check for, remove kinks from line*

ADVANCING HOSE UP STAIRWAY

- *Should be advanced up stairways uncharged when conditions allow*
- *Lay uncharged hose against outside wall to keep stairs clear as possible, avoid sharp bends and kinks in hose*
- *If possible, position firefighter at every turn/point of resistance*

CONTROLLING LOOSE HOSELINE



- *Very dangerous because it may flail about or whip back and forth*
- *Firefighters, bystanders may be seriously injured or killed*

- *Methods for controlling*
- *Hose clamp or kink can be used to stop flow of water when replacing burst section of hose*

OPERATING SMALL HANDLINES ONE-FIREFIGHTER METHOD

- *Only used during overhaul after fire or for very small outdoor nuisance fires*
- *Requires hose line to be straight at least 10 feet (3 m) behind nozzle*
- *Firefighter should hold nozzle with one hand and hose with the other*



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OPERATING SMALL HANDLINES TWO-FIREFIGHTER METHOD

- *Usually needed when nozzle must be advanced*
- *Nozzle operator duties*
- *Backup firefighter duties*



OPERATING LARGE HANDLINES ONE-FIREFIGHTER METHOD

- *Large loop formed that crosses over line behind nozzle*
- *Firefighter sits on intersection where hose crosses and directs stream*
- *May be used during exposure protection/overhaul operations*



(Continued)

OPERATING LARGE HANDLINES TWO-FIREFIGHTER METHOD #1

- *Uses means of anchoring hose because of nozzle reaction*
- *Nozzle operator duties*
- *Backup firefighter duties*

OPERATING LARGE HANDLINES THREE-FIREFIGHTER METHOD



- *In all cases, positioning of nozzle operator same as for two-firefighter method*

(Continued)

OPERATING LARGE HANDLINES THREE-FIREFIGHTER METHOD

- *Some departments prefer first backup firefighter to stand behind nozzle operator with third firefighter kneeling on hose behind second firefighter*
- *Another method is for all firefighters to use hose straps and remain standing*

FIRESTORM VESSEL AND ITS FIRE FIGHTING COMPONENTS



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FIRESTORM VESSEL FIRE EQUIPMENT AND TOOLS

- 285’ of 1 ¾” fire hose:
- 100’ high-rise pack x 2
- 85’ ready line (10x50x25xnozzle)
- 200’ of 2 ½” fire hose:
- 50’ ready flake pack x 2
- 50’ coils x 2
- 25’ of 4” fire hose, coiled
- 3 1 ½” Elkhart Chief break-apart nozzles
- 1 2 ½” All- purpose nozzle
- 1 2 ½” Cellar Nozzle
- 2 Double Male Couplers (4” x 1, 2 ½” x 1)
- 2 Double Female Couplers (4” x 1, 2 ½” x 1)
- 1 3.5” to 4” Increaser for Bow Pipe
- 2 Wye gate, 2 ½” to 1 ½”
- 1 Aluminum, POK Brand eductor
- 2 10’ Rigid Dewatering Hoses
- 1 Medium Expansion Foam tip (blue)
- 1 Tool Box w/ Pipe Wrench
- 1 Pick Head Axe
- 1 Bolt cutter
- 1 10 lb. sledge hammer
- 1 Haligan tool
- 1 Fire Maxx 14-in-1 Tool
- 1 Set damage control plugs
- 1 Rechargeable flashlight
- 4 Spanner wrenches
- **1 Hydrant wrench**

PUMP OPERATIONS AND CONTROLS





FIRE PUMP SHIFTING PROCEDURE

- *IN TO Pump Mode;*
  - *Ensure Port Engine Is at Idle speed.*
  - *Disengage Port Transmission*
  - *Wait 3 seconds for drive shaft to stop rotating*
  - *Engage Pump shift lever.*
  - *Wait for lights to cycle to "pump in gear" light*
  - *Engage Port Transmission*
  - *Prime pump.*
  - *Open desired monitor*
  - *Adjust Port Transmission throttle to desired Pump discharge Pressure*





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MONITORS

- *Elkhart Brass Equipment;*
  - *Radio controlled "Spit fire" 2000GPM Electric Monitor.*
  - *Manual "Big stick" 2000GPM Bow monitor*
  - *Manual "Copper head" 1250 GPM Aft deck monitor*
  - *Gated 'Wye' 2x 2.5" NST*
- *4" NST Aft Discharge*







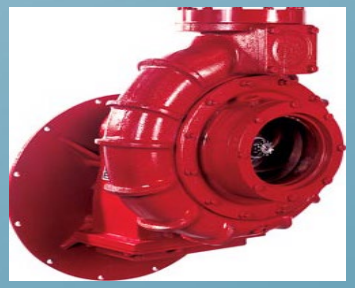




DARLEY FIRE PUMP

- *W.S. Darley PSM 1750 GPM*
- *Sea Chest with cleanout*
- *Manual - Intake shutoff valve*
- *Electric- Pump shift*





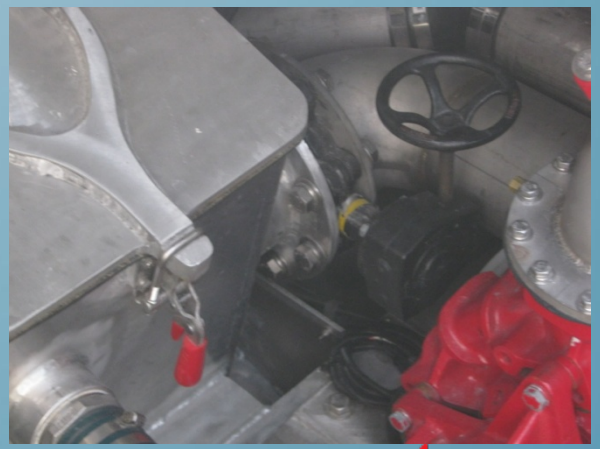
VALVES

- *Roof Monitor Valve Electric 4” w/ Manual over-ride*
- *Bow Monitor Valve*
- *4” Aft Discharge Valve*
- *6” Intake Valve*





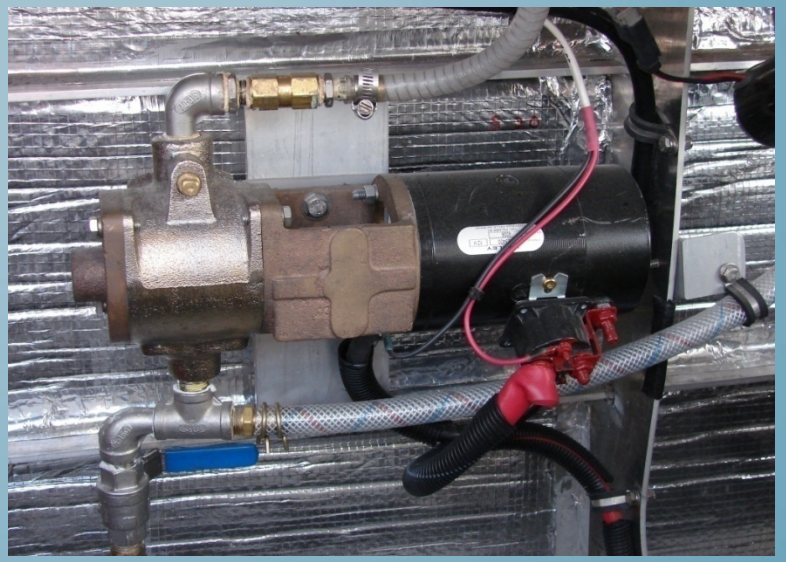




PRIMER PUMP

- *Oil-less primer*
- *Discharges through Hull port side.*

- *Trouble shooting Priming issues*
- *Check Sea chest intake for Fouling.*
- *Check Sea Chest Lid- Is it closed?*
- *Confirm Sea chest lid is making a good seal.*
- *Check Intake Valve- Is it open?*
- *Check Hose between Primer and pump for leaks.*
- *Inspect in-line Check valve- confirm it is serviceable.*



FOAM SYSTEM

- *Foam Pro 2002.*
- *80 USG Tank.*
- *Plumbed to pump discharge before header.*
- *Filled with F500*









SUMMARY

- *To fight fires safely and effectively, firefighters / Police officers must know the capabilities and limitations of the various types of fire hose, tool and apparatus used in their departments.*
  Considerations of your personal limitations should also be evaluated.

(Continued)

QUESTIONS?

Essentials of Fire Fighting,
5th Edition

Chapter 4 — Portable Fire Extinguishers

Firefighter I



Chapter 6 Lesson Goal

- After completing this lesson, the student shall be able to operate portable fire extinguishers effectively and safely following the policies and procedures set forth by the authority having jurisdiction.

Specific Objectives

1. Describe methods by which agents extinguish fire.
2. List mechanisms by which portable extinguishers expel their contents.
3. Distinguish among classifications of fires and the most common agents used to extinguish them.

(Continued)

Specific Objectives

4. Describe types of extinguishers and their common uses.
5. Discuss extinguishers and agents for metal fires.
6. Explain the portable extinguisher rating system.

(Continued)

Specific Objectives

7. Describe factors to consider in selecting the proper fire extinguisher.
8. Describe items to check for immediately before using a portable fire extinguisher.
9. Describe the PASS method of application.

(Continued)

Specific Objectives

10. Summarize procedures that should be part of every fire extinguisher inspection.
11. Discuss damaged portable fire extinguishers and obsolete portable fire extinguishers.

(Continued)

Specific Objectives

12. Operate a stored pressure water extinguisher.
13. Operate a dry chemical (ABC) extinguisher. (Skill Sheet 6-I-2)
14. Operate a carbon dioxide (CO2) extinguisher. (Skill Sheet 6-I-3)

Fire Extinguishment Methods

- Smothering
- Cooling
- Chain breaking
- Saponification

DISCUSSION QUESTION



Has anyone in the class ever used a portable fire extinguisher to extinguish a fire?

Portable Extinguisher Expulsion Mechanisms

- Manual pump
- Stored pressure
- Pressure cartridge

Fire Classifications

- Class A fires — Involve ordinary combustibles
  - Easily extinguished with water, water-based agents (foam), dry chemicals
  - Water most common agent used by fire service

(Continued)

Fire Classifications

- Class B fires — Involve flammable/ combustible liquids, gases, greases
  - Special fire hazards; should not be extinguished until fuel gas shut off
  - Special-hazard fires get larger as fuel volume increases
  - Extinguishing agents include carbon dioxide, dry chemical, Class B foam

(Continued)

Fire Classifications

- Class C fires — Involve Class A or B fires created by electrical energy
  - Do not use water, water-based agents until electrical energy eliminated
  - Recommended method is to turn off or disconnect electrical power before using appropriate extinguisher

(Continued)

Fire Classifications

- Class D fires — Involve combustible metals, alloys
  - Can be identified by bright white emissions from combustion process
  - Class D, dry powder extinguishers work best

(Continued)

DISCUSSION QUESTION



Why should water-based agents not be used on Class D fires?

Fire Classifications

- Class K fires — Involve combustible cooking oils
  - Examples are vegetable fats that burn at extremely high temperatures
  - Most fuels found in commercial kitchens; can also be found in private homes
  - Wet chemicals used in extinguishing systems

Pump-Type Water Extinguishers

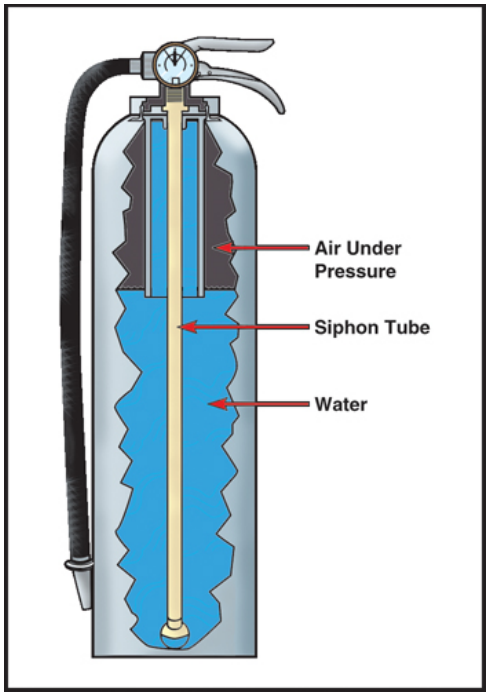
- Intended for use on small Class A fires only
- All operate in similar manner
- Equipped with single- or double-acting pump



Stored-Pressure Water Extinguishers

- Air-pressurized water extinguishers or pressurized water extinguishers
- Useful for all types of small Class A fires





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Stored-Pressure Water Extinguishers

- Often used for extinguishing hot spots
- Operation
  - Water stored in tank w/air or nitrogen
  - Gauge shows pressurization
  - Pressure forces water up tube, out hose
- Class A foam concentrate sometimes added

Water-Mist Stored-Pressure Extinguishers

- Use deionized water as agent, nozzles produce fine spray instead of stream
- Deionized water makes safe for use on energized electrical equipment
- Fine spray enhances cooling/soaking characteristics, reduces scattering of burning material

Wet Chemical Stored-Pressure Extinguishers



Courtesy of Ansul Corp.

- Specifically designed to control/extinguish Class K fires in deep fryers
- Contain special potassium-based alkaline agent to cool/suppress fires in unsaturated cooking oils

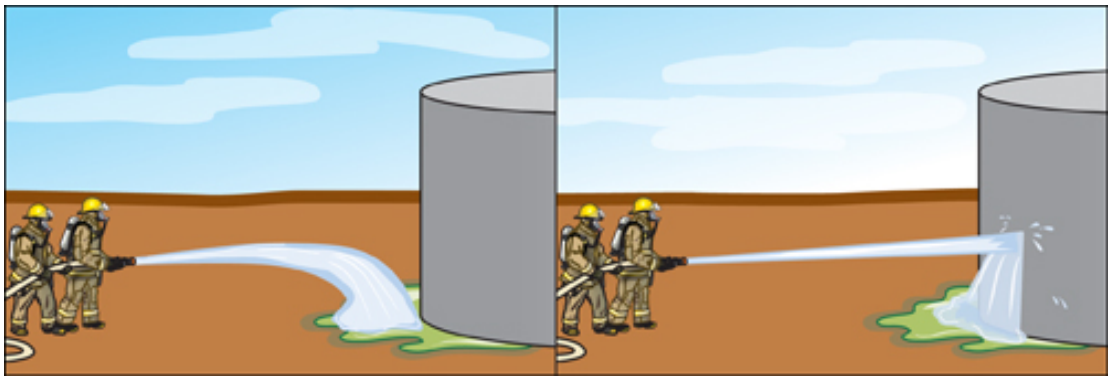
Aqueous Film Forming Foam (AFFF) Extinguishers

- Suitable for Class A, Class B fires
- Fires/vapors from small liquid fuel spills
- Different from stored-pressure water extinguishers
  - Tank contains specified amount of AFFF concentrate mixed with water
  - Air-aspirating nozzle aerates solution

(Continued)

Aqueous Film Forming Foam (AFFF) Extinguishers

- Water/AFFF solution expelled by compressed air or nitrogen
- To prevent disturbance of foam blanket, do not apply directly onto fuel; allow to rain onto surface/deflect off object



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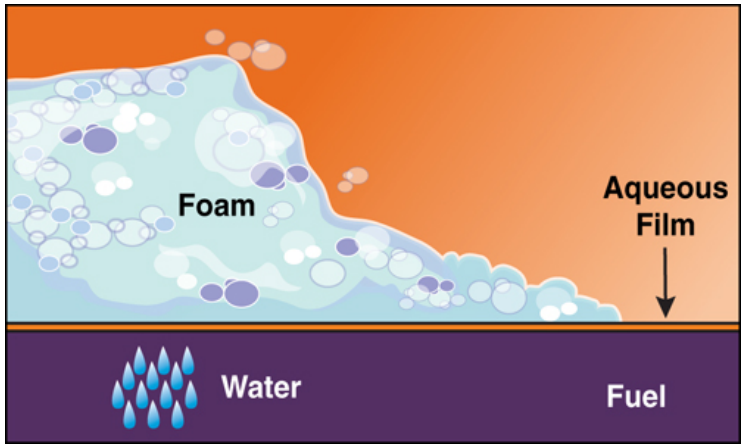
Aqueous Film Forming Foam (AFFF) Extinguishers

- When AFFF/water mixed, finished foam floats on fuels lighter than water
- Vapor seal created by film of water extinguishes flame, prevents reignition



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Aqueous Film Forming Foam (AFFF) Extinguishers

- Foam has good wetting, penetrating properties on Class A fuels; ineffective on polar solvents
- Not suitable for fires in Class C, D fuels
- Most effective on static pools of flammable liquids

Clean Agent Extinguishers

- Designed as replacement for Halon 1211, use "clean agents" that discharge as rapidly evaporating liquids that leaves no residue
  - Cool/smother fires in Class A, B fuels
  - Nonconductive so can be used on Class C
  - Approved by U.S. EPA

Carbon Dioxide (CO_2) Extinguishers



Courtesy of Ansul Corp.

- Found as both handheld/wheeled units
- Most effective in Class B, C fires
- Have limited reach; gas can be dispersed by wind

(Continued)

Carbon Dioxide (CO_2) Extinguishers

- Carbon dioxide stored under its own pressure as liquefied gas ready for release at any time
- Wheeled units similar to handheld except wheeled are considerably larger



Courtesy of Badger Fire Protection.

DISCUSSION QUESTION



What is the danger of touching the horn on a carbon dioxide extinguisher shortly after it has been used?

Dry Chemical Extinguishers

- For Class A-B-C fires and/or Class B-C fires; dry powder used on Class D only
- Commonly used today



Courtesy of Ansul Corp.

(Continued)

Dry Chemical Extinguishers

- Two basic types
  - Regular B:C-rated
  - Multipurpose and A:B:C-rated
- Commonly used dry chemicals
- Handheld units
- Wheeled units



Courtesy of Ansul Corp.

DISCUSSION QUESTION



What happens when water is applied to a combustible metal fire?

Controlling/Extinguishing Metal Fires

- Special extinguishing agents, application techniques developed to control/extinguish metal fires
- No single agent controls/extinguishes fires in all combustible metals

(Continued)

Controlling/Extinguishing Metal Fires

- Some powdered agents applied with portable extinguishers, others with shovel or scoop
- Appropriate application technique described in manufacturer's technical sales literature

(Continued)

Controlling/Extinguishing Metal Fires

- Portable extinguishers for Class D come in both handheld, wheeled units



Courtesy of Amerex Corp.

(Continued)

Controlling/Extinguishing Metal Fires

- Regardless of applicator, powder must be applied in sufficient depth to completely cover burning area to create smothering blanket



(Continued)

Controlling/Extinguishing Metal Fires

- If small amount of burning metal on combustible surface, fire should be covered with powder
- 1 to 2 inch (25 to 50 mm) layer spread nearby, burning metal shoveled onto layer
- After extinguishment, material left undisturbed until cooled



Portable Extinguisher Rating System

- Portable extinguishers classified according to types of fire they extinguish
- Class A, B also rated according to performance capability
- System based on tests by UL, ULC



Classifications

- Class A — From 1-A through 40-A
- Class B — From 1-B through 640-B
- Class C — No tests
- Class D — Test fires vary
- Class K — Recognized by UL, ULC since 1996

Multiple Markings

- Extinguishers for more than one class of fire identified by combinations of A, B, and/or C or symbols for each class
  - Most common are A-B-C, A-B, B-C
  - All must be labeled appropriately
  - Unlisted units should not be used
  - Ratings for each class are independent

Identification — Two Ways

- Geometric shapes of specific colors with class letter shown within shape
- NFPA® 10 recommended — Uses pictographs to make selection easier; shows types of fires on which extinguishers should not be used

Extinguisher Selection Factors

- Classification of burning fuel
- Rating of extinguisher
- Hazards to be protected
- Size/intensity of fire

(Continued)

Extinguisher Selection Factors

- Atmospheric conditions
- Availability of trained personnel
- Ease of handling extinguisher
- Life hazard/operational concerns

Extinguisher Selection Considerations

- Select those that minimize risk to life/ property and are effective in extinguishing the fire type
- Dry chemical extinguishers should not be selected for use in areas where highly sensitive computer equipment is located

Extinguisher Check

- Immediately before use
  - External condition
  - Hose/nozzle
  - Weight
  - Pressure gauge



- After selecting size/type for situation, approach fire from windward side

DISCUSSION QUESTION



Why should you always have an escape route?

Fire Extinguisher Operation



- All modern extinguishers operate in similar manner
- Pick up extinguisher by handles, carry to point of application

(Continued)

Fire Extinguisher Operation

- Once in position, use PASS method
  - P — Pull the pin
  - A — Aim the nozzle
  - S — Squeeze handles together
  - S — Sweep nozzle back and forth

(Continued)

Fire Extinguisher Operation

- Be sure agent reaches fire
- Apply agent from point where stream reaches but does not disturb fuel
- After fire knocked down, move closer for final extinguishment



(Continued)

Fire Extinguisher Operation

- If extinguishment not achieved after entire extinguisher discharged, withdraw/reassess
- If fire is in solid fuel reduced to smoldering phase, may be overhauled using appropriate tool

(Continued)

Fire Extinguisher Operation

- If fire in liquid fuel, it may be necessary to apply foam through hoseline or simultaneously attack with more than one extinguisher
- If more than one extinguisher used simultaneously, work in unison and maintain constant awareness

Fire Extinguisher Inspections

- NFPA® 10 and most fire codes require portable extinguishers inspected at least once/year
- Verify that extinguishers
  - Are in designated locations
  - Not tampered with or activated
  - No obvious damage/other condition

(Continued)

Fire Extinguisher Inspections

- Servicing responsibility of property owner/building occupant
- Firefighters should include inspections in building inspection program



(Continued)

Fire Extinguisher Inspections

- Three factors determine value
  - Serviceability
  - Accessibility
  - Simplicity of operation
- NFPA® 10 describes procedures for hydrostatic testing of cylinders

Parts of Fire Extinguisher Inspections

- Ensure extinguisher in proper location/accessible
- Inspect discharge nozzle
- Inspect extinguisher shell
- Check for legible operating instructions on nameplate



(Continued)

Parts of Fire Extinguisher Inspections

- Check locking pin, tamper seal
- Determine whether full of agent, fully pressurized
- Check for date of previous inspection
- Examine condition of hose/fittings
- If any items deficient, remove from service

Damaged Fire Extinguishers

- Can fail at any time; could result in serious injury
- Leaking, corroded, otherwise damaged shells/cylinders should be discarded or returned to manufacturer for repair



(Continued)

DISCUSSION QUESTION



How should a defective fire extinguisher be repaired?

Damaged Fire Extinguishers

- Only slight damage/corrosion and uncertain whether safe — Should be hydrostatically tested
- If allowed by SOP, leaking hoses, gaskets, nozzles, and loose labels can be replaced by firefighters

Obsolete Portable Fire Extinguishers

- In 1969
  - American manufacturers stopped making inverting-type extinguishers
  - Manufacturing of extinguishers made of copper or brass with cylinders soft soldered or riveted together discontinued

(Continued)

Obsolete Portable Fire Extinguishers

- Extinguishers using carbon tetrachloride and chlorobromomethane prohibited in workplace
- If obsolete extinguishers are discovered and occupant requests, firefighters should follow SOP to dispose of them

Halon Fire Extinguishers

- Included in Montreal Protocol
- U.S. stopped producing halogens at end of 1993
- Units may still be in service

Summary

- In many cases, fire extinguishers can control or extinguish small fires in less time than it takes to deploy a hoseline.

(Continued)

Summary

- Even though portable fire extinguishers may be found in many of the homes, apartments, and businesses that must be entered to extinguish fire, firefighters should only rely on those carried on the fire apparatus.

(Continued)

Summary

- To use fire extinguishers safely and effectively, firefighters must know capabilities and limitations of the extinguisher — and their own capabilities and limitations — as well as the proper techniques for their application.

Review Questions

1. What are the five classes of fire and what do they involve?
2. What fires are aqueous film forming foam (AFFF) extinguishers most effective on?
3. How do carbon dioxide (CO_2) portable extinguishers work?

(Continued)

Review Questions

4. What are the three most common combinations for extinguishers with multiple markings?
5. List three factors that affect the selection of the proper portable fire extinguisher.

(Continued)

Review Questions

6. What should be checked immediately before using a portable extinguisher?
7. What is the PASS method of application?
8. What procedures should be part of every fire extinguisher inspection?

Essentials of Fire Fighting,
5th Edition

Chapter 3 — Fire Streams

Firefighter I



Chapter 14 Lesson Goal

- After completing this lesson, the student shall be able to effectively operate a solid stream nozzle, fog stream nozzle, and broken stream nozzle following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. List methods that are used with fire streams to reduce the heat from a fire and provide protection to firefighters and exposures.
2. Discuss the extinguishing properties of water.

(Continued)

Specific Objectives

3. Describe friction loss.
4. Define water hammer.
5. Distinguish among characteristics of fire stream sizes.

(Continued)

Specific Objectives

6. Discuss types of streams and nozzles.
7. Discuss handling handline nozzles.
8. Describe types of nozzle control valves.
9. List checks that should be included in nozzle inspections.

(Continued)

Specific Objectives

10. Operate a solid-stream nozzle. (Skill Sheet 14-I-1)
11. Operate a fog-stream nozzle. (Skill Sheet 14-I-2)
12. Operate a broken-stream nozzle. (Skill Sheet 14-I-3)

DISCUSSION QUESTION



What is a fire stream?

Methods to Reduce Heat and Provide Protection

- Applying water or foam directly onto burning material to reduce its temperature
- Applying water or foam over an open fire to reduce the temperature so firefighters can advance handlines
- Reducing high atmospheric temperature

(Continued)

Methods to Reduce Heat and Provide Protection

- Dispersing hot smoke and fire gases from a heated area
- Creating a water curtain to protect firefighters and property from heat
- Creating a barrier between a fuel and a fire by covering the fuel with a foam blanket

How Water Extinguishes Fire

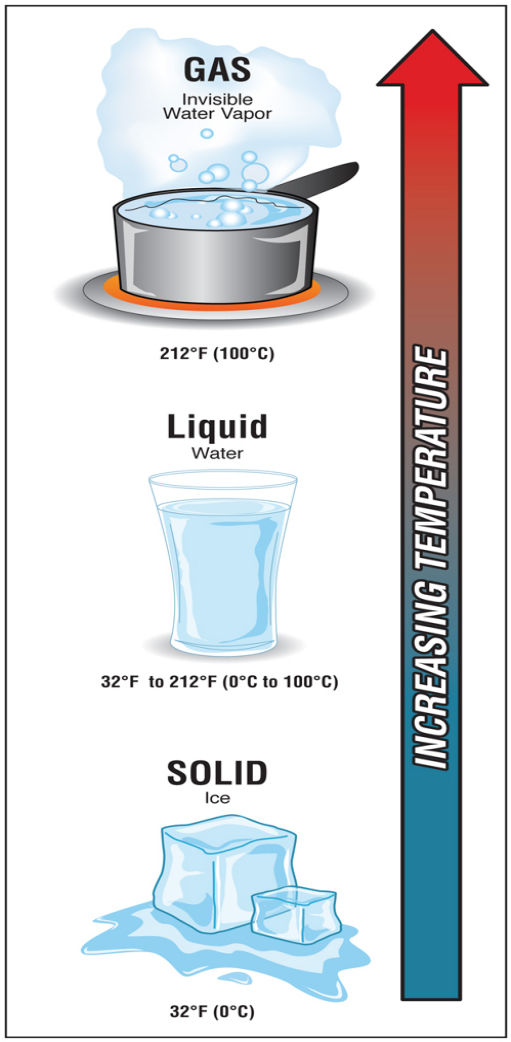
- Primary way is cooling
- Smothering by diluting or excluding oxygen

Heat Absorption

- When heated to boiling point, water absorbs heat
- Visible form of steam is called condensed steam
- Components of heat absorption
- Specific heat

(Continued)

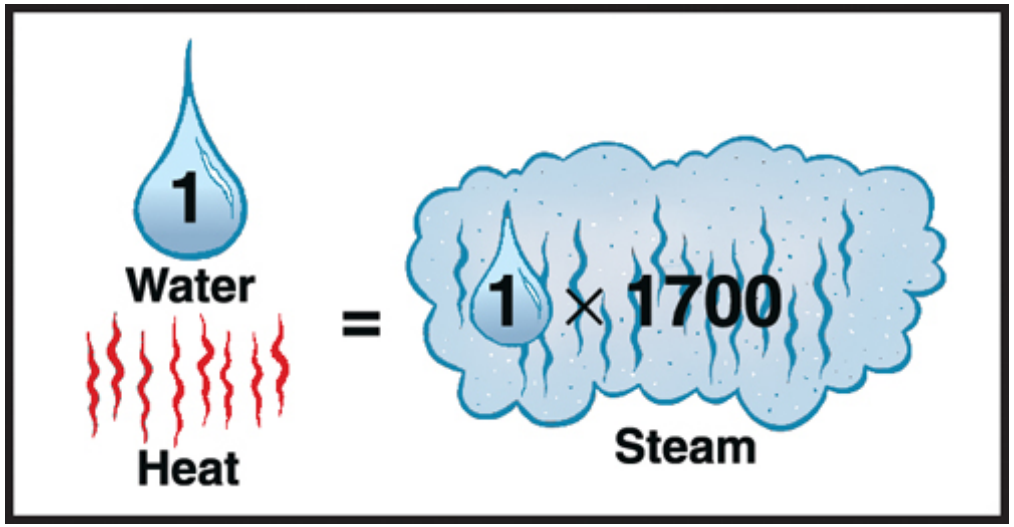
Heat Absorption



- Latent heat of vaporization
- Expansion capability
- Effective extinguishment with water generally requires steam production

(Continued)

Heat Absorption

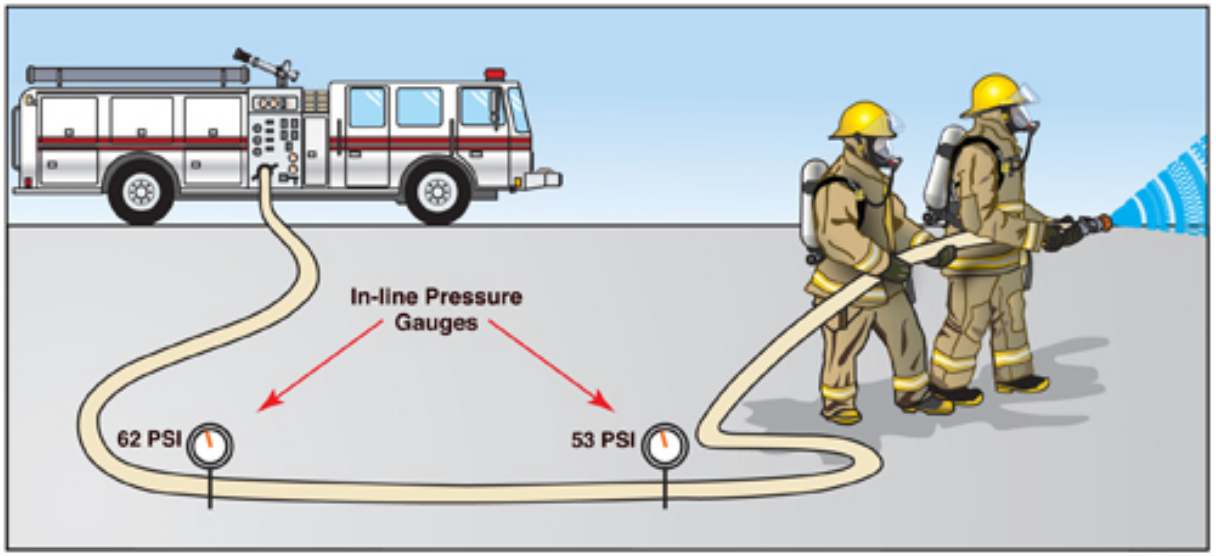


- Water absorbs more heat when converted to steam than when heated to boiling point

Characteristics of Water Valuable for Fire Extinguishment

- Readily available, relatively inexpensive
- Has greater heat-absorbing capacity than most other common agents
- Water changing to steam requires large amount of heat
- Can be applied in variety of ways

Friction Loss



- That part of total pressure lost while forcing water through pipes, fittings, fire hose, and adapters

(Continued)

Friction Loss

- When water flows through hose, couplings, appliances, its molecules rub against insides, producing friction
- Slows water flow, reduces its pressure

(Continued)

Friction Loss

- Loss of pressure in hoseline between the fireboat and nozzle is most common example
- Measuring friction loss
- Affected by velocity of water and characteristics of hose layouts

(Continued)

Friction Loss

- Generally, the smaller the hose diameter and longer the hose lay, the higher the friction loss at a given pressure, flow volume
- HPD General Friction Loss Calculations:
  - 20 psi loss per 100 ft of 1.75” at 200 gpm
  - 5 psi loss per 100 ft of 2.5” at 200 gpm

Factors Increasing Friction Loss

- Rough linings in fire hose
- Damaged hose couplings
- Kinks/sharp bends in hose
- More adapters than necessary
- Hoselines longer than necessary
- Hose diameter too small for volume needed

DISCUSSION QUESTION



What can be done to reduce friction loss during a fire ground operation?

Elevation Loss/Gain

- Elevation — Position of nozzle above or below pumping apparatus
- Elevation pressure — Gain/loss in hoseline pressure caused by gravity when there is difference in elevation

(Continued)

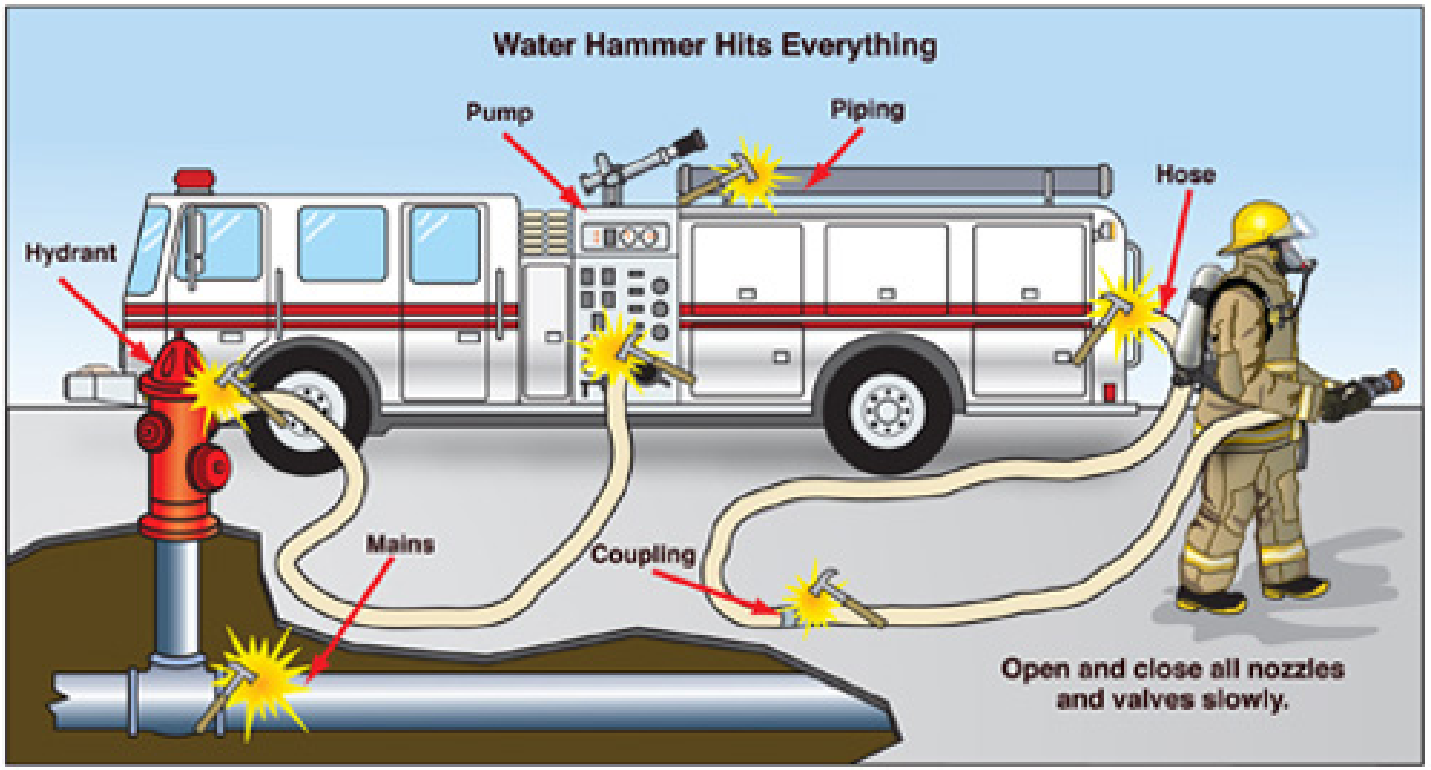
Elevation Loss/Gain

- 10 psi pressure loss per deck when nozzle is above fire pump
- 10 psi pressure gain when nozzle is below pump



Courtesy of District Chief Chris E. Mickal, NOFD Photo Unit.

Water Hammer



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Water Hammer

- When flow of water through fire hose or pipe is suddenly stopped, shock wave produced when moving water reaches end of hose and bounces back
- Pressure surge referred to as water hammer

(Continued)

Water Hammer

- Sudden change in direction creates excessive pressures that can cause damage to water mains, plumbing, fire hose, hydrants, fire pumps
- Can often be heard as distinct clank
- To prevent when water flowing, close components slowly

Identifying Fire Streams

- By size and type
- Size = Volume of flowing per minute
- Type = specific pattern/shape of water
- Rate of discharge measured in gallons per minute (gpm) or liters per minute (L/min)

Fire Stream Classifications

- Low-volume stream
- Handline stream
- Master stream

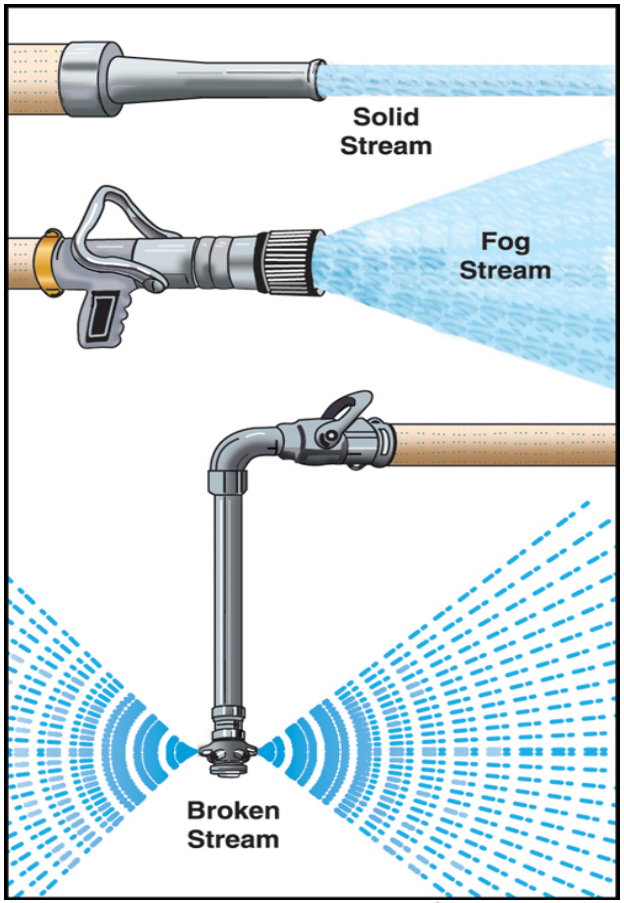
Fire Stream Considerations

- Volume discharged determined by design of nozzle, pressure at nozzle
- To be effective, stream must deliver volume of water sufficient to absorb heat faster than it is being generated

(Continued)

Fire Stream Considerations

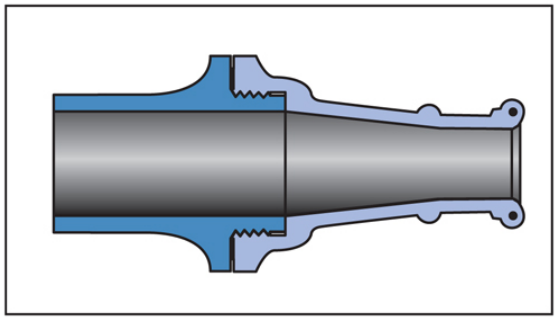
- Type of fire stream indicates specific pattern/shape of water stream
- Requirements of effective streams
- Requirements of all streams



Solid Stream



- Produced from fixed orifice, solid-bore nozzle
- Has ability to reach areas others might not; reach affected by several factors
- Design capabilities
- Not carried by HPD



(Continued)

Solid Stream

- Velocity of stream a result of nozzle pressure
- Nozzle pressure, size of discharge opening determine flow
- Characteristics of effective fire streams
- Flow rate

Advantages of Solid Streams

- May maintain better interior visibility than others
- May have greater reach than others
- Operate at reduced nozzle pressures per gallon (liter) than others
- May be easier to maneuver

(Continued)

Advantages of Solid Streams

- Have greater penetration power
- Less likely to disturb normal thermal layering of heat, gases during interior structural attacks
- Less prone to clogging with debris

(Continued)

Advantages of Solid Streams

- Produce less steam conversion than fog nozzles
- Can be used to apply compressed-air foam

Disadvantages of Solid Streams

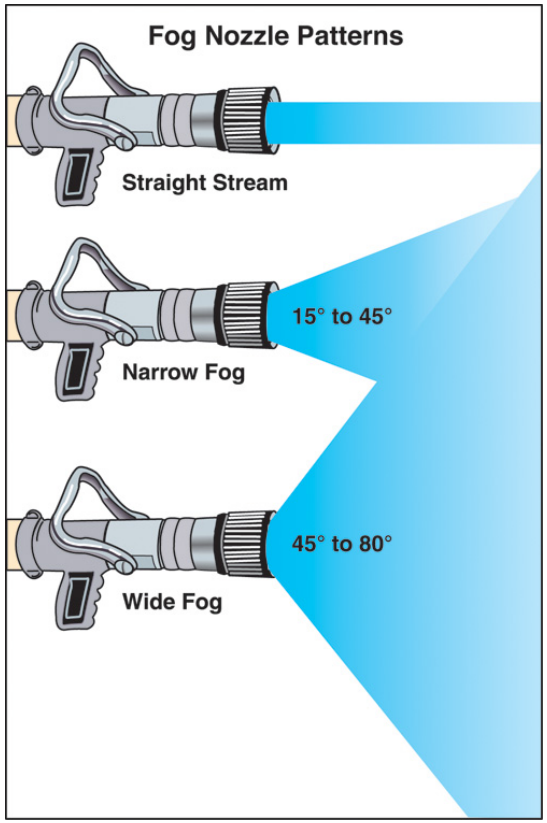
- Do not allow for different stream pattern selections
- Provide less heat absorption per gallon (liter) delivered than others
- Hoselines more easily kinked at corners, obstructions

DISCUSSION QUESTION



What type of fire situation would be ideal for a solid-stream nozzle?

Combination Fog Nozzles



- Fine spray composed of tiny water droplets
- Design of most fog nozzles permits adjustment of tip to produce different stream patterns

(Continued)

Fog Stream

- Water droplets formed to expose maximum water surface for heat absorption
- Desired performance of fog stream nozzles judged by amount of heat that fog stream absorbs and rate by which the water is converted into steam/vapor

(Continued)

Fog Stream

- Nozzles permit settings of straight stream, narrow-angle fog, and wide-angle fog
- https://www.youtube.com/watch?v=0Epyqi0ISGk
- Nozzles should be operated at designed nozzle pressure

(Continued)

Fog Stream

- Several factors affect reach of fog stream
- Interaction of these factors on fog stream results in fire stream with less reach than that of straight or solid stream

(Continued)

Fog Stream

- Shorter reach makes fog streams less useful for outside, defensive fire fighting operations
- Well suited for fighting interior fires

Fog Stream: Waterflow Adjustment

- Two types of nozzles control rate of water flow through fog nozzle
- Manually adjustable nozzles
- Automatic nozzles





DISCUSSION QUESTION



How should adjustments to the rate of flow be made?

Fog Stream: Nozzle Pressure

- Combination nozzles designed to operate at different pressures
- Designated operating pressure for HPD combination nozzles is 75 psi (700 kPa) to deliver 200 gpm

(Continued)

Fog Stream: Nozzle Pressure

- Nozzles with other designated operating pressures available
- Setbacks of nozzles with lower operating pressures



Courtesy of Elkhart Brass Manufacturing Company.

Advantages of Fog Streams

- Discharge pattern can be adjusted for situation
- Can aid ventilation
- Reduce heat by exposing maximum water surface for heat absorption
- Wide fog pattern provides protection to firefighters

DISCUSSION QUESTION



What type of fire situation would be ideal for a fog-stream nozzle?

Disadvantages of Fog Streams

- Do not have as much reach/penetrating power as solid streams
- More affected by wind than solid streams
- May disturb thermal layering
- May push air into fire area, intensifying the fire

Broken Stream

- One that has been broken into coarsely divided drops
- While solid stream may become broken stream past point of breakover, true broken stream takes on that form as it leaves nozzle



Advantages of Broken Streams

- Absorb more heat per gallon (liter) than solid stream
- Have greater reach, penetration than fog stream
- Can be effective on fires in confined spaces

Disadvantages of Broken Streams

- May have sufficient continuity to conduct electricity
- Stream may not reach some fires

DISCUSSION QUESTION



What are some examples of when broken streams might be used?

Handline Nozzles

- Differing designs cause each one to handle somewhat differently when operated at recommended pressure
- Those with variable patterns may handle differently in different settings

(Continued)

Handline Nozzles

- The water pattern produced by nozzle may affect ease of operation
- Nozzles not always easy to control at/above standard operating pressures

Solid-Stream Nozzles

- When water flows from nozzle, reaction equally strong in opposite direction, thus a force pushes back on person handling hoseline

(Continued)

Solid-Stream Nozzles

- Reaction caused by velocity, flow rate, discharge pattern of stream
- Reaction can make nozzle difficult to handle
- Increasing nozzle discharge pressure, flow rate increases nozzle reaction

Fog Stream Nozzles

- When water is discharged at angles from center line of nozzle, reaction forces may counterbalance each other, reduce nozzle reaction
- Balancing of forces is why a nozzle set on wide-angle fog handles more easily than straight-stream pattern

Nozzle Control Valves

- Enable operator to start, stop, or reduce flow of water while maintaining effective control of nozzle
- Allow nozzles to open slowly so operator can adjust as nozzle reaction increases

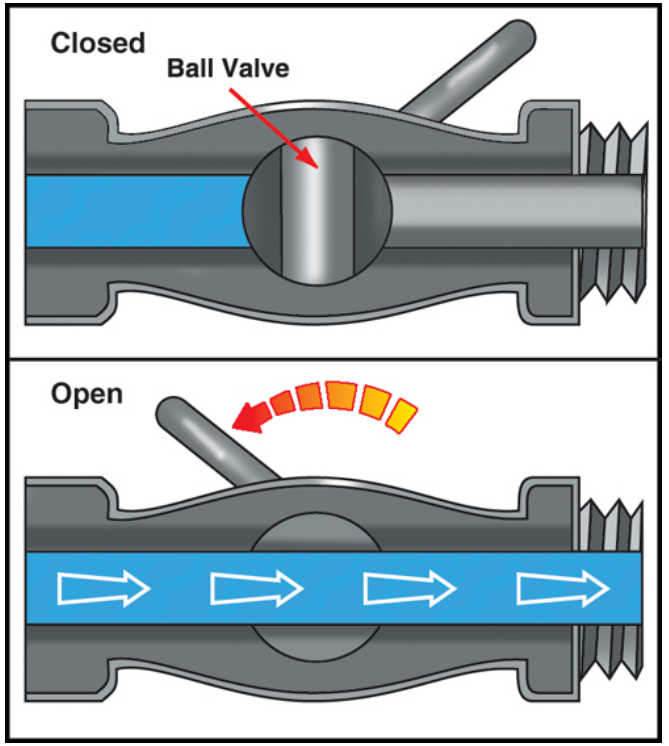
(Continued)

Nozzle Control Valves

- Also allow nozzles to be closed slowly to prevent water hammer
- Three main types

Ball Valve

- Most common
- Provides effective control during nozzle operation with minimum effort



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Ball Valve

- Ball, perforated by smooth waterway, is suspended from both sides of nozzle body and seals against seat
- Ball can be rotated up to 90 degrees by moving valve handle backward to open and forward to close

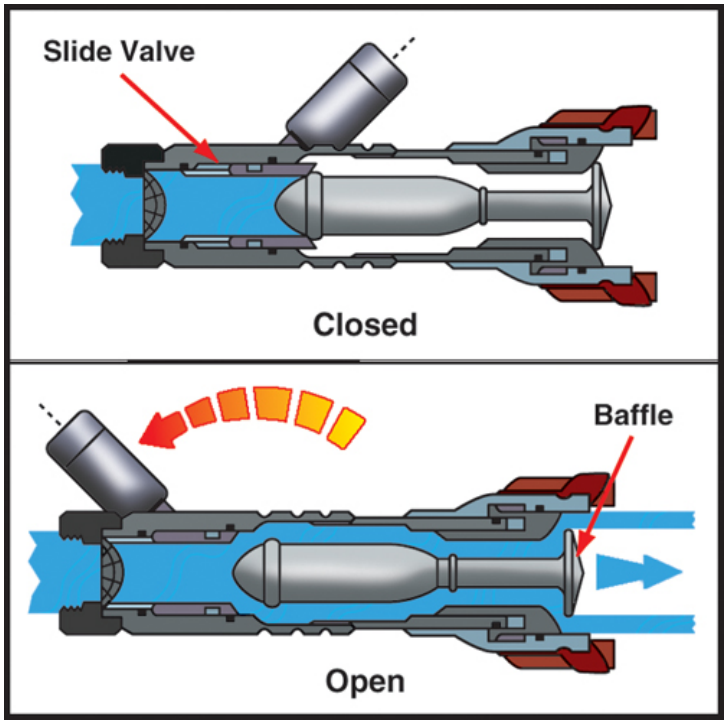
(Continued)

Ball Valve

- Nozzle will operate in any position between fully closed, fully open
- Operating nozzle with valve in fully open position gives maximum flow, performance

Slide Valve

- Cylindrical slide valve control seats movable cylinder against shaped cone to turn off flow of water



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Slide Valve

- Flow increases/decreases as shutoff handle is moved to change position of sliding cylinder relative to cone
- Stainless steel slide valve controls flow of water through nozzle without creating turbulence

(Continued)

Slide Valve

- Pressure control compensates for increase/decrease in flow by moving baffle to develop proper tip size, pressure

Rotary Control Valve

- Found only on rotary fog nozzles
- Consists of exterior barrel guided by screw that moves it forward/backward, rotating around interior barrel
- Major difference between rotary control and other valves is they also control discharge pattern of stream



Courtesy of Elkhart Brass Manufacturing Company.

Nozzle Inspections

- Swivel gasket for damage or wear; replace worn or missing gaskets
- External damage to the nozzle
- Internal damage and debris
- Ease of operation of the nozzle parts
- Pistol grip (if applicable) is secured to the nozzle

Summary

- To fight fires safely and effectively, firefighters must know the capabilities and limitations of all the various nozzles and extinguishing agents available in their departments.

(Continued)

Summary

- They must understand the effects that wind, gravity, velocity, and friction have on a fire stream once it leaves the nozzle.

(Continued)

Summary

- Firefighters must know what operating pressure their nozzles require and how the nozzles can be adjusted during operation.

Review Questions

1. What are the ways that water can extinguish fire?
2. Define friction loss, elevation loss/gain, and water hammer.
3. What factors can increase friction loss in fire hose?

(Continued)

Review Questions

4. What are the three size classifications of fire streams?
5. What is the difference between a solid stream and a fog stream?

Essentials of Fire Fighting, **5th Edition**

Chapter 5 — Ropes and Knots

Firefighter I

5th EDITION ESSENTIALS OF FIRE FIGHTING
INTERNATIONAL FIRE SERVICE TRAINING ASSOCIATION

Chapter 7 Lesson Goal

- After completing this lesson, the student shall be able to apply basic use of ropes and knots following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. Compare and contrast the characteristics of life-safety rope and utility rope.
2. Summarize criteria for reusing life-safety rope.
3. Describe rope materials.

(Continued)

Specific Objectives

4. Describe types of rope construction.
5. Summarize basic guidelines for rope maintenance.
6. Explain procedures for storing life-safety rope.
7. Describe webbing and webbing construction.

(Continued)

Specific Objectives

8. Describe parts of a rope and considerations in tying a knot.
9. Describe knot characteristics and knot elements.
10. Describe characteristics of knots commonly used in the fire service.

(Continued)

Specific Objectives

11. Select commonly used rope hardware for specific applications.
12. Summarize hoisting safety considerations.
13. Discuss rescue rope and harness.
14. Inspect, clean, and store rope. (Skill Sheet 7-I-1)

(Continued)

Specific Objectives

15. Coil and uncoil a rope. (Skill Sheet 7-I-2)
16. Tie the single overhand knot. (Skill Sheet 7-I-3)
17. Tie a bowline. (Skill Sheet 7-I-4)
18. Tie a clove hitch. (Skill Sheet 7-I-5)

(Continued)

Specific Objectives

19. Tie a clove hitch around an object. (Skill Sheet 7-I-6)
20. Tie a figure eight. (Skill Sheet 7-I-7)
21. Tie a figure-eight bend. (Skill Sheet 7-I-8)
22. Tie a figure eight on a bight. (Skill Sheet 7-I-9)

(Continued)

Specific Objectives

23. Tie a becket bend. (Skill Sheet 7-I-10)
24. Hoist an axe. (Skill Sheet 7-I-11)
25. Hoist a pike pole. (Skill Sheet 7-I-12)
26. Hoist a roof ladder. (Skill Sheet 7-I-13)

(Continued)

Specific Objectives

27. Hoist a dry hoseline. (Skill Sheet 7-I-14)
28. Hoist a charged hoseline. (Skill Sheet 7-I-15)
29. Hoist a power saw. (Skill Sheet 7-I-16)

Life-Safety Rope

- Used to support rescuers and/or victims during actual accidents or training
- Must conform to NFPA® 1983
- Must be block creel construction using continuous filament virgin fiber for load-bearing elements

Utility Rope

- Used in instances where rope is required but not used to support rescuer/victims
- Industry standards exist concerning physical properties
- No standards for applications
- Regularly inspect for damage

DISCUSSION QUESTION



What experiences have you had with either life-safety rope and/or utility rope?

NFPA® 1983

- Rope manufacturers must supply purchasers with information about
  - Use criteria
  - Inspection procedures
  - Maintenance procedures
  - Criteria for retiring life-safety rope from service

(Continued)

NFPA® 1983

- Criteria to consider before life-safety rope is reused in life-safety situations
  - Must not be visibly damaged
  - Must not show abrasions or have been exposed to high temps/direct flame contact
  - Has not been impact loaded

(Continued)

NFPA® 1983

- Criteria to consider before life-safety rope is reused in life-safety situations
  - Must not have been exposed to any substance that can deteriorate rope
  - Must pass inspection made by qualified person before AND after use

Removing Life-Safety Rope From Service

- Life-safety rope that fails to pass inspection or has been impact loaded should be destroyed immediately
- Destroy = Altered in such a manner that it cannot be mistaken for life-safety rope

(Continued)

Removing Life-Safety Rope From Service

- Rope subjected to impact loading must have entry made in log because there is no way to determine by inspection if it has been impact loaded

Natural Fiber Rope

- Primary type of rope used for rescue until last half of 20th century
- Most made of hemp or cotton



Courtesy of BlueWater Ropes.

(Continued)

Natural Fiber Rope

- No longer accepted in life-safety applications
- Can be used for utility purposes
- Made of short overlapping strands of fiber

Synthetic Rope



- Preferred for life-safety applications
- Excellent resistance to mildew and rotting, excellent strength, easy to maintain
- May feature continuous fibers running entire length of rope

(Continued)

Dynamic Rope

- Used when long falls are possible
- Designed to stretch without breaking
- Elasticity a disadvantage when raising/lowering heavy loads
- Not practical for rescue or hauling applications

Static Rope

- Used for most rope-rescue incidents
- Low stretch without breaking
- According to NFPA® 1983, must not elongate more than 10 percent when tested under load equal to 10 percent of breaking strength
- Used for rescue, rappelling, hauling

NFPA® 1983 Light Use Rope

- ⅜-inch (9.5 mm) diameter or greater, less than ½-inch (12.5 mm), intended to support one person's weight
- Minimum breaking strength of 4,500 pounds (20 k/N)
- Maximum safe working load limit of 300 pounds (136 kg)

NFPA® 1983 General-Use Rope

- 7/16-inch (11 mm) diameter or greater, less than or equal to ⅝-inch (16 mm), intended to support two persons
- Minimum breaking strength of 9,000 pounds (40 k/N)
- Maximum safe working load limit of 600 pounds (272 kg)

NFPA® 1983 Throwline

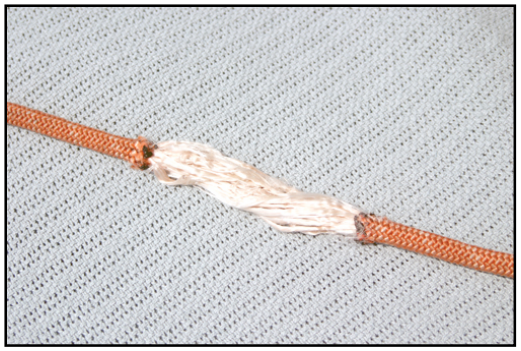
- 19/64-inch (7 mm) diameter or greater, but less than 3/8-inch (9.5 mm), used to tether rescuers during water rescues or to throw to victim in water
- Minimum breaking strength of 3,000 pounds (13 k/N)
- Maximum safe working load limit of 200 pounds (91 kg)

NFPA® 1983 Escape Rope

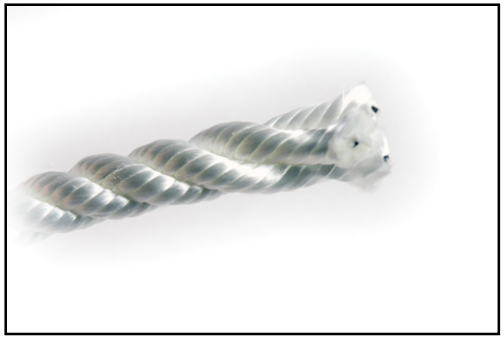
- Not life-safety or utility rope; constructed in same manner as life-safety rope
- Must meet generally the same requirements as throwline
- Intended to be used only one time then destroyed

Common Rope Construction

- Kernmantle rope



- Laid (twisted) natural or synthetic rope



Courtesy of BlueWater Ropes.

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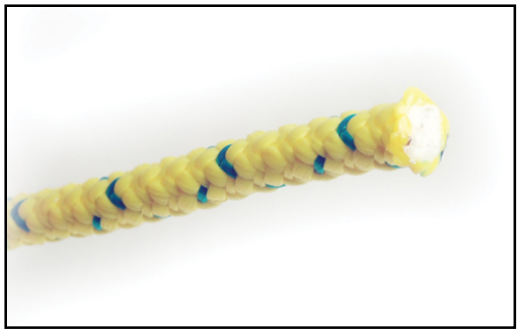
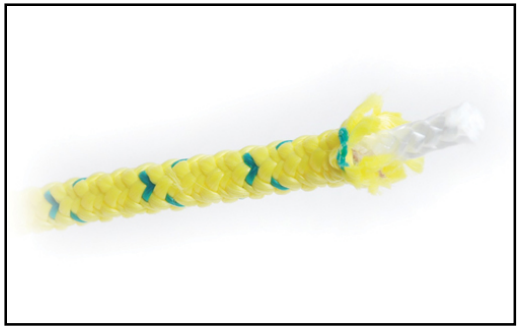
Common Rope Construction

- Braided rope



Courtesy of BlueWater Ropes.

- Braid-on-braid rope (double braid)



Courtesy of BlueWater Ropes.

General Rope Maintenance Guidelines

- Inspect all types after each use
- Unused should be inspected at least annually
- Inspect visually and by touch
- Inspect for foreign objects; if found, take out of service
- All inspections documented in log

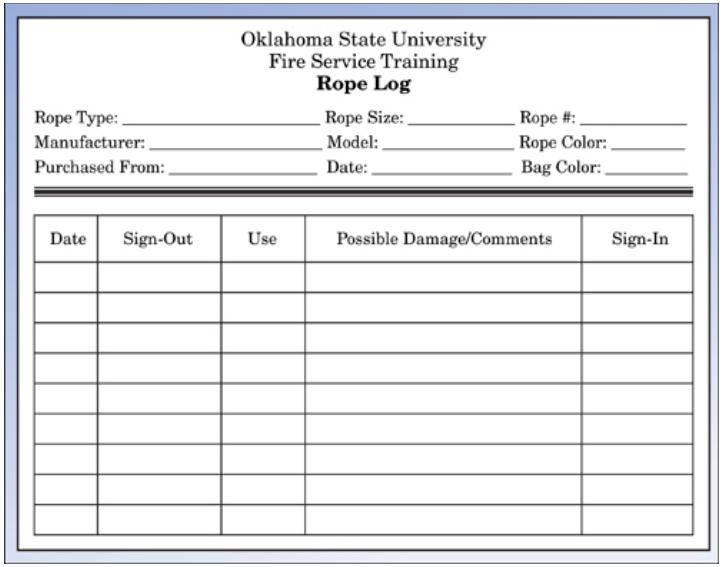
Types of Rope — Maintenance

- Kernmantle rope
- Laid rope
- Braided rope
- Braid-on-braid rope



Maintaining Rope Log

- When rescue rope is purchased, it must be permanently identified
- Record must be started and kept throughout rope's working life



Oklahoma State University
Fire Service Training
Rope Log

Rope Type: _____ Rope Size: _____ Rope #: _____
Manufacturer: _____ Model: _____ Rope Color: _____
Purchased From: _____ Date: _____ Bag Color: _____

Date	Sign-Out	Use	Possible Damage/Comments	Sign-In

Cleaning Rope

- Methods vary by manufacturer; contact for specific instructions
- Natural fibers
- Synthetic fibers



General Rope Storage Considerations

- Can be stored in coils or rope bags
- Should be stored in clean, dry spaces with adequate ventilation
- Not exposed to chemical contaminants
- Not stored in same space with gasoline-powered tools, spare fuel

(Continued)

Bagging Rope

- Best method for life-safety rope is to place in storage bag
- Bag makes rope easy to transport, protects rope from contamination
- Advantage of storing synthetic rope in bag is that rope can be deployed quickly

(Continued)

Bagging Rope

- Weight of the rope inside bag carries it toward target and rope pays out as bag travels through air



- Bag may have drawstring and shoulder straps for ease in carrying

Coiling/Uncoiling Rope

- Coiling necessary so rope may be placed into service with minimum delay important in fire service
- Improperly coiled rope may become tangled and fail to uncoil

Webbing

- Often used in conjunction with ropes
- Most made from same materials as synthetic rope; same precautions, maintenance procedures apply
- Size needed varies with intended use

Types of Webbing Construction

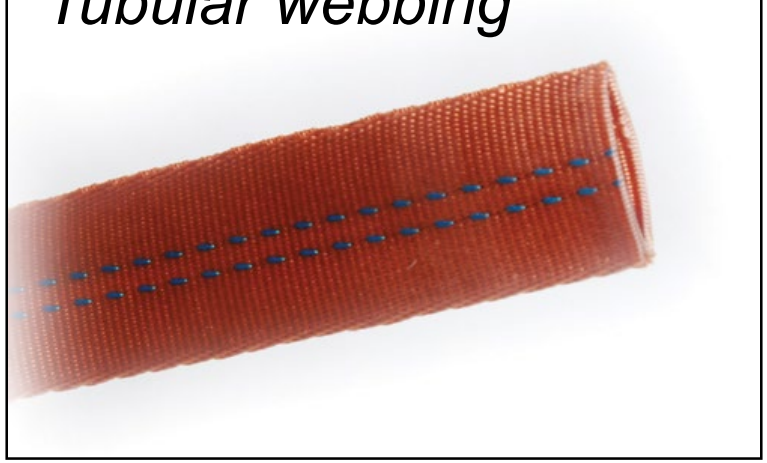
- Two designs

Flat webbing



Courtesy of BlueWater Ropes.

Tubular webbing



Courtesy of BlueWater Ropes.

(Continued)

Types of Webbing Construction

- Both look the same unless viewed at ends
- Tubular is of two designs: spiral and chain weave
- Spiral stronger, more resistant than chain

Parts of Rope

- Running end — Free end used for hoisting, pulling, belaying
- Working end — End tied to object being raised, lowered, stabilized
- Standing part — Section between working end and running end

Knot-Tying Considerations

- Knots are used to join or connect ropes or webbing, form loops in ropes or webbing or attach ropes or webbing to objects
- Should be dressed after tied
- Even properly dressed knots can fail

DISCUSSION QUESTION



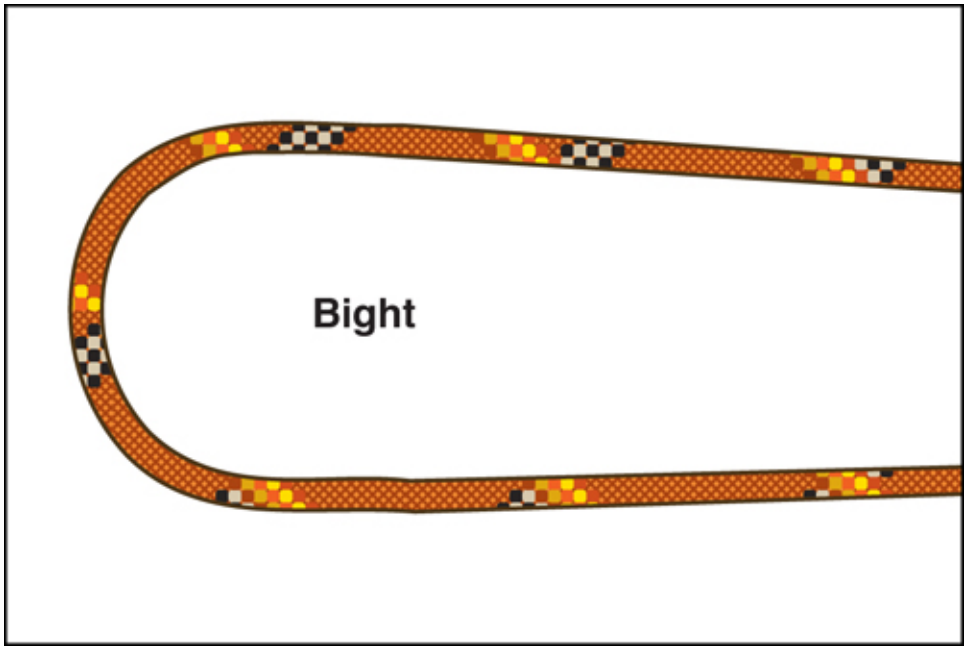
Why are knots important in the fire service?

Knot Characteristics

- To be suitable for rescue, must be easy to tie and untie, be secure under load, reduce rope's strength minimally
- Rope's strength reduced whenever bent
- Bight, loop, round turn — Bends in rope
- Knots, hitches formed by combining bending elements

Knot Elements

- Bight — Formed by bending rope back on itself while keeping sides parallel



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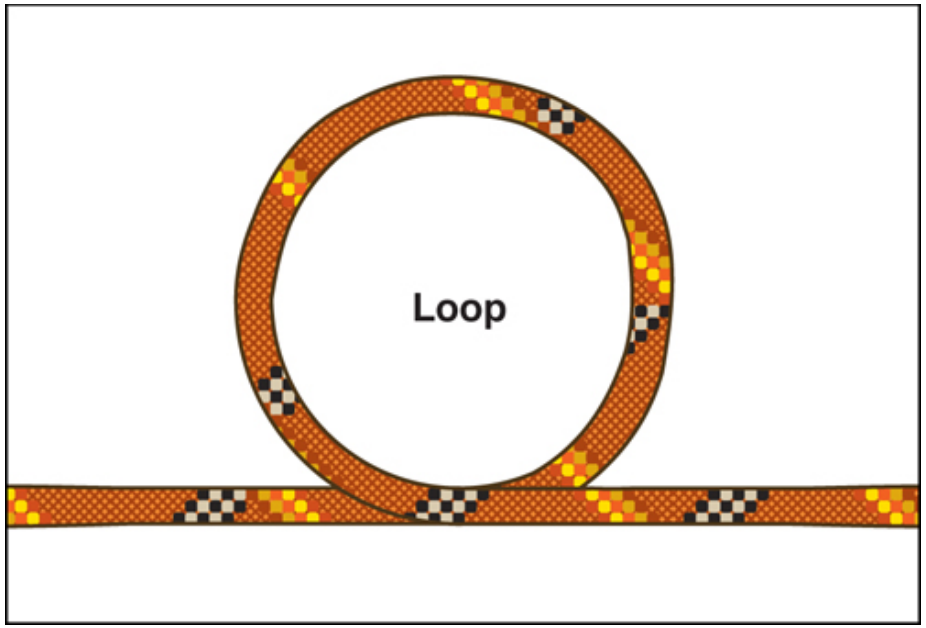
Knot Elements

- Loop — Made by crossing side of bight over standing part



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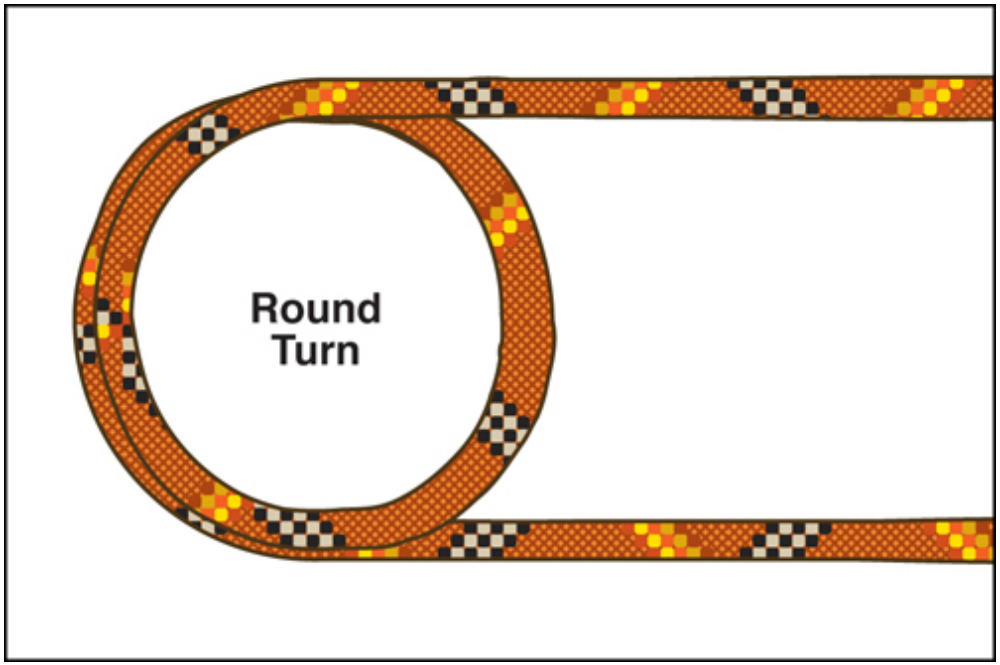
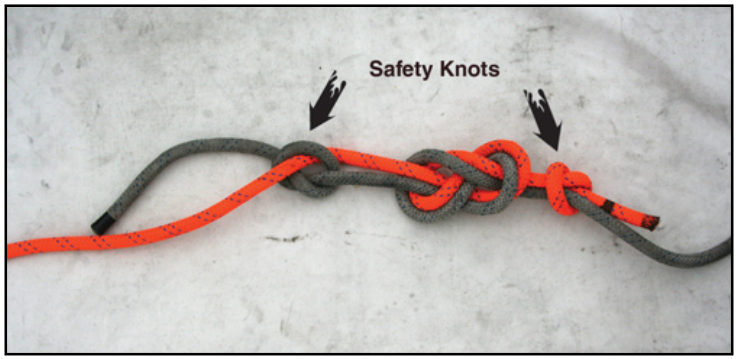
Knot Elements

- Round turn — Consists of further bending one side of loop



Commonly Used Knots

- Single/double overhand safety knots
  - Can be used when tying any type of knot
  - Best to provide highest level of safety
  - Use eliminates danger of end of rope slipping back through knot and causing failure



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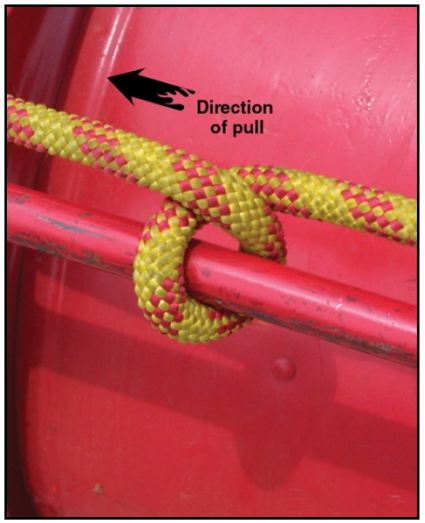
Commonly Used Knots

- Bowline
  - One of the most important in fire service
  - Easily tied, untied; good for forming single loop that will not constrict object it is placed around
  - Firefighters should be able to tie in the open as well as around objects

(Continued)

Commonly Used Knots

- Half-hitch
  - Particularly useful in stabilizing tall objects being hoisted; always used with another knot or hitch
  - Formed by making round turn around object
  - Several can be applied in succession if required



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Commonly Used Knots

- Clove hitch
  - May be formed by several methods
  - Highly susceptible to failure
  - May be formed anywhere in rope
  - Withstands steady pull in either direction
  - May need to be backed up with overhand safety knot

(Continued)

Commonly Used Knots

- Figure-eight family of knots
  - Figure eight
  - Figure-eight bend
  - Figure eight on a bight
  - Figure-eight follow through



(Continued)

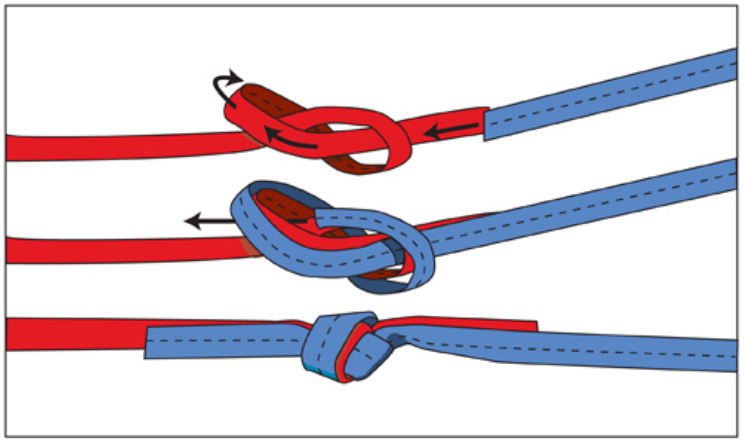
Commonly Used Knots

- Becket bend (sheet bend)
  - Used for joining two ropes of unequal diameters or joining rope and chain
  - Unlikely to slip when rope is wet
  - Advantages make it useful, dependable in fire service rope work
  - Not suitable in life-safety applications

(Continued)

Commonly Used Knots

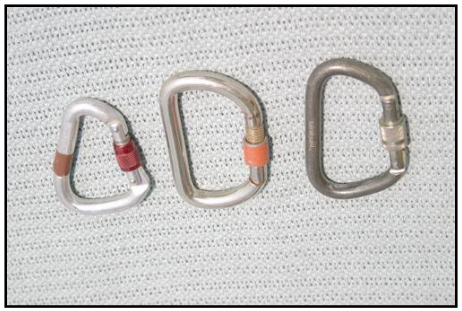
- Water knot
  - Preferred knot for joining two pieces of webbing or ends of same piece when loop needed



  - Formed by tying simple overhand knot in one piece or end and following through in reverse direction with another piece or end

Commonly Used Hardware

- Carabiner



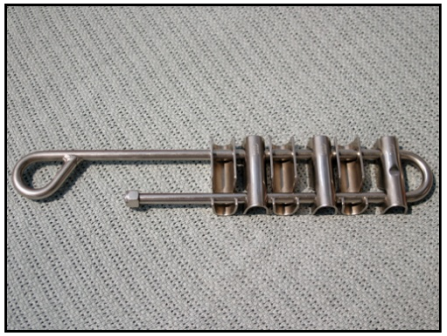
- Figure-eight plate (descender)



(Continued)

Commonly Used Hardware

- Brake bar rack (descender)



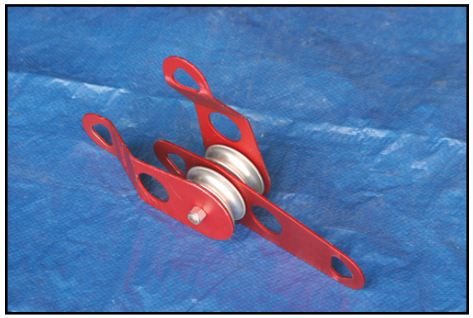
- Ascender



(Continued)

Commonly Used Hardware

- Pulleys



Using Rope for Hoisting

- One of most common uses of rope in fire service — Raise or lower tools and pieces of equipment from one elevation to another



(Continued)

Using Rope for Hoisting

- Thorough knowledge of knots, hitches makes this a safe, efficient practice
- Anything with closed-type D-ring handle can be raised, lowered with bowline or figure-eight bend
- Hoisting pressurized cylinders not recommended

(Continued)

Using Rope for Hoisting

- Using proper knots, securing procedures helps prevent dropping of equipment
- Separate guideline may be tied to any of these pieces of equipment; objects may also be tied in center of rope

Hoisting Safety — General

- Have solid footing, make necessary preparations beforehand
- Use hand-over-hand method
- Use edge roller or padding
- Work in teams



(Continued)

Hoisting Safety — General

- Look to ensure all personnel clear of hoisting area
- Avoid hoisting operations near electrical hazards
- Secure nozzles of charged hoselines
- Use guideline to help control object being hoisted

Hoisting Safety

- Hoisting
  - Axe
  - Pike pole
  - Ladder
  - Hoselines
  - Portable fans
  - Power saw



Rescue Rope

- Used when victims located above, below grade and need to be rescued
- Technical skill that requires specialized training
- Used for variety of purposes

Rescue Harness

- Three classes
  - Class I
  - Class II
  - Class III



Summary

- Rope is one of the oldest and most basic tools used by firefighters. It is used to stabilize vehicles and other objects, hoist tools and equipment aloft, and to allow firefighters to access and rescue victims who are stranded above or below grade, or in bodies of water.

(Continued)

Summary

- Rope is also used to help firefighters escape from life-threatening situations.

(Continued)

Summary

- To use rope safely and effectively during fires and rescue operations, firefighters must know the various types of rope and their applications. They must also be capable of tying a variety of knots and hitches quickly and correctly — and that takes practice.

(Continued)

Summary

- Firefighters must know how to inspect, clean, and store ropes so that they are ready for use when needed.

Review Questions

1. What is the difference between life-safety rope and utility rope?
2. List three criteria that life-safety rope must meet before it is reused in life-safety situations.

(Continued)

Review Questions

3. Why is synthetic rope preferred for life-safety situations?
4. What two types of rope are used in life-safety situations?
5. Describe the most common types of rope construction.

(Continued)

Review Questions

6. How should the following types of rope be inspected: kernmantle rope, laid rope, braided rope, and braid-on-braid rope?
7. What are general guidelines for cleaning synthetic fiber rope?

(Continued)

Review Questions

8. What are the elements of a knot?
9. Describe commonly used rope hardware.
10. List four safety considerations for hoisting tools and equipment.

Essentials of Fire Fighting,
5th Edition

Chapter 6 — Fire Behavior

Firefighter I



Chapter 3 Lesson Goal

- After completing this lesson, the student shall be able to summarize physical and chemical changes and reactions that occur with fire and the factors involved in fire development.

Specific Objectives

1. Describe physical and chemical changes of matter related to fire.
2. Discuss modes of combustion, the fire triangle, and the fire tetrahedron.
3. Explain the difference between heat and temperature.

(Continued)

Specific Objectives

4. Describe sources of heat energy.
5. Discuss the transmission of heat.
6. Explain how the physical states of fuel affect the combustion process.
7. Explain how oxygen concentration affects the combustion process.

(Continued)

Specific Objectives

8. Discuss the self-sustained chemical reaction involved in the combustion process.
9. Describe common products of combustion.
10. Distinguish among common classifications of fires.

(Continued)

Specific Objectives

11. Describe the stages of fire development within a compartment.
12. Summarize factors that affect fire development within a compartment.
13. Describe methods used to control and extinguish fire.

Matter is…

anything that occupies space and has mass (weight).

Physical and Chemical Changes of Matter Related to Fire

- Physical change
  - Water freezing
  - Water boiling
- Chemical reaction
  - Reaction of two or more substances to form other compounds
  - Oxidation

(Continued)

Physical and Chemical Changes of Matter Related to Fire

- Chemical and physical changes
  - Usually involve exchange of energy
  - Potential energy released and changed to kinetic energy
  - Exothermic reaction
  - Endothermic reaction

DISCUSSION QUESTION



What are some examples of physical and chemical changes of matter?

Combustion — Modes

Flaming

Oxidation involves fuel in gas phase

Requires liquid/solid fuels to be converted to gas or vaporized

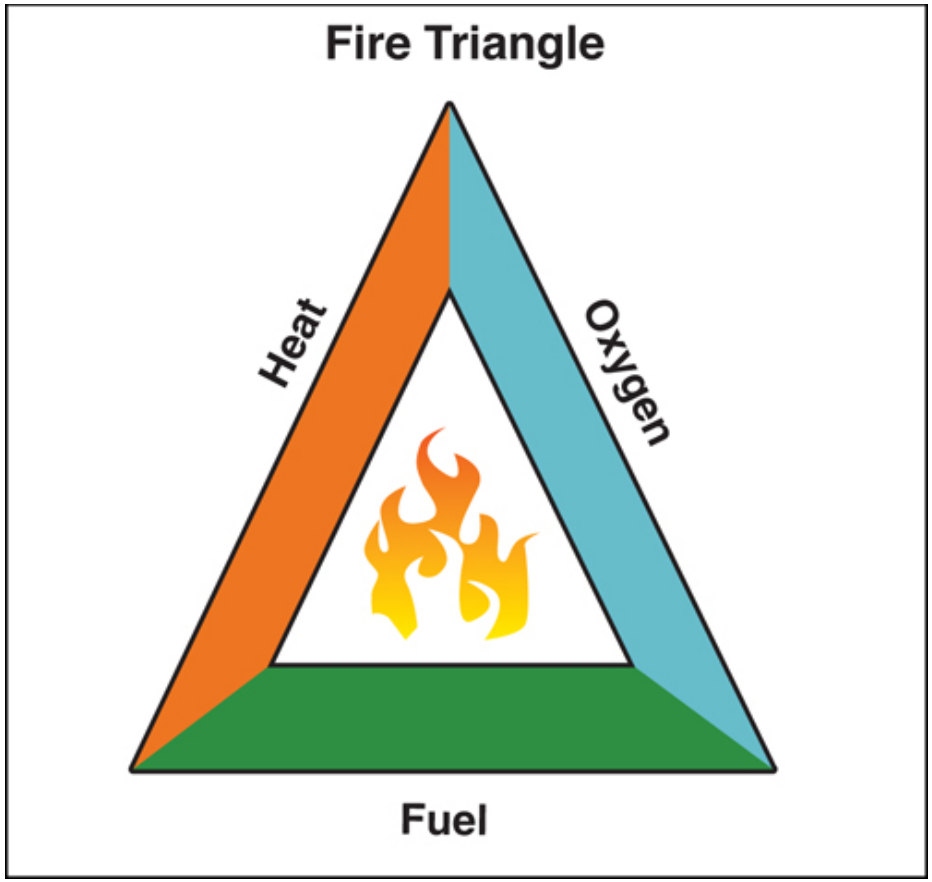
When heated, liquid/solid fuels give off vapors that burn

Nonflaming

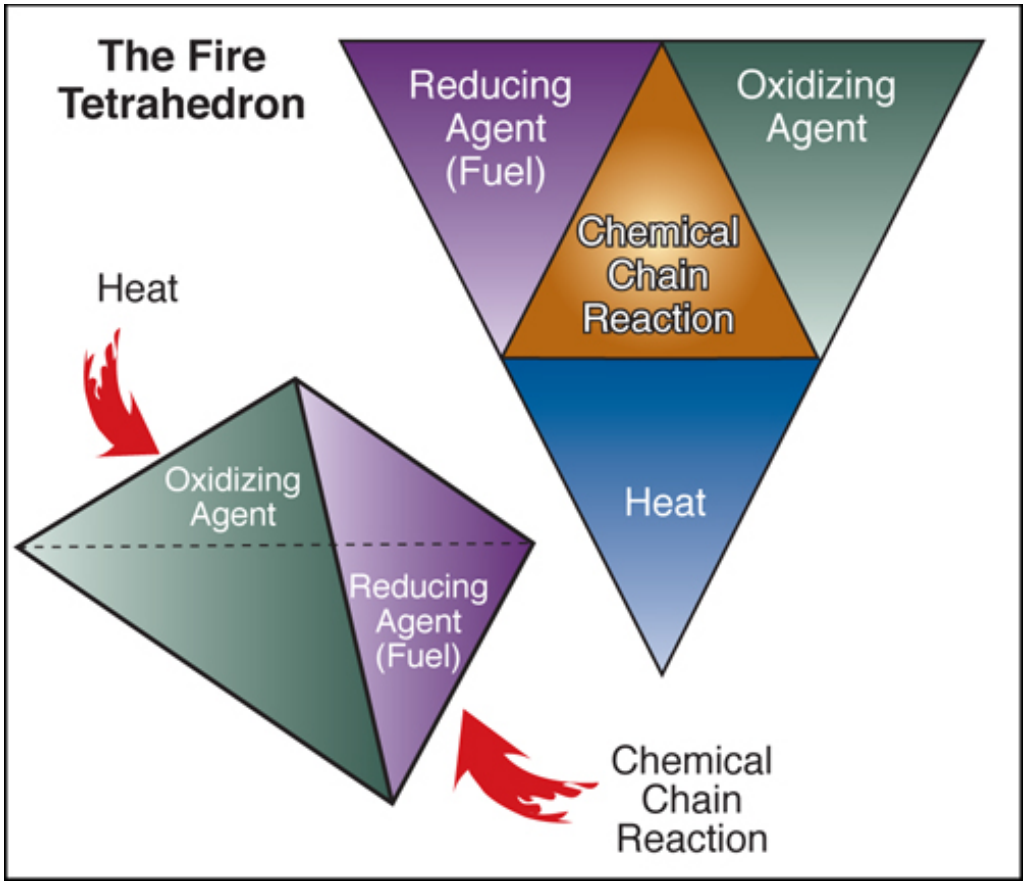
Some solid fuels can undergo oxidation at the surface of the fuel

Examples — Burning charcoal or smoldering fabric

Fire Triangle



Fire Tetrahedron



Heat as Energy

- Heat is a form of energy.
- Potential energy — Energy possessed by an object that may be released in the future
- Kinetic energy — Energy possessed by a moving object

Temperature

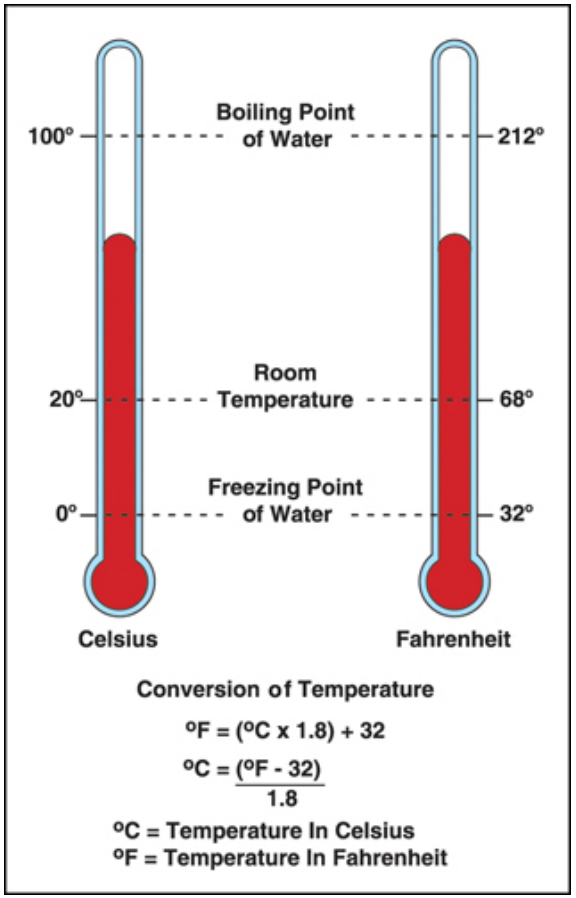
- Temperature is a measurement of kinetic energy
- Heat energy moves from objects of higher temperature to those of lower temperature.
- Understanding this movement is important

Measuring energy

- Not possible to measure directly
- *Work* means increasing temperature
- Measured in joules in International System of Units or metric system
- Measured in British thermal units in customary system

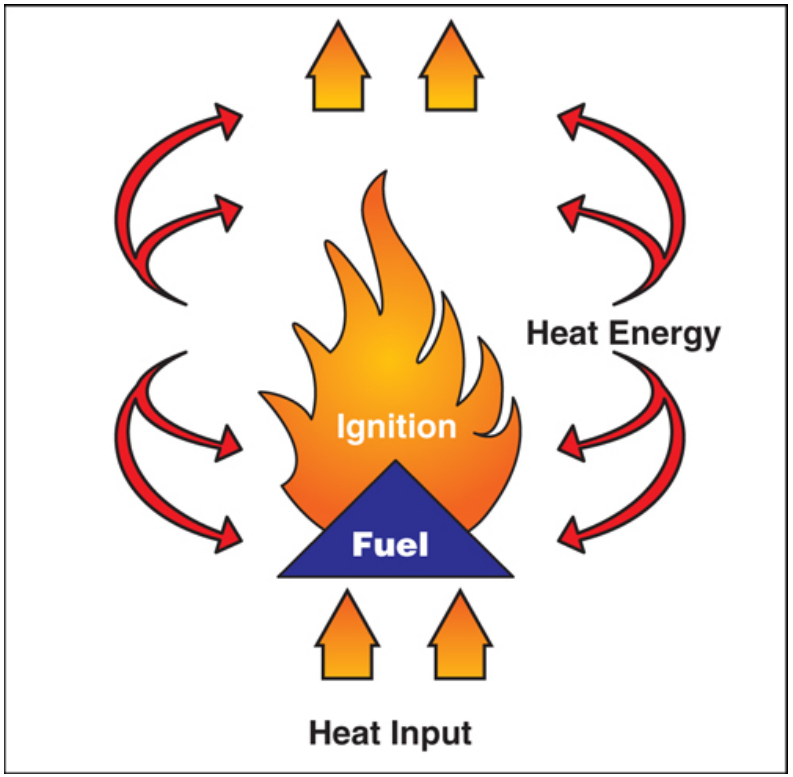
Scales Used to Measure Temperature

- Celsius — Metric
- Fahrenheit — Customary



Conversion of Energy Into Heat

- Heat is the energy component of tetrahedron
- Fuel is heated = temperature increases
- Starting ignition
- Forms of ignition



Chemical Heat Energy

- Most common heat source in combustion reactions
- Oxidation almost always results in production of heat
- Self-heating

Electrical Heat Energy

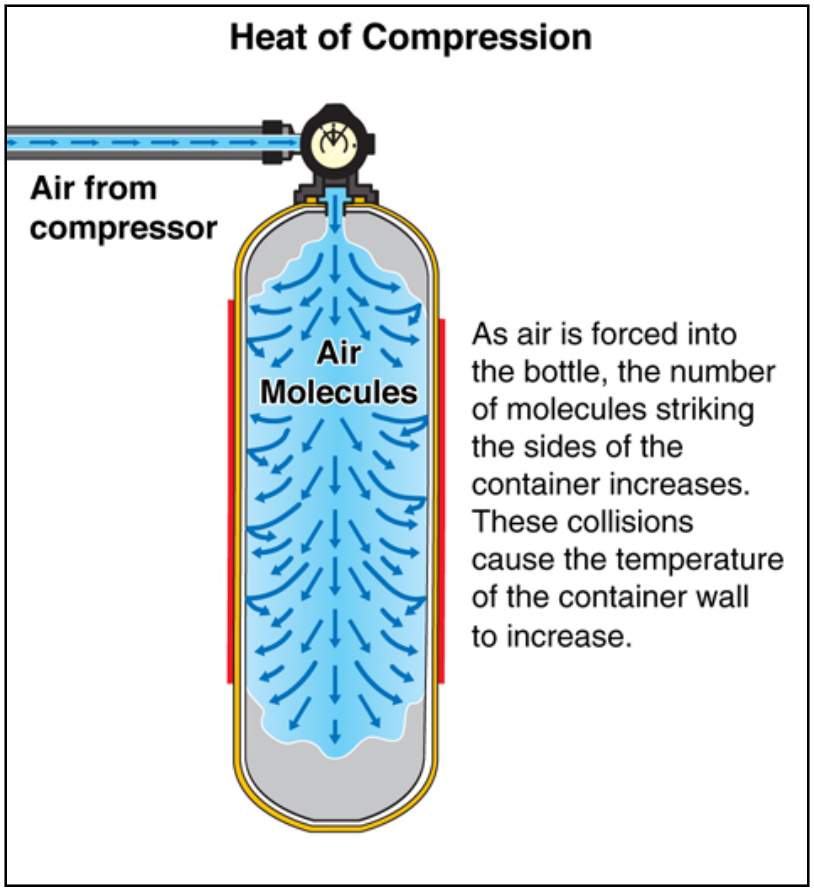
- Can generate temperatures high enough to ignite any combustible materials near heated area
- Can occur as
  - Resistance
  - Overcurrent/overload
  - Arcing
  - Sparking

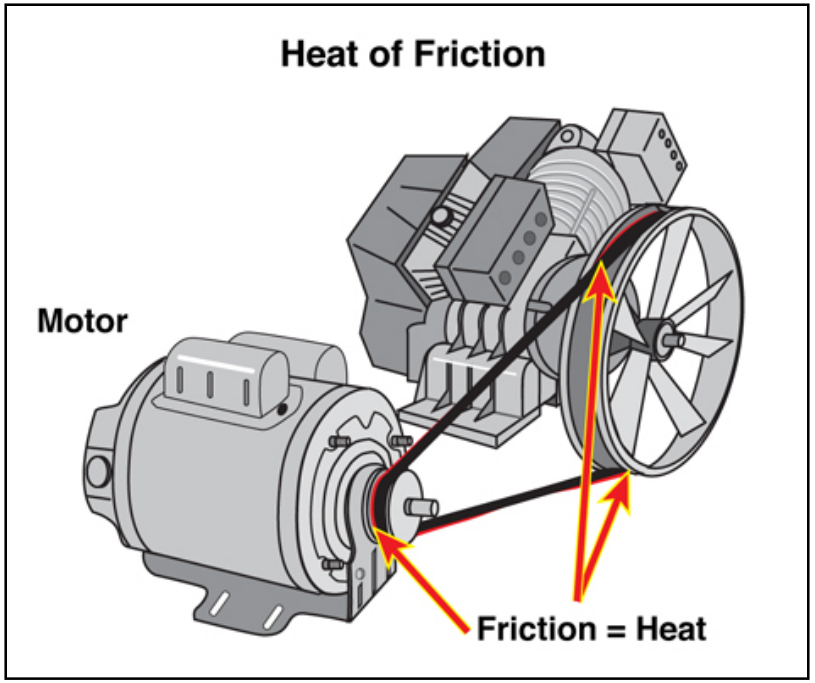
Mechanical Heat Energy

- Generated by friction or compression
- Movement of two surfaces against each other creates heat of friction
- Movement results in heat and/or sparks being generated
- Heat of compression generated when gas compressed

(Continued)

Mechanical Heat Energy





DISCUSSION QUESTION



What are some examples of chemical, electrical, and mechanical sources of heat energy?

Transfer of Heat

- Basic to study of fire behavior
- Affects growth of any fire
- Knowledge helps firefighters estimate size of fire before attacking
- Heat moves from warmer objects to cooler objects

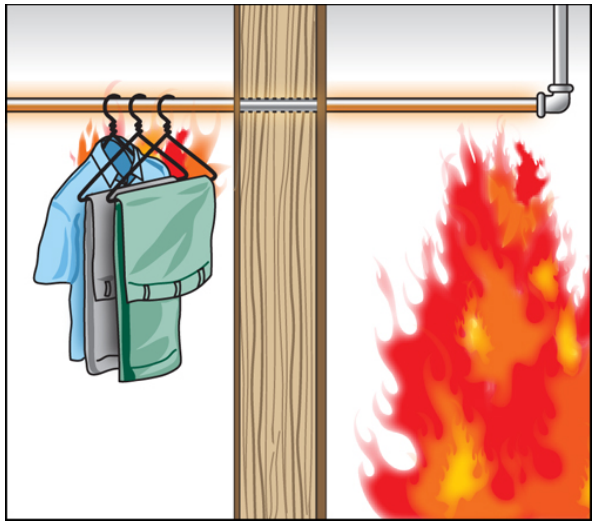
(Continued)

Transfer of Heat

- Rate related to temperature differential of bodies and thermal conductivity of material
- Greater the temperature differences between bodies, greater the transfer rate
- Measured as energy flow over time

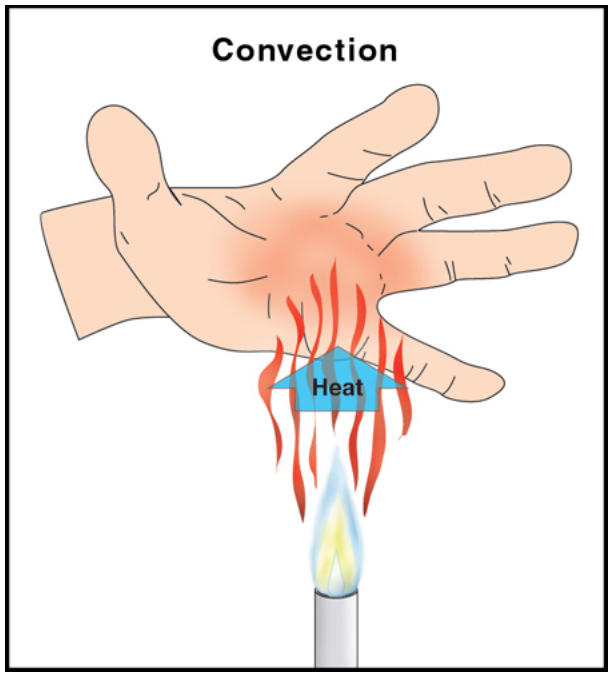
Conduction

- Transfer of heat within a body or to another body by direct contact
- Occurs when a material is heated as a result of direct contact with heat source
- Heat flow depends on several factors



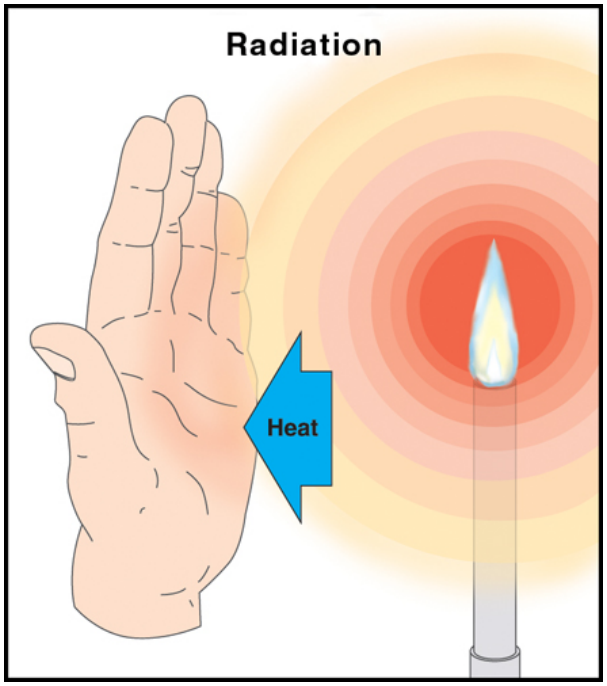
Convection

- Transfer of heat energy from fluid to solid surface
- Transfer of heat through movement of hot smoke and fire gases
- Flow is from hot fire gases to cooler components



Radiation

- Transmission of energy as electromagnetic wave without intervening medium



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Radiation

- Thermal radiation results from temperature
- Affected by several factors
- Energy travels in straight line at speed of light

Passive Agents

- Materials that absorb heat but do not participate in combustion
- Fuel moisture = passive agent
- Relative humidity and fuel moisture

DISCUSSION QUESTION



What is the impact of high fuel moisture on fire spread?

Fuel

- Material being oxidized in combustion process
- Reducing agent
- Inorganic or organic; organic most common

(Continued)

Fuel

- Organic can be broken into:
  - Hydrocarbon-based
  - Cellulose-based
- Key factors influencing combustion process
  - Physical state of fuel
  - Distribution or orientation of fuel

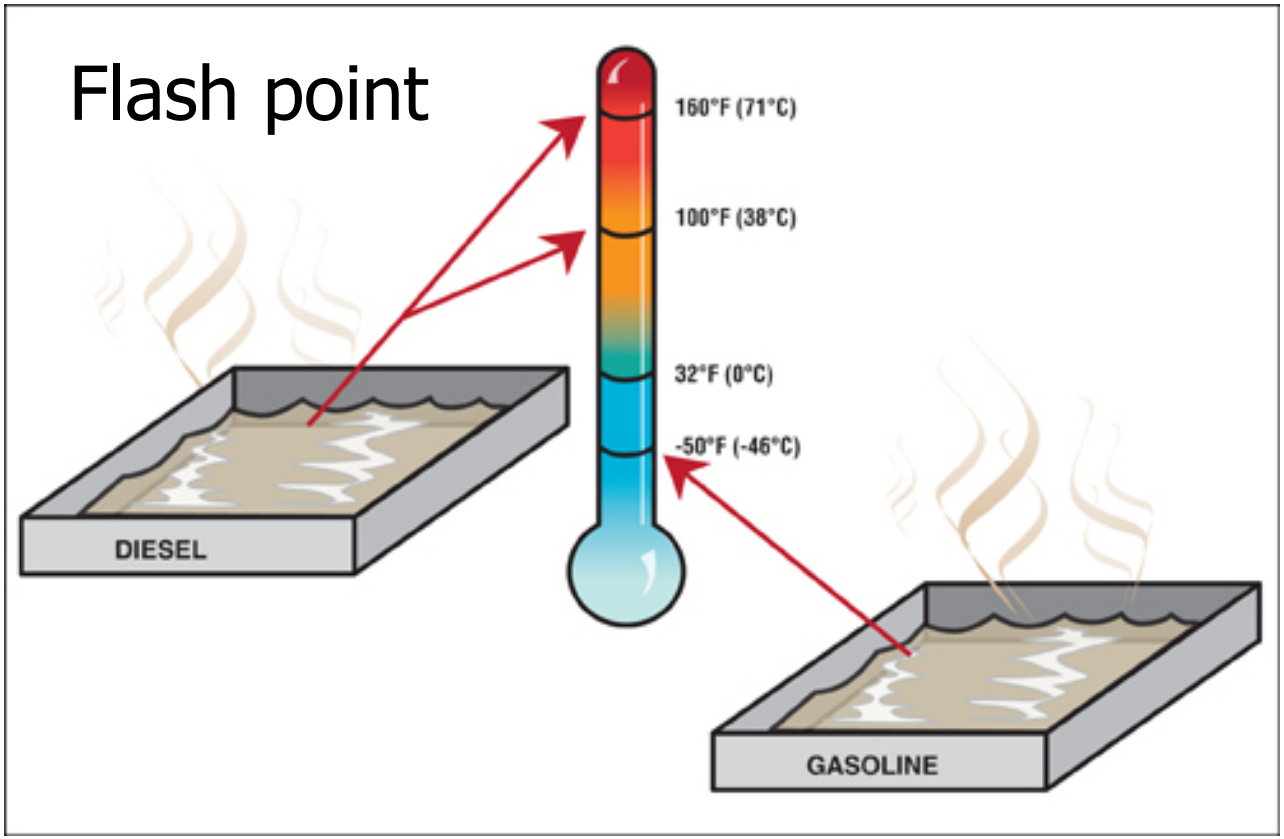
Gaseous Fuel

- Must be gaseous for flaming combustion
- Methane, hydrogen, etc. most dangerous because exists naturally in state required for ignition
- Has mass but no definite shape or volume

Liquid Fuel

- Has mass and volume but no definite shape except for flat surface
- Assumes shape of container
- Will flow downhill and pool in low areas
- Density is compared to that of water
- Must be vaporized in order to burn

Liquid Fuel Characteristics



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DISCUSSION QUESTION



From a practical standpoint, why should the flash point generally be considered the temperature at which a liquid or gas will sustain combustion?

Liquid Fuel Characteristics

- Fire point
- Surface area
- Solubility
- Fire fighting considerations

Solid Fuel

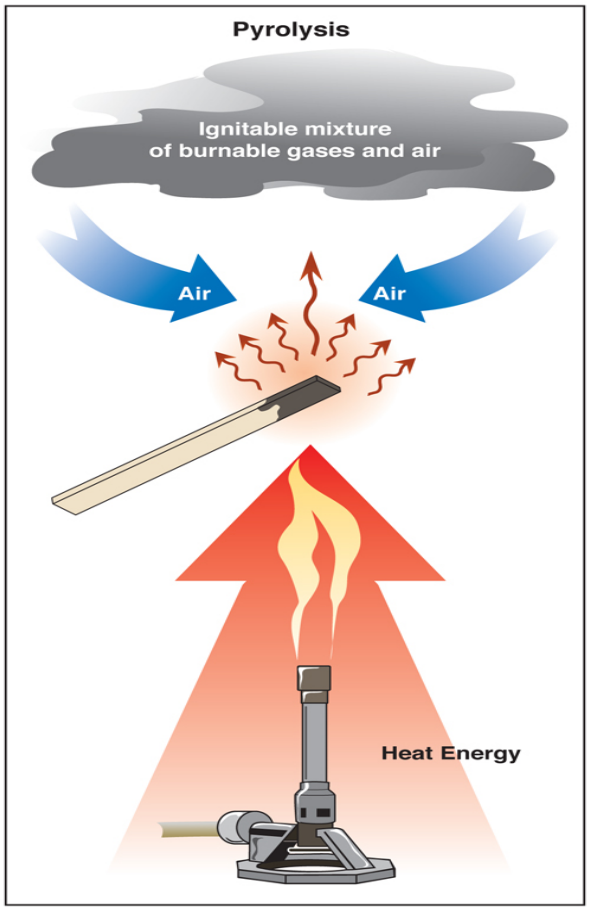
- Definite size and shape
- May react differently when exposed to heat



(Continued)

Solid Fuel

- Pyrolysis evolves solid fuel into fuel gases/vapors.
- As it is heated, begins to decompose, giving off combustible vapors



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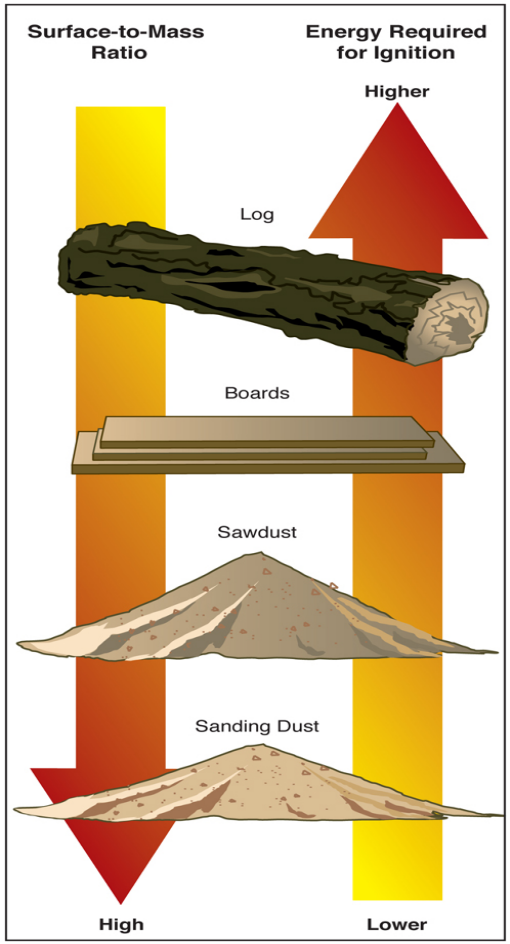
Solid Fuel

- Commonly the primary fuel
- Surface-to-mass ratio — Primary consideration in ease or difficulty of lighting



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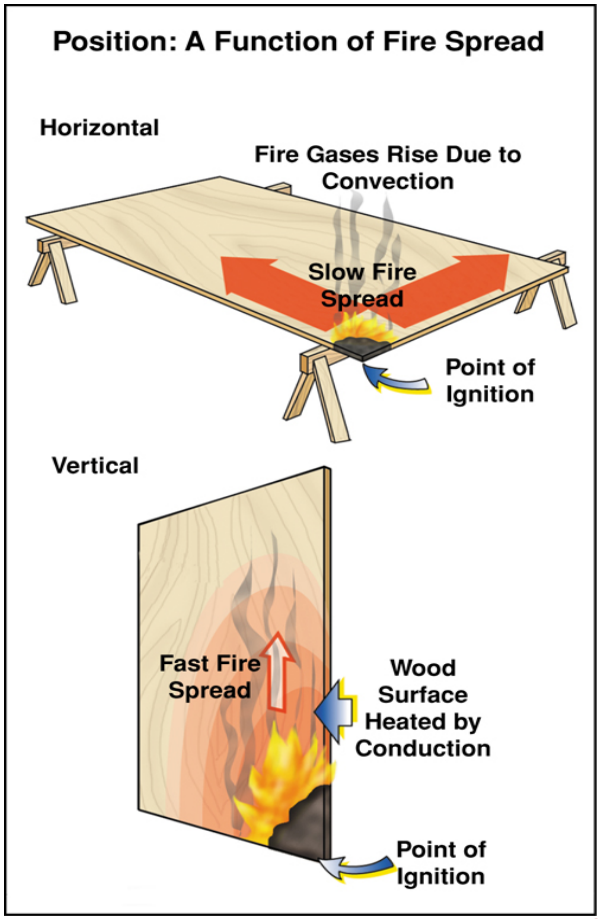
Solid Fuel

- Proximity/orientation of solid fuel relative to source of heat affects the way it burns



Heat of Combustion/ Heat Release Rate

- Heat of combustion — Total amount of energy released when a specific amount of fuel is oxidized
  - Usually expressed in kilojoules/gram (kJ/g)
- Heat release rate (HRR) — Energy released per unit of time as fuel burns
  - Usually expressed in kilowatts (kW)

Oxygen

- In air, is the primary oxidizing agent in most fires
- Air consists of about 21 percent oxygen
- Other materials can react with fuels in same way

Oxygen Concentrations

- At normal ambient temperatures, materials can ignite/burn at concentrations as low as 14 percent.
- When limited, flaming combustion may diminish; combustion will continue in surface or smoldering mode.

(Continued)

Oxygen Concentrations

- At high ambient temperatures, flaming combustion may continue at much lower oxygen concentrations.
- Surface combustion can continue at extremely low oxygen concentrations.

(Continued)

Oxygen Concentrations

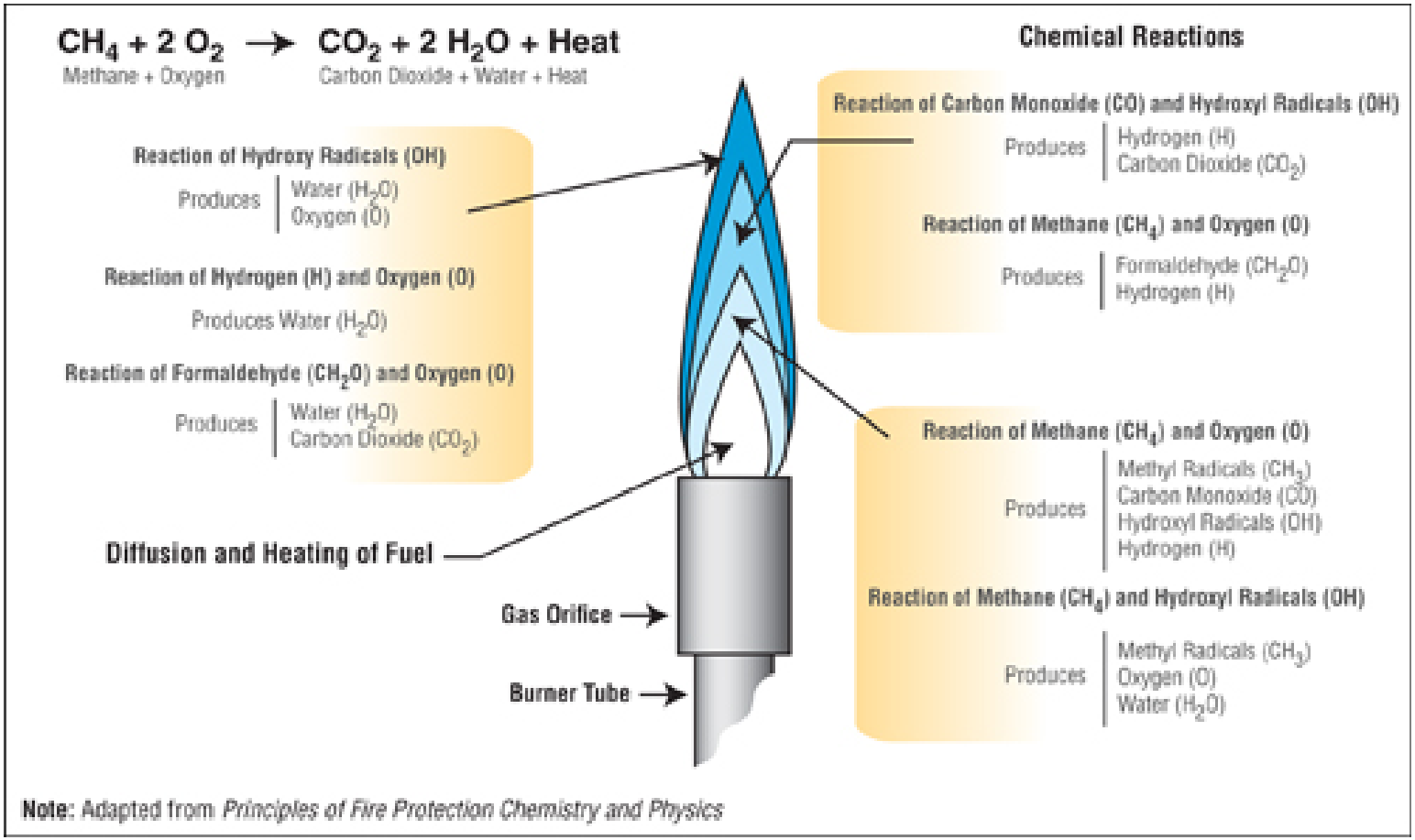
- When higher than normal, materials have different burning characteristics.
- Fires in oxygen-enriched atmospheres are difficult to extinguish and present a potential safety hazard.
- Flammable explosive range — Range of concentrations of fuel vapor and air

Self-Sustained Chemical Reaction

- Very complex
- Example: Combustion of methane and oxygen

(Continued)

Self-Sustained Chemical Reaction



Note: Adapted from *Principles of Fire Protection Chemistry and Physics*

Flaming Combustion

- Sufficient heat causes fuel/oxygen to form free radicals, initiates self-sustained chemical reaction
- Fire burns until fuel/oxygen exhausted or extinguishing agent applied
- Agents may deprive process of fuel, oxygen, sufficient heat for reaction

Surface Combustion

- Distinctly different from flaming combustion
- Cannot be extinguished by chemical flame inhibition
- Must be extinguished by working on one side of the fire triangle

General Products of Combustion Include Heat, Smoke, Light

- Heat, smoke impact firefighters most
- Heat generated during fire helps spread fire
- Lack of protection from heat may cause burns and other health issues
- Toxic smoke causes most fire deaths

Common Products of Combustion

- Carbon monoxide
- Hydrogen cyanide
- Carbon dioxide

Hazards to Firefighters

- Toxic effects of smoke inhalation not results of any one gas
- Smoke contains a wide range of irritating substances that can be deadly
- Firefighters must use SBCA when operating in smoke

Flame

- Visible, luminous body of a burning gas
- Becomes hotter, less luminous when burning gas mixes with proper amounts of oxygen
- Loss of luminosity caused by more complete combustion of carbon
- Product of combustion

Class A Fires

- Involve ordinary combustible materials
- Primary mechanism of extinguishment is cooling to reduce temperature of fuel to slow or stop release of pyrolysis products



Courtesy of Dave Ricci.

Class B Fires

- Involve flammable and combustible liquids and gases
- Those involving gases can be extinguished by cutting off gas supply
- Can be extinguished with appropriately applied foam and/or dry chemical agents



Class C Fires

- Involve energized electrical equipment
- Typical sources — Household appliances, computers, electric motors
- Actual fuel usually insulation on wiring or lubricants



(Continued)

Class C Fires

- When possible, de-energize electrical equipment before extinguishing
- Any extinguishing agent used before de-energizing must not conduct electricity

Class D Fires

- Involve combustible metals
- Powdered materials most hazardous
- In right concentrations, airborne metal dust can cause powerful explosions
- High temperature of some burning metals makes water reactive and other extinguishing agents ineffective

(Continued)

Class D Fires



(Continued)

Courtesy of NIST.

Class D Fires

- No single agent effectively controls
- Materials may be in a variety of facilities
- Caution urged when extinguishing — Can react violently to water and may produce toxic smoke/vapors

Class K Fires

- Involve oils and greases
- Require extinguishing agent specifically formulated for materials involved
- Agents use saponification to turn fats and oils into soapy foam that extinguishes fire



Fire Development in a Compartment

- Compartment — Closed room or space within vessel
- Walls, ceiling, floor absorb some radiant heat produced by fire
- Radiant heat energy not absorbed is reflected back, increasing temperature of fuel and rate of combustion

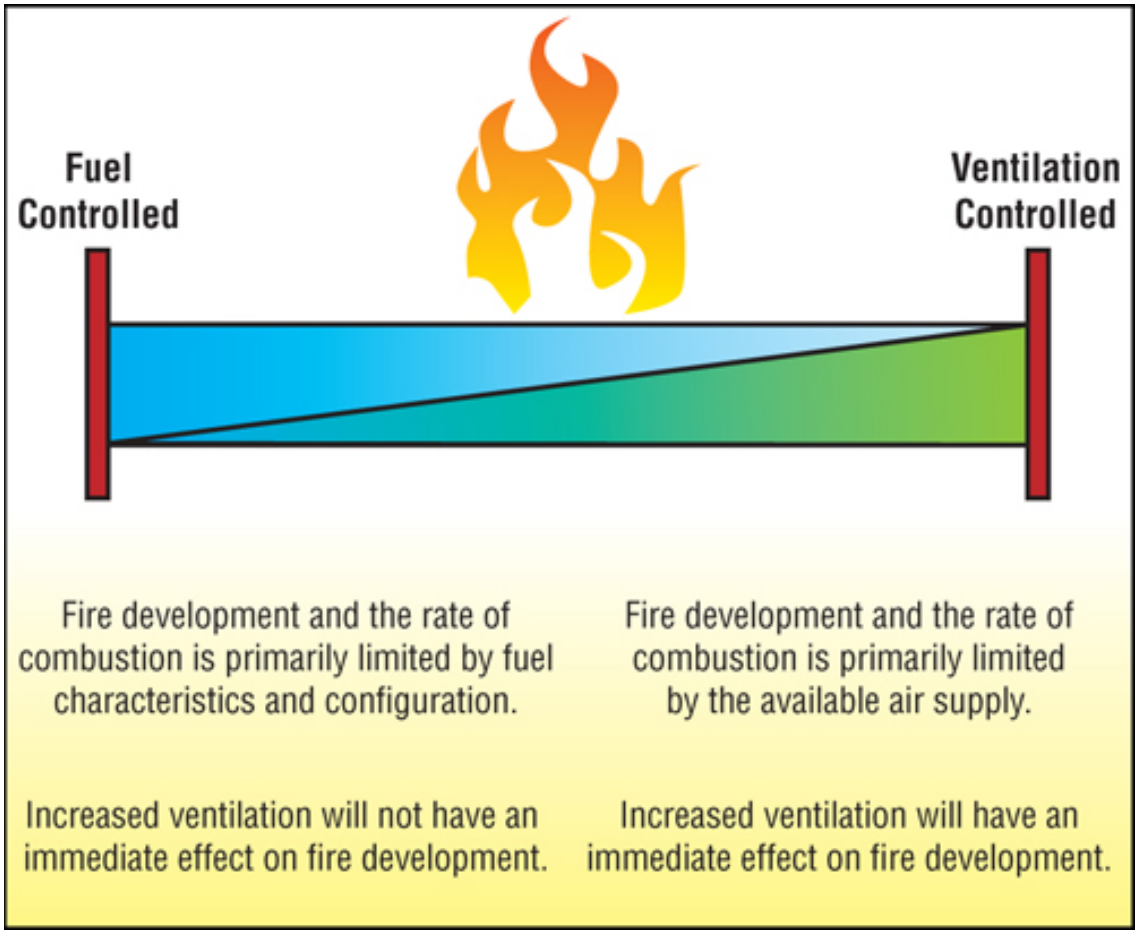
(Continued)

Fire Development in a Compartment

- Hot smoke/air becomes more buoyant
- Upon contact with cooler materials, heat conducted, raising temperature
- Heat transfer process raises temperature of all materials
- As nearby fuel is heated, begins to pyrolize, causing fire extension

(Continued)

Fire Development in a Compartment



Incipient Stage

- Ignition — Point when the three elements of the fire triangle come together and combustion occurs
- Once combustion begins, development is largely dependent on characteristics and configuration of fuel involved.

(Continued)

Incipient Stage

- Fire has not yet influenced environment to a significant extent
- Temperature only slightly above ambient, concentration of products of combustion low



Courtesy of NIST.

(Continued)

Incipient Stage

- Occupants can safely escape from compartment and fire could be safely extinguished with portable extinguisher or small hoseline
- Transition from incipient to growth stage can occur quite quickly

Growth Stage

- Fire begins to influence environment within compartment
- Fire influenced by configuration of compartment and amount of ventilation

(Continued)

Growth Stage

- Thermal layering — Tendency of gases to form into layers according to temperature



Courtesy of NIST.

(Continued)

Growth Stage

- Isolated flames — As fire moves through growth stage, pockets of flames may be observed moving through hot gas layer above neutral plane
- Rollover/flameover
- Flashover

Flashover Video



Fully Developed Stage

- Occurs when all combustible materials in compartment are burning



Courtesy of Gresham (OR) Fire and Emergency Services

(Continued)

Fully Developed Stage

- Burning fuels in compartment release maximum amount of heat possible for available fuel and ventilation, producing large volumes of fire gases
- Fire is ventilation controlled

Decay Stage

- Fire will decay as fuel is consumed or if oxygen concentration falls to point where flaming combustion can no longer be supported.
- Decay due to reduced oxygen concentration can follow much different path if ventilation profile of compartment changes.

(Continued)

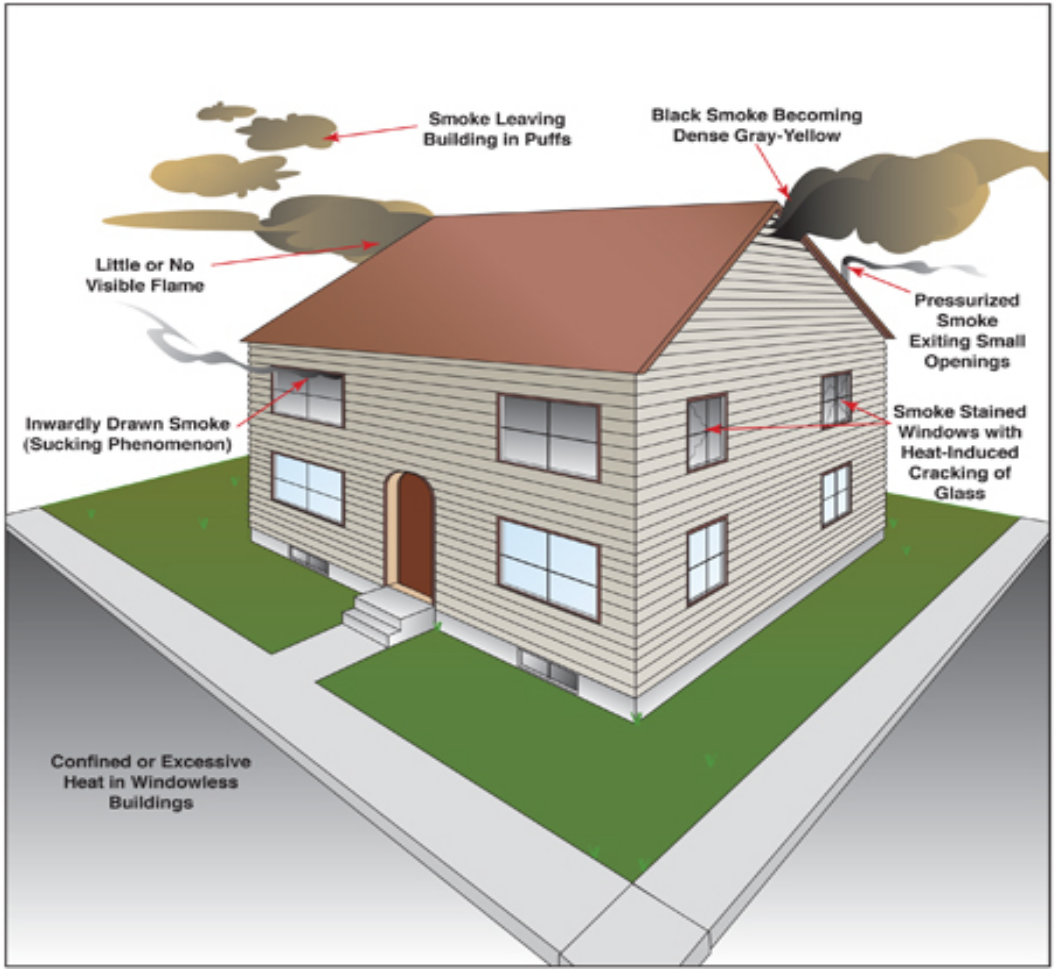
Decay Stage

- Consumption of fuel
- Limited ventilation
- Backdraft

Backdraft Video



Backdraft Conditions



B.L.E.V.E.

- Boiling Liquid Expanding Vapor Explosion
  - Constant threat in the MFF environment
  - Most common threat comes from propane tanks stored aboard vessels for cooking
  - Effects any tank that stores compressed liquid gas

http://www.youtube.com/watch?v=UM0jtD_OWLU
http://www.youtube.com/watch?v=Xf3WKTwHpIU
http://www.youtube.com/watch?v=GWjxrAhpBQk
http://www.youtube.com/watch?v=KVFrTDsO-Dw

Fuel Type

- Impacts both amount of heat released and time over which combustion occurs
- Mass and surface area are most fundamental fuel characteristics influencing development in compartment fire

Availability/Location of Additional Fuel

- Factors that influence
  - Configuration of building
  - Contents
  - Construction
  - Location of fire in relation to uninvolved fuel

Compartment Volume and Ceiling Height

- All other things being equal, a fire in a large compartment will develop more slowly than one in a small compartment
- The large volume of air will support the development of a larger fire before ventilation becomes the limiting factor

Ventilation

- Influences how fire develops
- Preexisting ventilation is the actual and potential ventilation of a structure
- Consider potential openings that could change the ventilation profile
  - Size, number, and arrangement of existing and potential ventilation openings

Thermal Properties of Enclosure

- Include insulation, heat reflectivity, retention, conductivity
- When compartment well-insulated, less heat lost; more heat remains to increase temperature and speed combustion reaction

(Continued)

Thermal Properties of Enclosure

- Surfaces that reflect heat return it to the combustion reaction and increase its speed
- Some materials act as heat sink and retain heat energy
- Other materials conduct heat readily and spread fire

Ambient Conditions

- Less significant factor inside structure
- High humidity/cold temperatures can impede natural movement of smoke
- Strong winds significantly influence fire behavior

Impact of Changing Conditions

- Structure fires can be dynamic
- Factors influencing fire development can change as fire extends from one compartment to another
- Changes in ventilation likely most significant factors in changing behavior

Temperature Reduction

- One of the most common methods of fire control/extinguishment
- Depends on reducing temperature of fuel to point of insufficient vapor to burn
- Solid fuels, liquid fuels with high flash points can be extinguished by cooling

(Continued)

Temperature Reduction

- Use of water is most effective method for extinguishment of smoldering fires.
- Enough water must be applied to absorb heat generated by combustion.
- Cooling with water cannot reduce vapor production enough to extinguish fires in low flash point flammable liquids/gases.

(Continued)

Temperature Reduction

- Water can be used to control burning gases/reduce temperature of products of combustion above neutral plane.
- Water absorbs significant heat as temperature raised, but has greatest effect when vaporized into steam.

Fuel Removal

- Effectively extinguishes any fire
- Simplest method is to allow a fire to burn until all fuel consumed.

Oxygen Exclusion

- Reduces fire's growth and may totally extinguish over time
- Limiting fire's air supply can be highly effective fire control action.

Chemical Flame Inhibition

- Extinguishing agents interrupt combustion reaction, stop flame production
- Effective on gas, liquid fuels because they must flame to burn
- Does not easily extinguish surface mode fires

Summary

- Many people believe that fire is unpredictable, but there is no unpredictable fire behavior. Our ability to predict what will happen in the fire environment is hampered by limited information, time pressure, and our level of fire behavior knowledge.

(Continued)

Summary

- Firefighters need to understand the combustion process and how fire behaves in different materials/different environments. They also need to know how fires are classified so that they can select and apply the most appropriate extinguishing agent.

(Continued)

Summary

- Most importantly, firefighters need to have an understanding of fire behavior that permits them to recognize developing fire conditions and be able to respond safely and effectively to mitigate the hazards presented by the fire environment.

Review Questions

1. What are the four elements of the fire tetrahedron?
2. What are common sources of heat that result in the ignition of a fuel?
3. Define conduction, convection, and radiation.

(Continued)

Review Questions

4. What is flash point?
5. What are three hazardous products of combustion?
6. Describe the five classes of fire.
7. What are the stages of fire development in a compartment?

(Continued)

Review Questions

8. Define thermal layering, rollover, flashover, and backdraft.
9. What are the factors that influence fire development within a compartment?
10. How can fire be controlled and extinguished?

Essentials of Fire Fighting,
5th Edition

Chapter 7 — Fire Control

Firefighter I



Chapter 7 Lesson Goal

- After completing this lesson, the student shall be able to attack various types of fires, using effective attack tactics, following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. Identify the basic tactics of the R.E.C.E.O. model.
2. Discuss responsibilities of Marine Fire Fighting units at vessel fires.
3. Describe direct attack, indirect attack, and combination attack.
4. Discuss deploying master stream devices.

(Continued)

Specific Objectives

5. Describe initial factors to consider when suppressing structure fires.
6. Summarize considerations prior to entering a burning building.
7. Explain the gas cooling technique.

(Continued)

Specific Objectives

8. Explain actions taken in attacking fires in upper levels of structures.
9. Explain actions taken in attacking fires belowground in structures.
10. Discuss structure fires in properties protected by fixed systems.

(Continued)

Specific Objectives

11. Describe actions and hazards associated with suppressing Class C fires.
12. List electrical hazards and guidelines for electrical emergencies.

(Continued)

Specific Objectives

13. Attack a structure fire — Exterior attack. (Skill Sheet 15-I-1)
14. Deploy and operate a master stream device. (Skill Sheet 15-I-2)
15. Turn off vessel utilities.(Skill Sheet 15-I-3)
16. Attack a vessel fire (above, below, and at weather deck) — Interior attack. (Skill Sheet 15-I-4)

(Continued)

Basic Firefighting Tactics

- Standard tactical priorities — Life safety, incident stabilization, property conservation
- Order of priorities same, but actions taken in the marine environment may differ from those used in structural firefighting

Basic Firefighting Tactics

- R.E.C.E.O. – V.S. Model
  - Rescue
  - Exposure Protection
  - Containment
  - Extinguish
  - Overhaul
  - Ventilation
  - Salvage

Basic Firefighting Tactics

- Rescue
  - Life Safety is the paramount responsibility of all officers / firefighters at any operation.
  - Life Safety includes ***YOUR*** safety as well as the safety of your partners.
  - Every search or rescue requires the **Risk Vs. Gain** assessment.

Basic Firefighting Tactics

- Rescue
  - Only time the Two In / Two Out rule does not apply:
    - There is either visual or audible evidence that a person(s) is alive and in a viable situation or area they can be rescued from.
  - Minimum of two personnel required to effect the rescue.

Basic Firefighting Tactics

- Exposure Protection
  - Once rescue operations are either being handled or are unnecessary, next highest priority.
  - If the exposures to the fire are not protected, the fire can continue to grow unabated.
  - Exposures are anything exposed to the direct or indirect heat of the fire.

Basic Firefighting Tactics

- Exposure Protection
  - Limited only to your imagination and capabilities
  - Can be as simple as moving non-burning, but threatened vessels out of the slips near a burning boat in a marina.
  - In a large vessel, may require multiple hose teams as one of the exposures is the ship itself.

Basic Firefighting Tactics

- Containment
  - In the MFF world, the task is often accomplished simultaneously with exposure protection.
  - In shipboard firefighting, containment can sometimes come before exposure protection due to their construction and use of steel hatches.

Basic Firefighting Tactics

- Extinguishment
  - Once the fire is contained, the process of putting it out begins.
  - Can be accomplished through a variety of tactics depending on available resources:
    - Attack with hose lines
    - Suffocation through limiting oxygen
    - Fixed fire suppression systems

Basic Firefighting Tactics

- Overhaul
  - The process of finding and extinguishing hot spots once the main fire is extinguished
  - Aboard large ships, this process can last from several hours to several DAYS.

Basic Firefighting Tactics

- Ventilation
  - This important but dangerous operation can occur anywhere in the RECEO model and depends entirely on conditions and resources.
- Salvage
  - The process of saving as much property as possible; has different connotations in the marine environment.

Coordination When Suppressing Marine Fires

- Fire attack on burning vessels must be coordinated
- When fighting any fire, firefighters should always work as a team under direction of a supervisor



Responsibilities — First Due Fire Boat

- Marina Fires
  - Determine the need for rescue and conduct operations as necessary
  - If no rescue is necessary, main priority is establishing a water supply to assist land based fire departments.

Responsibilities — First Due Fire Boat

- Shipboard Fires
  - Locate a member of the ship's crew and get a rapid assessment as to the severity of the fire / emergency.
  - Obtain a copy of the ship's fire plan.
  - Determine the need for rescue and conduct operations as necessary.

Responsibilities — Second Due Fire Boat

- Marina Fires
  - If first arriving vessel is conducting any other operation other than water supply, assume that operation.
  - If water supply under way, spot the vessel in a position to attack the fires or cover exposures from the opposite side of the land based units.
  - ***Beware of opposing fire streams!***

Responsibilities — Second Due Fire Boat

- Shipboard Fires
  - Locate first arriving vessel crew and receive an update of conditions.
  - Develop and Initial Action Plan (IAP) with the other crew based on the RECEO model
  - If first crew involved in a rescue attempt, IMMEDIATLEY set up for R.I.T. operations.

Responsibilities — Rapid Intervention Team (RIT)

- Consists of 2+ members wearing appropriate PPE, radio; equipped with special rescue tools, equipment necessary to effect rescue of other emergency personnel

(Continued)

Responsibilities — Rapid Intervention Team (RIT)

- May be assigned other emergency scene duties; must be prepared to drop those immediately if needed
- Exact number determined by IC



Courtesy of District Chief Chris E. Mickal, NOFD Photo Unit.

Responsibilities — Chief Officer/ Incident Commander

- Upon arriving at scene, chief officer may choose to assume Command from original IC, take responsibility for all on-scene operations



(Continued)

Responsibilities — Chief Officer/ Incident Commander

- If original IC has incident well organized, progress toward incident stabilization being made, chief officer may assume another role

Actions to Take

- Advancing hoseline teams should carry equipment needed to perform a variety of tasks
- Certain equipment carried by teams advancing hoselines
- Person at nozzle has responsibilities before entering IDLH



(Continued)

Actions to Take

- When vessel/major contents are involved in fire, firefighters should wait at entrance, staying low, out of doorway until fire officer gives order to advance
- Before entry, extinguish fires showing in exterior overhangs/around entry or egress points

(Continued)

Actions to Take

- Whenever possible, approach and attack fire from unburned side to keep it from spreading throughout vessel
- Once fire is contained, determine area of origin, protect evidence before overhaul and extinguishment

(Continued)

Actions to Take

- Breathing apparatus must be worn during overhaul, extinguishment
- Valuables found during overhaul should be turned in to supervisor



Pre-Entry Considerations

- Conduct quick size-up
- Maintain high level of situation awareness
- Read fire behavior indicators
- Understand crew's tactical assignment

(Continued)

Pre-Entry Considerations

- Identify potential emergency escape routes
- Assess forcible entry requirements
- Identify hazards
- Verify that radios are working, on right channel, being received

Opening Doors

- If door to fire area must be opened, all members should stay low and to one side of doorway



- Check door for heat before opening

DISCUSSION QUESTION



What should be done if smoke is escaping at the top of a doorway that is about to be opened?

Gas Cooling

- Not a fire extinguishment method; way of reducing hazard presented by hot gas layer
- Effective when faced with shielded fire

Hot Gas Layer

- Hot gas layer accumulating in upper levels of compartment presents problems
- Cooling hot gas layer mitigates hazards by slowing transfer of heat to other combustibles

Cooling Hot Gas Layer

- Apply short pulses of water fog onto it
- Repeat technique as necessary while hose team advances under gas layer toward fire



Courtesy of Dick Giles.

Direct Attack



- Most efficient use of water on free-burning fires made by direct attack

(Continued)

Direct Attack

- Usually from straight or solid stream
- Techniques
- Water should not be applied long enough to upset thermal layering

Indirect Attack

- Used when firefighters unable to enter burning vessel/ compartment
- Can be made from outside compartment through window or other small opening



Courtesy of Dick Giles.

(Continued)

Indirect Attack

- Not ideal method of attack where occupants may still be inside
- May be only method of attack until temperatures reduced
- Procedures for making indirect attack

DISCUSSION QUESTION



What is the difference between a direct and indirect attack?

Combination Attack

Uses heat-absorbing technique of cooling hot gas layer followed by heat-reducing direct attack on materials burning near floor level



Courtesy of Central Florida Fire Academy.

Master Streams

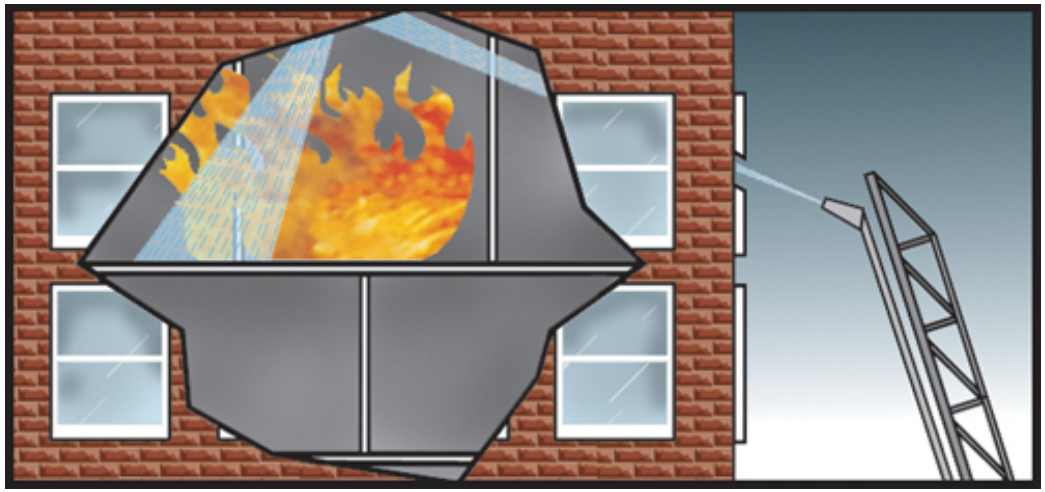
- Usually deployed in situations where fire is beyond effectiveness of handlines or there is need for fire streams in areas that are unsafe for firefighters
- Main uses for master stream

Positioning Master Stream

- Must be properly positioned to apply effective master stream on fire
- Master stream can be adjusted up, down and left, right
- Once line in operation, must be shut down if device is to be moved

(Continued)

Positioning Master Stream



- Stream should be aimed so it enters structure at upward angle, deflects off ceiling or other overhead objects

(Continued)

Positioning Master Stream

- Desirable to place master stream device in location that allows stream to cover most surface area of building

Supplying Master Streams

- Master stream devices can have high friction loss in supply hose
- Because master stream devices used primarily in defensive fire fighting, desirable to shut down handlines to keep from reducing water supply available for master streams

(Continued)

Supplying Master Streams

- Always follow SOPs in operation of master streams, handlines

Staffing Master Stream Devices

- Usually takes minimum of two firefighters to deploy master stream device, supply water to it
- Once portable master stream device in place, can be operated by one firefighter



(Continued)

Staffing Master Stream Devices

- Some situations may be too dangerous to have firefighters stationed at master stream device

DISCUSSION QUESTION



What should be done if a master stream device starts to move?

Elevated Master Stream Devices

- Used to apply water to upper stories of multistory buildings, either in direct attack or to supply handlines
- Delivered by aerial devices

Fires in Upper Decks of Vessels

- Typical residential response consisting of 2-3 engines; one truck usually inadequate
- Large number of firefighters needed

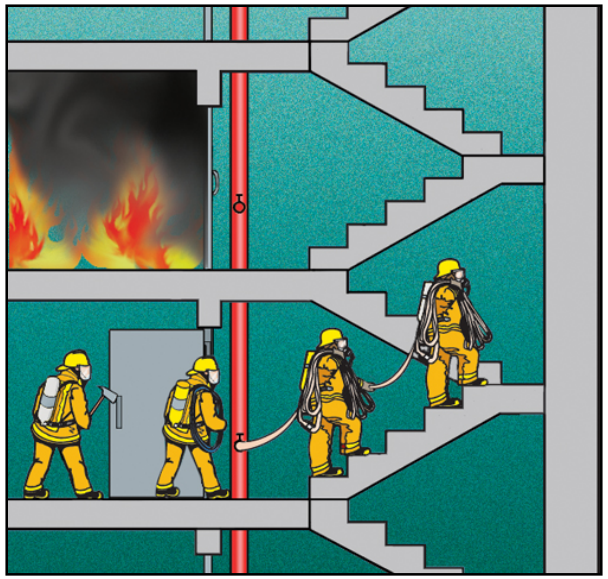
DISCUSSION QUESTION



Should elevators ever be used during fire operations?

Attacking Fires in Upper Decks

- Fire attack typically initiated from deck below the fire
- Crews should check decks above main fire for fire extension, victims



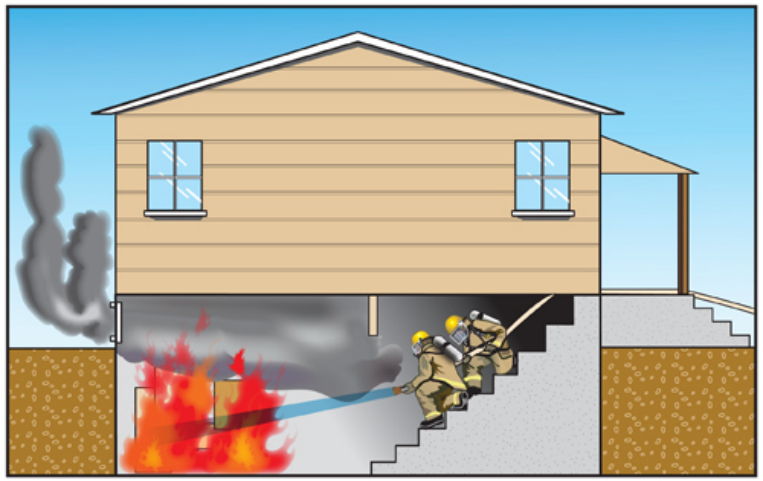
(Continued)

Attacking Fires in Upper Decks

- Staging usually established two decks below fire, but can vary based on vessel construction / type
  - Example: The best staging area on a Ro / Ro ship may be on the weather deck, which will be above the fire.

Fires Below The Weather Deck

- Can expose firefighters to extremely hostile conditions
- May be possible to control fire without entering the effected space



(Continued)

Fires Below The Weather Deck

- If cellar nozzle unavailable, firefighters may have to enter lower decks
- Good ventilation techniques extremely important
- Use extreme caution as you will be entering the same way super-heated gases will be exiting

Fixed Fire Extinguishing Systems

- Firefighters should be familiar with systems in vessels
- Supporting systems critical during fire



(Continued)

Fixed Fire Extinguishing Systems

- Types of systems
- Dangers involved with fires in occupancies with fixed systems

Class C Fires

- Involve energized electrical equipment
- Major safety hazard — Firefighters fail to recognize danger and take appropriate steps for protection
- Once electrical power turned off, may self-extinguish or fall into Class A or B

(Continued)

DISCUSSION QUESTION



What are some examples of potential Class C fires?

Class C Fires

- In many commercial vessels, electrical power necessary to operate essential systems; not to be shut off until ordered
- When handling fires in delicate electronic/computer equipment, clean extinguishing agents should be used

(Continued)

Class C Fires

- Multipurpose dry-chemical agents effective, but some chemically reactive with components
- Using water inappropriate because of shock hazard

(Continued)

Class C Fires

- Fire suppression techniques needed for fires involving commercial high-voltage installations or spaces
- Always consult with the ship's Master or Chief Engineer before taking any action on electrical equipment

Controlling Electrical Power

- Advantageous for electrical power to remain on for lighting, fire pumps, other essential systems
- Decision made by Ship's Master, IC and Incident Safety Officer

(Continued)

Electrical Shock

- Consequences of electrical shock
- Factors most affecting seriousness of electrical shock

Summary

- Attacking fires early in their development is an important aspect of a successful fire fighting operation. Likewise, selecting and applying the most effective fire attack strategy and tactics are also important.

(Continued)

Summary

- Failing to do any of these things can result in a fire growing out of control, an increase in fire damage and loss, and possibly in firefighter injuries.

(Continued)

Summary

- Firefighters need to know how to use the fire fighting tools and techniques adopted by their departments. They need to know how to safely and effectively attack and extinguish structure fires, vehicle fires, refuse fires, and wildland fires.

Review Questions

1. What initial actions should firefighters take when suppressing a structural fire?
2. What are the differences among a direct attack, an indirect attack, and a combination attack?

(Continued)

Review Questions

3. When are master streams usually deployed?
4. What are three guidelines for electrical emergencies?
5. What are the parts of a wildland fire?

Essentials of Fire Fighting, **5th Edition**

Chapter 8 — Fire Ground Communications

Marine Firefighter



Chapter 19 Lesson Goal

- After completing this lesson, the student shall be able to communicate effectively by radio following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. Describe communication responsibilities of the firefighter.
2. Summarize necessary skills for fire department communication.
3. Summarize guidelines for radio communications.
4. Discuss local radio operations between HPD and local FD's.

(Continued)

Specific Objectives

5. Describe information given in arrival and progress reports.
6. Explain the purpose of tactical channels.
7. Discuss calls for additional resources and emergency radio traffic.

(Continued)

Specific Objectives

8. Discuss evacuation signals and personnel accountability reports.
9. Use a portable radio for routine and emergency traffic. (Skill Sheet)

Guidelines for Radio Communications

- Use plain English or clear text without codes of any kind
  - Clear text — Standardized set of fire-specific words and phrases, often used in the wildland fire community
- Use a moderate rate of speaking

(Continued)

Guidelines for Radio Communications

- Everyone on the fireground should follow two basic rules
  - Units must identify themselves in every transmission
  - The receiver must acknowledge every message

(Continued)

Guidelines for Radio Communications

- Do not transmit until the frequency is clear
- Any unit working at an emergency scene has priority over routine transmissions
- Do not use profane or obscene language on the air

(Continued)

Joint HPD – FD Radio Operations

- Two different radio systems
  - RCS (All agencies except SDFD / SDPD)
  - City of San Diego radio system
- Three Fire Communication Centers
  - San Diego Fire (Independent Comm Center)
  - Chula Vista Fire Channels (Contract w/ SDFD)
    - Covers C.V., N.C., I.B. and Coronado

Joint HPD – FD Radio Operations

- Command and Tactical Channels
  - Command channels used while responding and prior to receiving and assignment
  - Tactical channels used once and assignment has been given by the IC
- Joint HPD / FD Operations
  - Vessels will switch the boat's radio to the working command channel once identified

Arrival Reports

- Also called a report on conditions or situation report
- Establish a time of arrival and inform other responding units of what actions might be needed



(Continued)

Arrival Reports

- Format
  - Situation found
  - Action(s) taken/actions to be taken
  - Command status

(Continued)

Arrival Reports

- Some situations require more detail
  - Address, if other than the one initially reported
  - Vessel and occupancy description
  - Nature and extent of fire or other emergency
  - Attack mode selected

(Continued)

Arrival Reports

- Some situations require more detail (cont.)
  - Rescue and exposure problems
  - Instructions to other responding units
  - Location of Incident Command position
  - Establishing Command
  - Water supply situation

Progress Reports

- Are used to keep the communications center continually advised

Progress Report Items

- Transfer of Command
- Change in command post location
- Progress (or lack of) toward incident stabilization
- Direction of fire spread



(Continued)

Progress Report Items

- Exposures by direction, occupancy, and distance
- Any problems or needs
- Anticipated actions

Tactical Channels

- Most often used for large incidents
- Small routine incidents usually do not require a tactical channel
- In many departments, units are initially dispatched on the primary dispatch channel

(Continued)

Tactical Channels

- Upon arrival on the scene, units may switch to an assigned tactical channel

Tactical Channels: Telecommunicator Roles

- Assign a tactical frequency
- Ensure additional responding units are aware of the assigned tactical channel
- Notify other agencies and services of the incident and the need for them to respond
- Provide updated information

Calls for Additional Resources

- Normally, only the Incident Commander may strike multiple alarms or order additional resources
- Know local procedure for requesting additional resources

(Continued)

Calls for Additional Resources

- Be familiar with alarm signals
- When multiple alarms are struck, a radio-equipped mobile communications vehicle can be used to reduce the load on the communications center



(Continued)

Calls for Additional Resources

- Firefighters must be able to communicate the need for team assistance

Emergency Radio Traffic

- Person transmitting the message should make the urgency clear
- Telecommunicator should give an attention tone, advise all other units to stand by, and then advise the caller to proceed

(Continued)

Emergency Radio Traffic

- After the emergency communication is complete, telecommunicator notifies all units to resume normal or routine radio traffic
- https://www.youtube.com/watch?v=JpJjl_R-98M
- https://www.youtube.com/watch?v=rmj4Xh7LNGA

Evacuation Signals

- Are used when the IC decides that all firefighters should immediately withdraw
- All firefighters should be familiar with their department's method of sounding an evacuation signal

- https://www.youtube.com/watch?v=KvnWX-HQ2FU

(Continued)

Evacuation Signals

- Radio broadcast
  - Similar to emergency traffic broadcast
  - Message is broadcast several times
  - https://www.youtube.com/watch?v=ymYZzS5XQxw

(Continued)

Evacuation Signals

- Audible warning devices
  - Will work outside small structures
  - May not be heard by everyone
  - Can be confused with those being used by units arriving at the scene

Personnel Accountability Report (PAR)

- A systematic way of confirming the status of any unit operating at an incident
- When requested, every supervisor must verify the status of those under his or her command

(Continued)

Personnel Accountability Report (PAR)

- May have to rely on touch or hearing to verify each member's status
- Others in the chain of command must rely on radio reports from their subordinates

(Continued)

Personnel Accountability Report (PAR)

- Command can request a PAR at any time, but one is usually requested when:
  - The incident is declared under control
  - There is a change in strategy
  - There is a sudden catastrophic event
  - There is an emergency evacuation
  - A firefighter is reported missing or in distress

HPD Fire Operation Terminology

- Terms used by HPD officers during fire operations
  - Incident Commander (IC)
  - Tactical Officer
  - Interior
  - R.I.T.
  - Division
  - Fire Attack

HPD Fire Operation Terminology

- Incident Commander
  - Person in charge of the incident
  - Initially the first arriving Firestorm Operator or Fire Captain (whoever is 1st on scene)
  - As operation grows in size and complexity, passed on to higher ranks as they arrive
    - i.e. Officer to Sergeant to Lieutenat for HPD, or Fire Captain to Battalion Chief to Division Chief for fire departments
  - May be part of a Unified Command

HPD Fire Operation Terminology

- Safety Officer
  - Specific to HPD based on unique operating areas
  - Usually a Sergeant, but could also be assigned to a Fire Team Officer or Corporal
  - Purpose is to provide a secondary level of supervision of the HPD officers working at a fire if the HPD IC Sergeant is separated from those officers by the location of the operation
  - Accountability and Command / Control are the primary responsibilities

HPD Fire Operation Terminology

- Interior
  - Used by an HPD team of officers entering and IDLH for any reason
  - Eliminates confusion of multiple call signs
  - Gives priority radio traffic to this team, as they are exposed to the greatest danger of all personnel on scene
  - May be given a more specific title once additional personnel arrive on scene

HPD Fire Operation Terminology

- Fire Attack
  - Term used by all FD's in San Diego
  - Team of officers or firefighters tasked with locating and containing the fire
  - May replace the term 'Interior' as more personnel begin operating in or near the IDLH

HPD Fire Operation Terminology

- Division
  - Term used by all FD's in San Diego
  - Can refer to a person or team assigned to a specific task or location
    - Task examples: Dewatering Division, Ventilation Division
    - Location examples: A team sent to check conditions on, or officer in charge of, Deck 4 of a ship may be referred to as Division 4

Summary

- Fire alarms or calls for help must be handled expediently and accurately. If they are not, incidents can increase in size and severity.

(Continued)

Summary

- Fire department communications are a critical factor in the successful outcome of any incident. The better the communications, the safer the incident.

(Continued)

Summary

- Firefighters must know how to handle both emergency and routine communications, including nonemergency calls for business purposes or public inquiries made directly to the station.

(Continued)

Review Questions

1. What communication skills are necessary for fire department communications?
2. What is computer-aided dispatch (CAD)?
3. List three basic business telephone courtesies.

(Continued)

Review Questions

4. What actions should be taken when receiving an emergency call from a citizen?
5. How should the public report a fire or other emergency using a telephone?

PORT of SAN DIEGO

Rapid Intervention

Port of San Diego HARBOR POLICE

Rapid Intervention Teams

Rapid Intervention Lesson Goal

- At the conclusion of this lesson, the student will be familiar with the role of the Rapid Intervention Team assignment and be able to perform the skills necessary to accomplish a rescue during a RIT operation

Rapid Intervention Teams

Rapid Intervention Specific Objectives

1. Be able to define the need for and responsibilities of a Rapid Intervention Team at every fire
2. Know the staffing and capability differences between an IRIT vs RIT
3. Recognize the four different phases of a RIT deployment

Rapid Intervention Teams

Rapid Intervention Specific Objectives

4. Be able to identify and utilize all components of the Scott RIT PAK III

5. Demonstrate competencies in all necessary skill sets as required by NFPA 1407

6. Successfully complete Skill Sheets 9-5, 9-6, 9-7

Rapid Intervention Teams

- Rapid Intervention Team Definition
  - NFPA 1407, Section 3.3.8 - A dedicated team of firefighters who are assigned for rapid deployment to rescue lost or trapped members
  - These teams do not search for, or operate to rescue, civilians or vessel crewmembers. They are strictly for the emergency rescue of firefighters.

Rapid Intervention Teams

NFPA 1500 – Standard on Fire Department Occupational Safety, Health and Wellness Program

- Standard for the overall safety of firefighters
- Section 8.8 Covers all aspects of Rapid Intervention
- 8.8.1 – The department shall provide personnel for the rescue of members operating at emergency incidents
- 8.8.2 – During the initial point of the operation where only four members are on scene and entry into the IDLH is required, two members must be outside and ready to perform a rescue as necessary; while previously known as ‘Two In / Two Out’, it is now referred to as IRIT

Rapid Intervention Teams

Harbor Police R.I.T. Operations

- Our agency is not equipped or staffed to supply a full four-person RIT as defined by NFPA 1710 for most operations
- Generally will follow the IRIT format
- Will begin as the ‘Two In / Two Out’ IRIT
- May eventually have a dedicated two-person team assigned specifically to IRIT
- If a full RIT team is required, it will most likely be provided by one of our mutual aid agencies

Rapid Intervention Team Operations

- RIT Operations take place in four phases
  - Preparation
  - Communication and Deployment
  - Search and Locate
  - Stabilization and Extraction

Rapid Intervention Team Operations

- Preparation
  - Begins when ETAs of both boats are given, and you are identified as the second arriving vessel
  - Mentally recognize that you will be the IRIT if the first arriving crew feels an entry into the IDLH is required
  - Upon arrival, coordinate with the first crew as to potential entry and egress points prior to their entry
  - Begin to gather and stage equipment needed for a potential IRIT deployment

Rapid Intervention Team Operations

- Preparation
- It is expected that IRIT, as part of the initial response, will prepare for that role while simultaneously performing other functions
- Basic IRIT equipment:
  - Set of Irons
  - RIT Bag
  - Rope Bags
  - TIC
  - Stokes Basket (Later in the operation)

Rapid Intervention Team Operations

- <u>Communication and Deployment</u>
- A RIT operation begins with some form, or lack of, communication
  - Hearing a PASS Alarm
  - A voice you recognize yelling for help
  - ‘Mayday’ is declared
  - P.A.R. is conducted and someone is unaccounted for
  - The crew in the IDLH does not respond to radio calls and their status is unknown
  - Any reason that may indicate a firefighter is in distress

Rapid Intervention Team Operations

- Communications and Deployment
- Another part of communication is monitoring what the interior team is putting out via their radios to allow you to ‘follow’ them in the vessel
- If order to deploy is given to the RIT, multiple decisions need to be made rapidly:
  - Will you enter the same way as the crew you are deploying for?
  - Are you following a hose line?
  - Do you need to deploy your own search line?
  - If a Mayday was given, do you have the additional tools requested by the team declaring the emergency?
  - What conditions are you seeing from the vessel?

Rapid Intervention Team Operations

- Stabilization and Extraction
- Once a deployment has begun, this is a rapid search for the lost or trapped firefighter(s); this is not a primary search
- Should be using one or all of these methods to search and locate the firefighter(s):
  - Interior team's hose line
  - Interior team's tag line
  - Audible PASS alarm
- Remember to bring your hand tools; you may have to move objects off of the firefighter you're rescuing

Rapid Intervention Team Operations

- Stabilization and Extraction
- Once you have located the firefighter you were searching for, you must stabilize the situation that created the emergency
- In ***every*** case where a RIT deployment has occurred, your first priority is to establish the status of the effected member's air levels and correct any identified breathing emergencies using the RIT Bag

Rapid Intervention Team Operations

- Stabilization and Extraction
- The Scott RIT PAK III is designed to correct any form of breathing emergency you may encounter with the firefighter you have been sent to rescue, to include:
  - Refill a low or depleted air bottle
  - Replace a damaged regulator
  - Replace a damaged mask
  - Act as an independent SCBA if the downed firefighters pack has completely failed

Scott RIT PAK III



Scott RIT PAK III



PORT of SAN DIEGO

Scott RIT PAK III



Scott RIT PAK III



PORT of SAN DIEGO

Rapid Intervention Team Operations

- Stabilization and Extraction
- As your correcting any air or breathing issues you encounter, begin assessing what else (if anything) caused the firefighter's emergency:
    - Injury
    - Disorientation
    - Entrapment or Entanglement
    - Mental Incapacity
    - Exhaustion
- From this information, determine if the firefighter is mobile, semi-mobile or immobile

Rapid Intervention Team Operations

- Stabilization and Extraction
- Once you've determined the mobility of the firefighter, you must decide whether to shelter in place or attempt an extraction
- Extracting an immobile firefighter from an IDLH is one of the most difficult operations conducted in the firefighting community
- The national average of performing the entire RIT operation is 10 to 1
- This type of operation will probably exceed HPDs resources and require a multi-agency response

Rapid Intervention Training

NFPA 1407 – Standard for Rapid Intervention Teams

- Chapter 7 of this standard covers the knowledge and skill sets required to operate in the IRIT or RIT environment, to include:
  - Declaring a Mayday (Fire Ground Communications)
  - Search Techniques (Basic S&R)
  - Access and Extrication (Forcible Entry)
  - *Air Supply Management*
  - Ropes, Slings and Harnesses (Ropes & Knots / S&R)
  - *Protecting in Place*
  - *Moving to Safety*
  - *Self-Rescue*
  - *Equipment Familiarity*

Rapid Intervention Training

NFPA 1407 – Standard for Rapid Intervention Teams

- Chapter 8 of this standard covers the recommended evaluations of members who could be tasked with operating in the IRIT or RIT role
- The evaluations that are pertinent to HPD and will be conducted during initial and on going training are as follows:
  - Locate, assess the firefighter and decide on a strategy
  - Remove a downed firefighter on the same deck
  - Moving a downed firefighter up one deck
  - Removing a firefighter from a lower deck via vertical escape hatch without a ladder

Any Questions?

Essentials of Fire Fighting,
5th Edition

Chapter 9 — Rescue and Extrication

Firefighter I



Chapter 8 Lesson Goal

- After completing this lesson, the student shall be able to summarize procedures and guidelines for rescue operations and perform basic victim removal following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. Distinguish between rescue and extrication operations.
2. Summarize safety guidelines for search and rescue personnel operating within a burning building
3. Explain the objectives of a building search.

(Continued)

Specific Objectives

4. Describe primary search and secondary search.
5. Discuss conducting search operations.
6. Explain what actions a firefighter should take when in distress.

(Continued)

Specific Objectives

7. Describe actions that should be taken by a rapid intervention crew (RIC) when a firefighter is in distress.
8. Discuss victim removal methods.
9. Conduct a primary and secondary search. (Skill Sheet 9-1)

(Continued)

Specific Objectives

10. Demonstrate the incline drag. (Skill Sheet 9-2)
11. Demonstrate the webbing drag. (Skill Sheet 9-3)
12. Demonstrate the seat lift/carry — Two-rescuer method. (Skill Sheet 9-4)
13. Demonstrate the extremities lift/carry — Two-rescuer method. (Skill Sheet 9-5)

(Continued)

Rescue and Extrication Operations

- Rescue — Involves removal of victims from entrapment by
  - Fires
  - Terrain features
  - Structural collapse
  - Elevation differences
  - Confined spaces
  - Non-extrication situations



(Continued)

Rescue and Extrication Operations

- Extrication — Involves disentanglement, removal of victims from vehicles
- Differences between rescue and body recovery operation
  - Rescues involve risk to life
  - Body recoveries should not involve risk to life

Safety Guidelines for Search and Rescue Personnel

- Do not enter building in which fire has progressed to point where viable victims are unlikely to be found
- If backdraft conditions are apparent, attempt entry only after ventilation
- Work according to IAP

(Continued)

Safety Guidelines for Search and Rescue Personnel

- Maintain radio contact with supervisor; monitor radio contact
- Continuously monitor fire conditions that might affect search team safety
- Use established personnel accountability system

(Continued)

Safety Guidelines for Search and Rescue Personnel

- Be aware of secondary means of egress
- Wear full PPE, including SCBA, PASS device
- Work in teams of two or more, stay in contact with each other
- Search systematically

(Continued)

Safety Guidelines for Search and Rescue Personnel

- Stay low, move cautiously
- Stay alert
- Continuously monitor structure's integrity
- Check doors for excessive heat before opening

(Continued)

Safety Guidelines for Search and Rescue Personnel

- Mark entry doors into rooms
- Maintain contact with wall, hoseline, or tagline
- Have charged hoseline at hand
- Coordinate with ventilation teams before opening windows

(Continued)

Safety Guidelines for Search and Rescue Personnel

- Close door, report condition, follow supervisor's orders if fire encountered
- Inform supervisor of inability to search any rooms
- Report to supervisor when search complete

Building Search Objectives

- Locating victims
  - Primary search
  - Secondary search
  - Rapid intervention
- Obtaining information about location/extent of fire



DISCUSSION QUESTION



What should be worn when conducting interior search and rescue operations?

Primary Search

- Rapid but thorough search performed before or during fire suppression
- Often carried out under extremely adverse conditions
- Check known/likely locations of victims
- Confirm fire conditions

Secondary Search

- Conducted after fire under control
- Conducted by personnel other than primary search personnel
- Slower, more thorough search to ensure no occupants overlooked during primary search

Primary Search Operations

- Standard search priorities
- Use buddy system
- Appropriate equipment
  - Radio
  - TIC
  - Flashlight
  - Forcible entry tools
  - Search rope



(Continued)

Primary Search Operations

- Search may be conducted by
  - Walking upright
  - Crawling on hands/knees



(Continued)

Primary Search Operations



- When searching
  - Move systematically
  - Search each room completely
  - Listen for sounds from victims
  - Start as close to fire as possible
  - Proceed as directly as possible from entry and pay out tagline if utilized

(Continued)

Primary Search Operations

- When searching
  - Search bathrooms, bathtubs, points of entry / egress
  - Search perimeter of rooms
  - Extend arms/legs or use tool to reach under furniture



(Continued)

Primary Search Operations



- Visibility
  - May be limited; use TIC
  - May be obscured by smoke; report to IC

(Continued)

Primary Search Operations

- Making reports
  - Report essentials to supervisor/Command
  - Maintain radio contact with supervisor
  - Negative information also important
  - Inform IC of unsearched areas

(Continued)

Primary Search Operations

- Search line system
  - Consists of 200 feet (60 m) of ⅜-inch (10 mm) rope with Kevlar™ sheath
  - Every 20 feet (6 m) along length, 2-inch (50 mm) steel ring tied into line

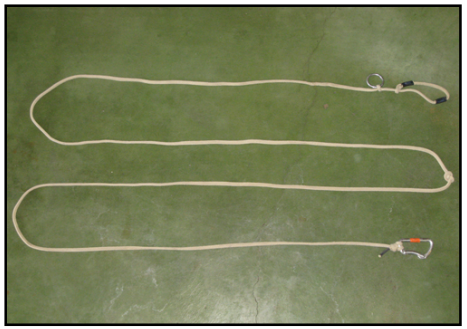


Courtesy of Jeff Seaton.

(Continued)

Primary Search Operations

- Search line system
  - Rings also provide anchor point for lateral tethers
  - Implementing search line system
  - May become necessary to search areas perpendicular to search line
  - Navigator keeps Command informed of progress



Courtesy of Jeff Seaton.

Secondary Search Operations

- Assigned to personnel other than primary search personnel
- Speed not as important as thoroughness
- Conducted as systematically as primary search to ensure no spaces missed

(Continued)

Secondary Search Operations

- Conducted more slowly, carefully than primary search
- Any negative information should be reported immediately



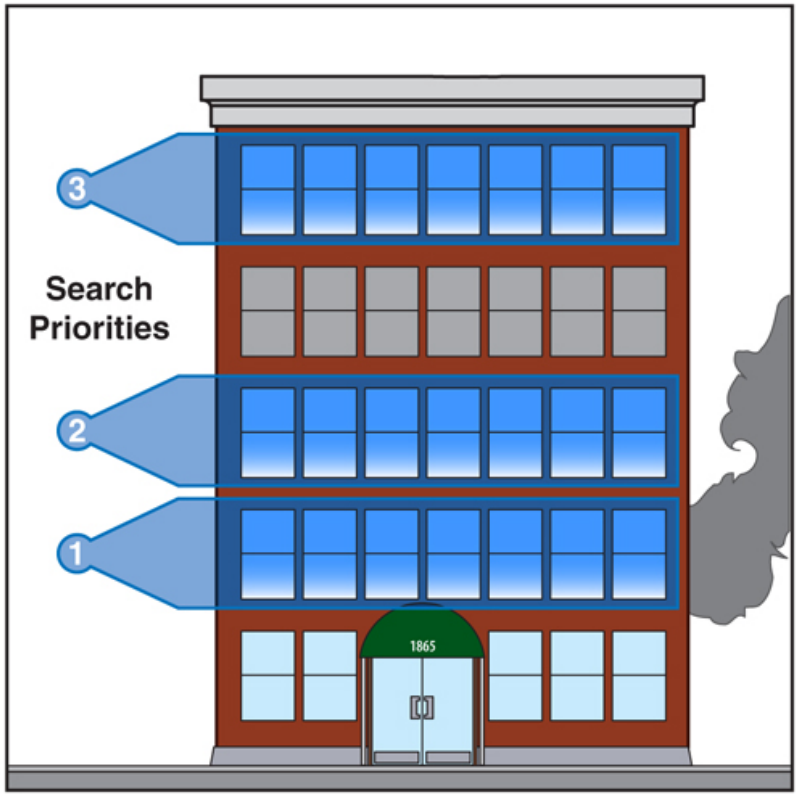
DISCUSSION QUESTION



When is it safe to remove your SCBA during a secondary search?

Searching Multistory Buildings

- Most critical areas are fire floor, floor directly above fire, and topmost floor
- Once critical areas searched, intervening floors should be checked



(Continued)

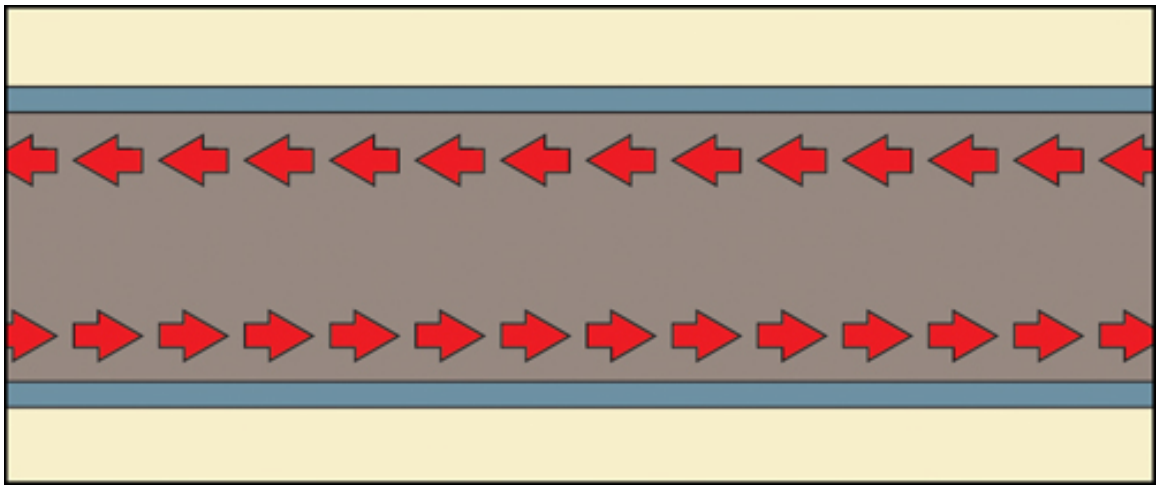
Searching Multistory Buildings

- During primary search, unless a part of ventilation, doors to uninvolved rooms should be closed
- Exits, hallways, stairs should be kept clear as possible



Search Methods

- When rooms, offices, apartments extend from center hallway, search line system can be used



(Continued)

Search Methods

- If search line system cannot be used
  - Teams should be assigned to search both sides of hallway
  - Critically important to control access/egress
  - Entering first room, searchers turn right or left and follow walls around room

(Continued)

Search Methods

- If search line system cannot be used
  - Important that rescuers exit through same doorway entered
  - Use thermal imaging camera (TIC)

(Continued)

If No TIC Available

- One member stays at door while other searches
- Searcher remains oriented by maintaining constant dialogue with member at door
- Searcher keeps member at door informed of progress

(Continued)

If No TIC Available

- When search completed, two rejoin at doorway, close and mark door, proceed to next room
- When searching next room, exchange roles

Marking Systems

- Several methods used
- Latch straps serve function of preventing other rescuers from being locked out of room



(Continued)

Marking Systems

- Marks should be placed on lower third of door
- Some departments train teams to use a two-part system





DISCUSSION QUESTION



What are some examples of marking systems used by your department?

Building Search Safety

- Search initiated on arrival
- Guidelines for rescuers
  - Work quickly, operate safely
  - Always be alert for weakened/hazardous structural conditions
  - Feel floor to be sure intact

(Continued)

Building Search Safety

- Firefighters on or directly below fire floor should be alert for sagging floors, etc. to indicate floor/ceiling above or below has weakened



When Searching Within A Burning Building

- Open doors cautiously
- Feel top of door and door knob to determine heat level
- Do not remain in front of door while being opened



(Continued)

When Searching Within A Burning Building

- Stay on hinge side of outward-opening doors
- If inward-opening door difficult to open, do not kick door; place strap behind knob to maintain control while opening

If in Imminent Life-Threatening Danger

- When Should You Call a Mayday

-Lost, Separated from Crew, Trapped, Disoriented, Disabled due to injury

---Low Air?????

****Do Not Be Afraid To Call a Mayday

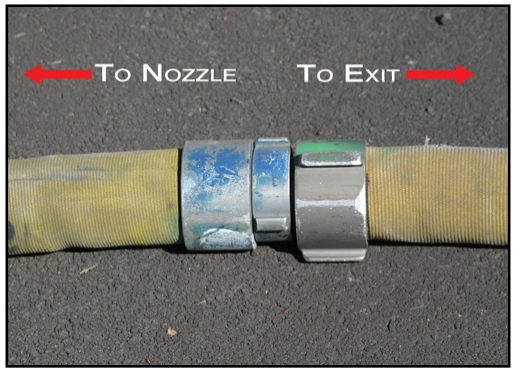
You are Not Replaceable!!!****

If in Imminent Life-Threatening Danger

- Transmit Mayday!
  - Use UCANP, LUNAR, ETC.
- Activate PASS device
- Communicate situation to supervisor/Command
- Actions when contact made

If Hoseline Can Be Located

- Crawl along and feel for couplings
  - Female – Toward nozzle, has smaller lugs
  - Male – Toward water source, has lungs on shank
- Follow hoseline to exit or nozzle team



If Unable to Retrace Steps

- Look for exit from building – windows, rooms already searched



- Search by locating wall and crawling along while sweeping floor with one hand and sweeping wall as high as possible without standing up

(Continued)

If Unable to Retrace Steps

- Sweeping hand back and forth on floor will help avoid holes, other openings into which fall may be possible
- Sweep walls while crawling to help locate window
- Take appropriate actions if outside window found – webbing, radio

If Door Can Be Found

- Secure door with rope/strap attached to knob so can be closed quickly
- Check door for heat before opening
- If cool to touch, open slowly, carefully
- If door leads to closet or fire on other side, continue along wall in same direction

If Exit Through Door/Window Not Possible

- Break through interior or exterior wall
- Follow guidelines for attempting to breach interior wall



DISCUSSION QUESTION



What should be done if the space between studs is not enough to escape through?

If Unable to Exit

- Activate PASS device and move close to wall
- If exhausted, sit on floor and lean against wall
- If unable to reach wall, position flashlight toward ceiling

When Trapped Suffering Injury

- Find place of relative safety and activate PASS device
- If against wall, tap or pound on wall with tool or hard object
- Try to maintain composure to maximize air supply



Air Management

- Low air alarm
- Keep working or STOP????
- http://flashovertv.firerescue1.com/Media/2996-FIREGROUND-Fire-Entrapment-Conserving-SCBA-Air/

Rapid Intervention Crew (RIC)

- Must be standing by when firefighters are in hazard zone inside burning building
- Composed of at least two firefighters equipped to enter hazard zone to locate/rescue firefighter in distress
- IC may decide RIC needs more than two firefighters

(Continued)

Rapid Intervention Crew (RIC)

- Members may be assigned nonessential duties as long as they can be abandoned
- Other allowable assignments
  - Location relatively close to hazard zone
  - Must not require much physical exertion
  - Alternate egress points

(Continued)

Rapid Intervention Crew (RIC)

- May be more than one at a given fire, especially if interior crews entered building at different points



Actions by Rescuers Searching for Firefighter in Distress

- Remember firefighter will probably be wearing SCBA
- Try to establish radio contact
- IC may order noise-producing devices be shut down

(Continued)

Actions by Rescuers Searching for Firefighter in Distress

- If actions unsuccessful, attempt to determine last known location
- TIC should be used
- RIC should stop frequently to listen
- Crew members may hold breath for complete silence

Actions Once Downed Firefighter Located

- Air supply should be checked
- Firefighter should be medically evaluated (quickly!)
- Level of consciousness, vital signs should be checked

(Continued)

Actions Once Downed Firefighter Located

- If unable to walk, use any safe means possible to move



(Continued)

Actions Once Downed Firefighter Located

- Need to exit hostile atmosphere usually overrides need to stabilize injuries prior to moving
- If firefighter has functioning SCBA, carefully move him/her so as not to dislodge mask

(Continued)

Actions Once Downed Firefighter Located

- If no functioning SCBA, connect mask to functioning SCBA from RIC kit or quickly remove victim from hazardous atmosphere



Removing Located Firefighters

- Even though a two-firefighter RIC can locate a firefighter in distress, unlikely to be able to remove him/her from hazard zone

(Continued)

Removing Located Firefighters

- If firefighter in distress waited until low-air alarm sounded before calling Mayday, firefighter will almost certainly be out of air



- RIC must take specific actions when searching for missing firefighters

Victim Removal

- Injured victims should not be moved unless in immediate danger
- Situations where emergency moves are necessary



Remember During Victim Removal

- Chief danger is possibly aggravating spinal injury
- If necessary to perform emergency move, pull victim in direction of long axis of body
- Better to have two or more rescuers when lifting/carrying adult

(Continued)

Remember During Victim Removal

- Unconscious victim always more difficult to lift
- Rescuers helping carry victim should guard against losing balance
- Lifting incorrectly is one of the most common causes of injury to rescuers

Carries and Drags

- SCBA Harness

http://flashovertv.firerescue1.com/Media/3094-FIREGROUND-Flash-Tip-Using-an-SCBA-Harness-to-Move-a-Downed-Firefighter/

- Incline drag

http://www.youtube.com/watch?v=Y7vxaF78Iwg

- Webbing drag

http://www.youtube.com/watch?v=PfMC0ATOFHY

- Seat lift/carry

http://www.youtube.com/watch?v=RIp167L8ozY

- Extremities lift/carry

http://www.youtube.com/watch?v=gGYblsnmHyg



(Continued)

Review Questions

1. List four guidelines that should be used by search and rescue personnel operating within a building.
2. What is a primary search?
3. What should primary search teams carry with them?

(Continued)

Review Questions

4. How can firefighters help operate safely while conducting building searches?
5. What should a firefighter in distress do?

Essentials of Fire Fighting, **5th Edition**

Chapter 10 — Forcible Entry

Firefighter I

5th EDITION ESSENTIALS OF FIRE FIGHTING
ifsta INTERNATIONAL FIRE SERVICE TRAINING ASSOCIATION

Chapter 10 Lesson Goal

- After completing this lesson, the student shall be able to force entry through various types of doors, padlocks, windows, and walls following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. Select appropriate cutting tools for specific applications.
2. Discuss manual and hydraulic prying tools.
3. Discuss pushing/pulling tools and striking tools.

(Continued)

Specific Objectives

4. Summarize forcible entry tool safety rules.
5. Describe correct methods for carrying forcible entry tools.
6. Summarize general care and maintenance practices for forcible entry tools.

(Continued)

Specific Objectives

7. Explain items to look for in sizing up a door.
8. Describe the characteristics of various types of wooden swinging doors.
9. Describe the characteristics of various types of metal swinging doors.

(Continued)

Specific Objectives

10. Describe the characteristics of various types of sliding doors, revolving doors, and overhead doors.
11. Explain how fire doors operate.
12. Describe the characteristics of basic types of locks.

(Continued)

Specific Objectives

13. Describe rapid-entry lockbox systems.
14. Describe methods of forcible entry through doors.
15. Describe methods of through-the-lock forcible entry for doors.

(Continued)

Specific Objectives

16. Explain action that can be taken to force entry involving padlocks.
17. Describe ways of gaining entry through gates and fences.
18. List hazards in forcing windows.

(Continued)

Specific Objectives

19. Describe types of windows and entry techniques.
20. Describe techniques for breaching walls.
21. Describe techniques for breaching floors.

(Continued)

Specific Objectives

22. Clean, inspect, and maintain hand tools and equipment. (Skill Sheet 10-I-1)
23. Clean, inspect, and maintain power tools and equipment. (Skill Sheet 10-I-2)
24. Force entry through an inward-swinging door — Two-firefighter method. (Skill Sheet 10-I-3)

(Continued)

Specific Objectives

25. Force entry through an outward-swinging door — Wedge-end method. (Skill Sheet 10-I-4)
26. Force entry using the through-the-lock method. (Skill Sheet 10-I-5)

(Continued)

Specific Objectives

27. Force entry using the through-the-lock method using the K-tool. (Skill Sheet 10-I-6)
28. Force entry using the through-the-lock method using the A-tool. (Skill Sheet 10-I-7)

(Continued)

Specific Objectives

29. Force entry through padlocks. (Skill Sheet 10-I-8)
30. Force entry through a double-hung window. (Skill Sheet 10-I-9)
31. Force entry through a window (glass pane). (Skill Sheet 10-I-10)

(Continued)

Specific Objectives

32. Force a Lexan® window. (Skill Sheet 10-I-11)
33. Force entry through a wood-framed wall (Type V Construction) with hand tools. (Skill Sheet 10-I-12)

(Continued)

Specific Objectives

34. Force entry through a masonry wall with hand tools. (Skill Sheet 10-I-13)
35. Force entry through a metal wall with power tools. (Skill Sheet 10-I-14)
36. Breach a hardwood floor. (Skill Sheet 10-I-15)

Cutting Tools

- Manually operated/powered
- Often specific to types of materials they cut
- No single tool safely/efficiently cuts all materials
- Using tool on materials for which it is not designed can cause problems

Axes

- Most common types of cutting tools
- Two basic types
  - Pick-head
  - Flat-head
- Smaller axes and hatchets



Pick-Head Axe

- Available with 6-pound or 8-pound (2.7 or 3.6 kg) head
- Used for cutting, prying, digging
- Handle either wood or fiberglass
- Effective for chopping through variety of materials

(Continued)

Pick-Head Axe

- Pick end can be used to penetrate materials that resist being cut by blade
- Blade can be used as striking tool
- Most often used in structural fire fighting operations

Flat-Head Axe

- Available in 6-pound or 8-pound (2.7 or 3.6 kg) head weights
- Wooden or fiberglass handle
- Used to chop through same materials as pick-head axe
- Blade can be used for same purposes as pick-head axe

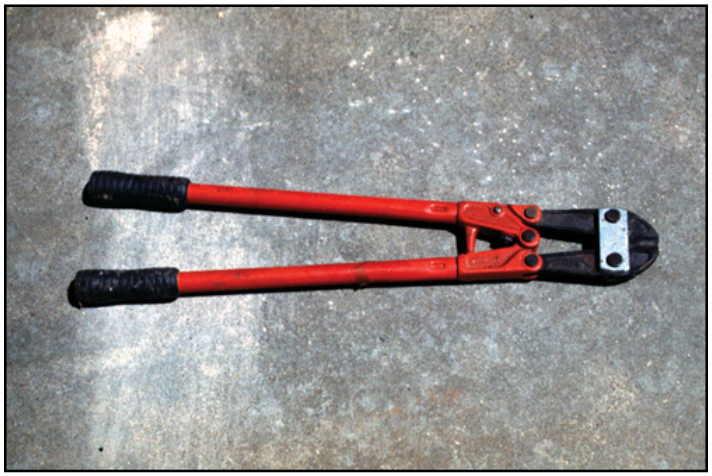
(Continued)

Flat-Head Axe

- Used in conjunction with other tools to force entry
- Commonly carried with Halligan bar; set known as "irons"
- Used in both structural and wildland fire fighting operations

Metal Cutting Devices

- Bolt cutters
  - Used in forcible entry in a variety of ways
  - Advancement in security technology has limited use



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Metal Cutting Devices

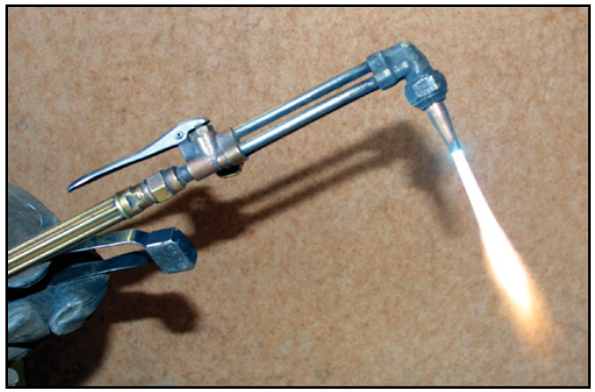
- Rebar cutters
  - Powered version
  - Manual version
  - Used to cut rebar when breaching concrete
  - Used to cut security bars on windows/doors



(Continued)

Metal Cutting Devices

- Oxyacetylene cutting torches
  - Hand-carried and wheeled units
  - Cut through heavy metal components
  - Generate flame temperature more than 5,700ºF (3 149ºC)
  - Cut through iron, steel with ease
  - Use diminishing in fire service



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Metal Cutting Devices

- Oxygasoline cutting torches
  - Relatively new system
  - Conventional cutting torch, dual-hose
  - Produce cutting flame in range of 2,800ºF (1 538ºC)
  - Fully functional under water
  - Advantages



(Continued)

Metal Cutting Devices

- Burning bars
  - Exothermic cutting rods
  - Ultra-high temperature cutting device, capable of cutting virtually any metallic, nonmetallic, or composite material
  - Cut through concrete or masonry
  - Cut through metals much faster
  - Temperatures above 10,000ºF (5 538ºC)

(Continued)

Metal Cutting Devices

- Plasma arc cutters
  - Ultrahigh-temperature metal-cutting devices with temperatures as high as 25,000ºF (13 871ºC)
  - Require power supply, one of several compressed gases

(Continued)

Metal Cutting Devices

- Exothermic cutting flares
  - Used for cutting metal or concrete
  - Size/shape of fusees or highway flares
  - Produce 6,800ºF (3 760ºC) flame lasting 15 seconds to two minutes
  - Advantages



Courtesy of Pyrotechnic Tool Co.

(Continued)

Metal Cutting Devices

- Handsaws
  - May be needed when power saw unavailable
  - Include carpenter's handsaw, keyhole saw, hacksaw, drywall saw
  - Extremely slow in comparison to power saws



(Continued)

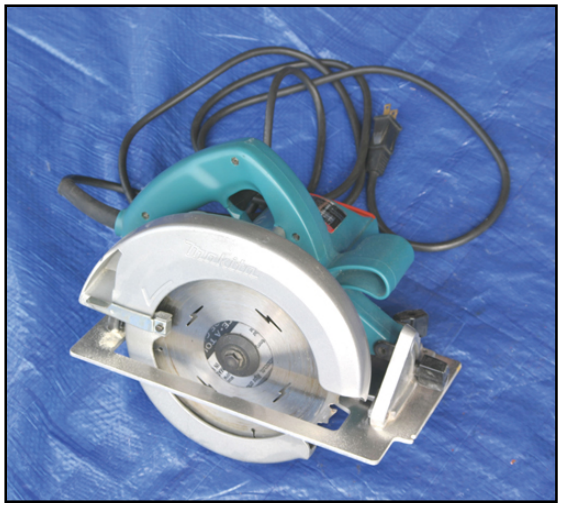
Metal Cutting Devices

- Power saws
  - Most useful tools in fire service
  - Types include circular, rotary, reciprocating, chain, ventilation saws
  - Many able to run on AC and DC power
  - Safety issues

(Continued)

Metal Cutting Devices

- Circular saws
  - Useful when electrical power readily available and heavier, bulkier saws too difficult to handle
  - Small battery-powered units available



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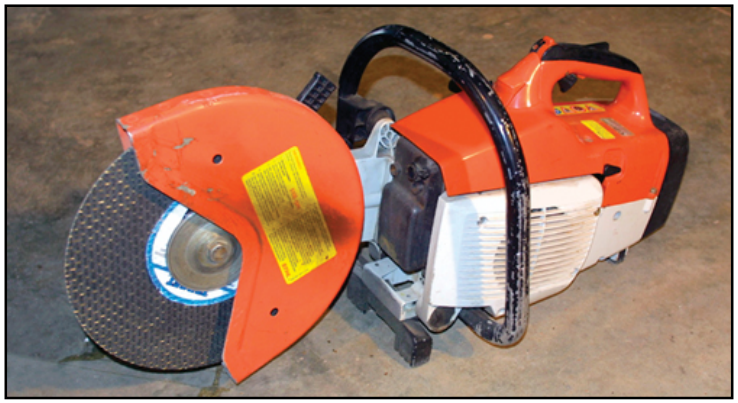
Metal Cutting Devices

- Rotary saws
  - Usually gasoline powered with changeable blades
  - Different blades available based on material



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Metal Cutting Devices



- Reciprocating saw
  - Blade moves in/out similar to handsaw
  - Variety of blades
  - When equipped with metal-cutting blade, ideal for cutting sheet metal, structural components on vehicles
  - Battery-powered available

(Continued)

Metal Cutting Devices

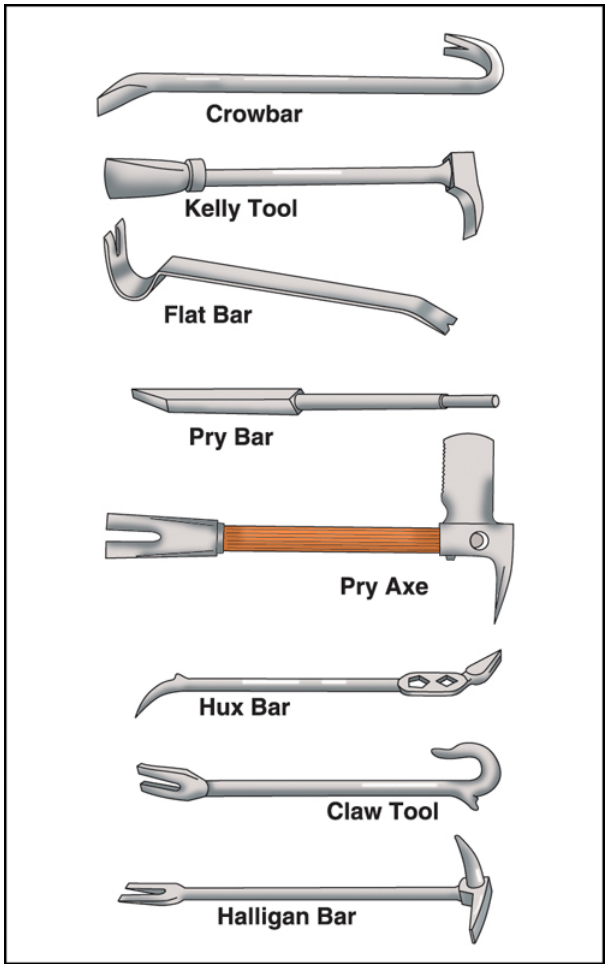
- Chain saw
  - Used for years by logging industry
  - Useful during natural disasters
  - Commonly used as ventilation tool



Prying Tools

- Useful for opening doors, windows, locks, and moving heavy objects
- Manually operated types use principle of lever and fulcrum
- Hydraulic can be powered or manual

Manual Prying Tools



- Some can be used as striking tools; most cannot
- Use only for intended purpose for safe and efficient operation

Hydraulic Prying Tools

- Effective in extrication rescues
- Useful in forcible entry situations
- Useful for prying, pushing, pulling
- Rescue tools, hydraulic door opener
  - Hydraulic spreader
  - Hydraulic ram
  - Hydraulic door opener



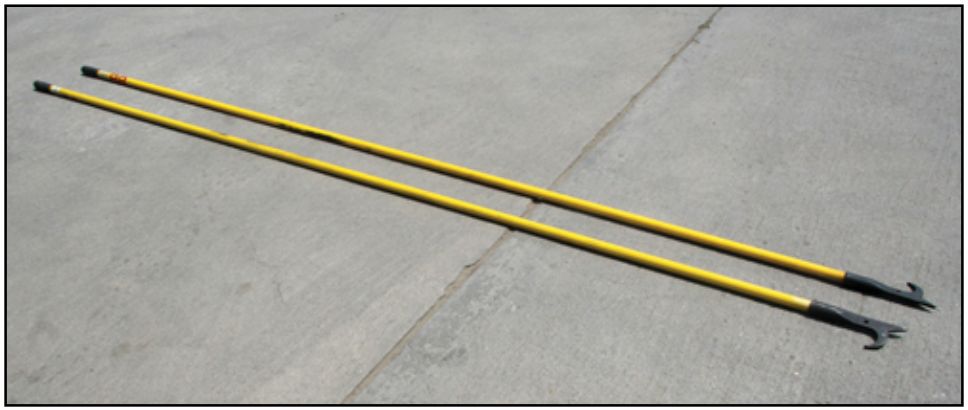
Pushing/Pulling Tools

- Limited use in forcible entry
- Tools of choice when breaking glass, opening walls or ceilings
- Includes variety of tools
- Pike poles, hooks give reach advantage

(Continued)

Pushing/Pulling Tools

- When using a pike pole to break a window, a firefighter should stay upwind of window and higher than window



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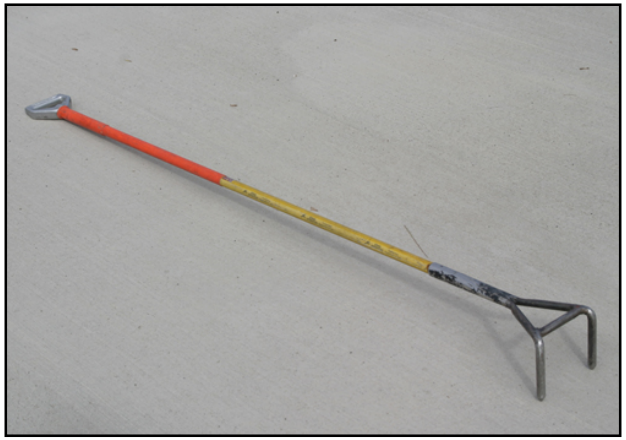
Pushing/Pulling Tools

- Except for roofman's hook, pike poles and hooks should not be used for prying
- Pike pole's strength is pushing or pulling



Striking Tools

- Examples
- Sometimes only tool required
- In forcible entry, used with another tool



- Dangerous when improperly used, carried, or maintained

Tool Use

- No single forcible entry tool provides a firefighter with needed force/leverage to handle all forcible entry situations
- Firefighters may have to combine two or more tools to accomplish task

(Continued)

Tool Use

- Types of combinations carried vary
- Most important consideration is selecting proper tools for job
- Preincident surveys help determine necessary tools



Forcible Entry Tool Considerations

- Become familiar with all tools used
- Read/follow manufacturers' guidelines
- Use extreme caution in atmospheres that could be explosive
- Keep tools in properly designated places on apparatus

Prying Tool Safety

- Using incorrectly can cause serious injury or damage the tool
- If job cannot be done with tool, do not strike handle of tool; use larger tool
- Do not use prying tool as striking tool unless designed for purpose

DISCUSSION QUESTION



Why it is important to use tools correctly and only for the purpose for which they were designed?

Rotary Saw Safety

- Use with extreme care
- Blades from different manufacturers may look alike but not be interchangeable
- Twisting caused by spinning blade a hazard

(Continued)

Rotary Saw Safety

- Start all cuts at full rpm
- Store blades in clean, dry environment
- Do not store composite blades in compartment where gasoline fumes accumulate

Other Power Saw Safety

- Match saw to task and material
- Never force saw beyond design limitations
- Wear proper PPE
- Fully inspect saw before/after use

(Continued)

Other Power Saw Safety

- Do not use when working in flammable atmosphere
- Maintain situational awareness
- Keep unprotected/nonessential people out of work area



(Continued)

Other Power Saw Safety

- Follow manufacturer's guidelines for operation
- Keep blades/chains well sharpened
- Be aware of hidden hazards

Carrying Forcible Entry Tools

- Axes
  - If not in scabbard, carry with blade away from body
  - With pick-head axe, grasp pick with hand to cover
  - Never carry on shoulder



(Continued)

Carrying Forcible Entry Tools

- Prying tools — Carry with any pointed/ sharp edges away from body
- Combinations of tools — Strap tool combinations together



(Continued)

Carrying Forcible Entry Tools

- Pike poles and hooks
  - Carry with tool head down, close to ground, ahead of body
  - When entering building, carefully reposition tool and carry with head upright close to body



(Continued)

Carrying Forcible Entry Tools

- Striking tools
  - Keep heads close to ground
  - Maintain firm grip
- Power tools
  - Never carry running tool more than 10 feet (3 m)
  - Transport to where working, start there

General Care/Maintenance of Forcible Entry Tools

- Forcible entry tools function as designed when properly maintained
- Tool failure on fireground may have harsh consequences
- Always read manufacturers' recommended maintenance guidelines

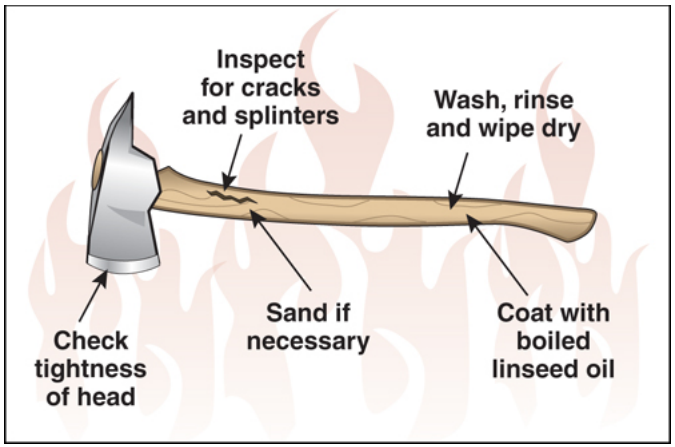
Care of Wooden Handles

- Inspect for cracks, blisters, splinters
- Sand if necessary
- Wash with mild detergent and rinse, wipe dry
- Do not soak in water
- Apply coat of boiled linseed oil

(Continued)

Care of Wooden Handles

- Do not paint/varnish handle
- Check tightness of tool head
- Limit amount of surface area covered with paint for tool marking



Care of Fiberglass Handles

- Wash with mild detergent, rinse, and wipe dry
- Check for damage, cracks
- Check tightness of tool head

Care of Cutting Edges

- Inspect cutting edge
- Replace cutting heads when required
- File cutting edges by hand
- Sharpen blade as specified in SOP



Care of Plated Surfaces

- Inspect for damage
- Wipe clean or wash with mild detergent, water

Care of Unprotected Metal Surfaces

- Keep free of rust
- Oil metal surface lightly
- Do not paint metal surfaces
- Inspect metal for chips, cracks, sharp edges; file off when found

Care of Axe Heads

- How well maintained directly affects performance
- DO NOT PAINT

Power Equipment

- Read, follow manufacturers' instructions
- Be sure battery packs fully charged
- Inspect periodically; ensure will start manually



(Continued)

Power Equipment

- Check blades for damage, wear
- Replace damaged, worn blades
- Check electrical components for cuts, other damage
- Ensure all guards functional, in place
- Ensure fuel is fresh; mixture may separate, degrade over time

DISCUSSION QUESTION



What are your department's procedures for reporting tools and equipment that need to be repaired?

Sizing Up Door — Considerations

- Locked/blocked door is primary obstacle in gaining access to building
- Critical issues
  - Recognizing how door functions
  - Knowing how constructed
  - Knowing how locked

(Continued)

Sizing Up Door — Considerations

- Doors function in one of following ways
  - Swinging
  - Sliding
  - Revolving
  - Overhead

(Continued)

Sizing Up Door — Considerations

- Size up
  - Try door to make sure locked before forcing — **Try before you pry**
  - If locked, begin additional size-up
  - Look at door and immediate surroundings
  - If no glass panel or side window, check whether swinging or another type

(Continued)

DISCUSSION QUESTION



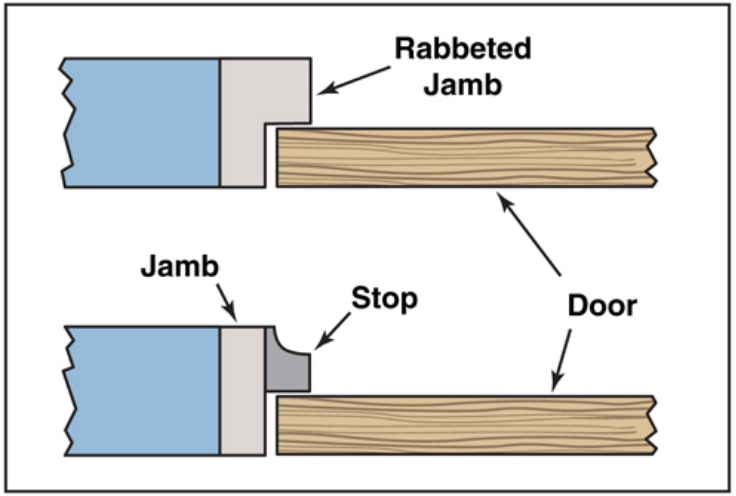
When should you break or open a window?

Sizing Up Door — Considerations

- If proves to be too well secured, look for another
- Type of door and lock installed determine tools/techniques required to force

Wooden Swinging Door Characteristics

- Three types
  - Panel
  - Slab
  - Ledge
- Most are panel or slab



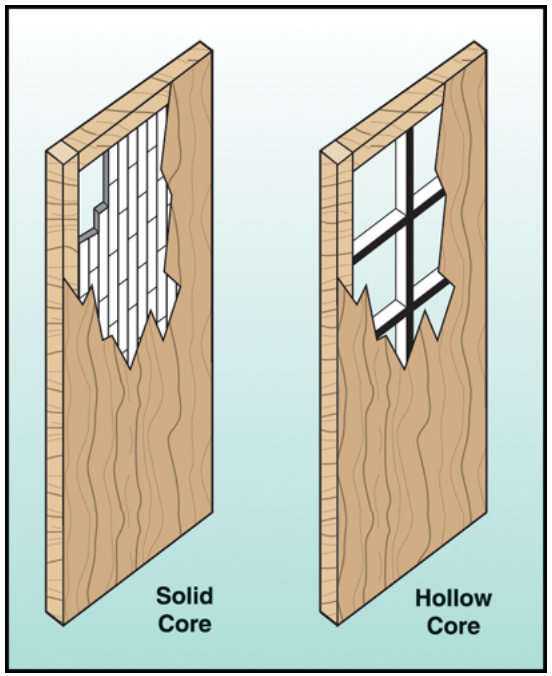
Panel Doors

- Made of solid wooden members inset with panels
- Panels may be wood or other materials
- Panels may be held in place by molding that can be removed for quick access



Slab Doors

- Among most common
- Two configurations
  - Solid core
  - Hollow core



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Slab Doors

- Most interior doors in newer residences are hollow core
  - Lightweight
  - Relatively inexpensive
- Exterior slab usually solid core

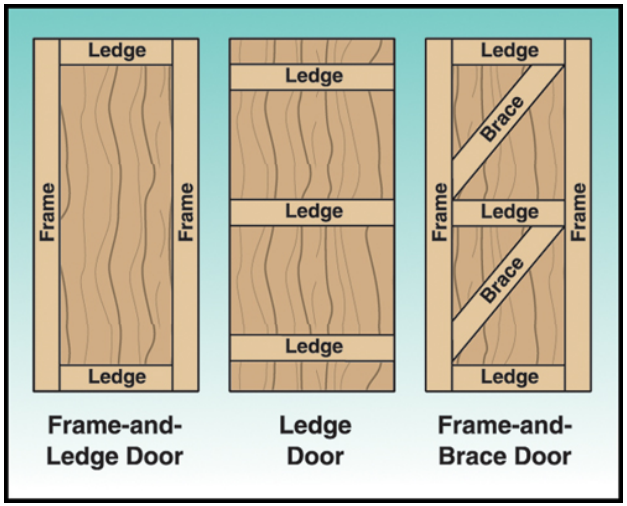
(Continued)

Slab Doors

- Most do not have windows, other openings
- Raised panels purely decorative
- Solid-core doors much more substantial, heavier, more expensive than hollow-core

Ledge Doors

- Also known as batten doors
- Found in variety of occupancies
- Planks fastened to horizontal, diagonal ledge boards
- Lock with various locks



Metal Swinging Door Characteristics

- Classifications
  - Hollow metal
  - Metal clad
  - Tubular
- Difficult to force
- Most often set in metal frame



(Continued)

Metal Swinging Door Characteristics

- Rigid, resist being penetrated
- When set in metal frame, power tools almost always needed to open
- Construction varies depending on intended use
- When ordered to force, consider power tools

Sliding Doors

- Most residential sliding doors travel left or right
- Those in retail businesses often travel in both directions



(Continued)

Sliding Doors

- Operation
  - Do not actually slide
  - Small roller/guide wheel make easy to move
  - Some are pocket doors

(Continued)

Sliding Doors

- More common type is assembly used in patio areas of residencies
- Patio sliding doors may be barred or blocked by metal rod

Revolving Doors

- Made up of glass door panels that revolve around center shaft
- Lock in various ways
- All equipped with mechanism that allows locking open in emergency



(Continued)

Revolving Doors

- Not all lock open in same way
- Preincident surveys should locate revolving doors/identify how individual mechanisms work

(Continued)

Revolving Doors

- Three types of mechanisms used to lock open
  - Panic-proof
  - Drop-arm
  - Metal-braced



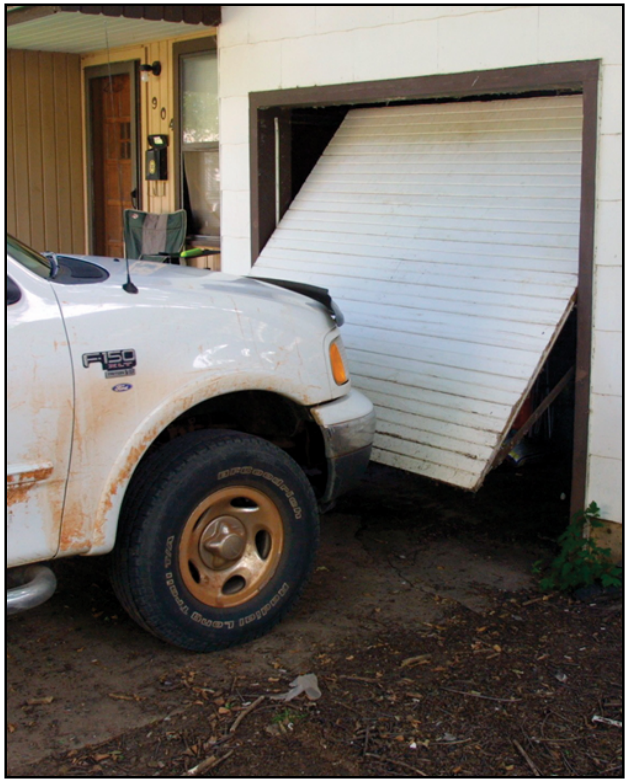
Overhead Doors

- Wide variety of uses
  - Residential, commercial garage doors
  - Service doors at loading docks
- Constructed of variety of materials
  - Wood
  - Metal
  - Fiberglass

(Continued)

Overhead Doors

- Difficult to force open
- Sectional doors
- Tilt-slab doors
- Roll-up doors
- Telescoping doors



Forcing Entry Through Overhead Doors

- One of most common methods of cutting roll-up or sheet curtain door was to make triangular cut in center
- Technique has fallen out of favor because it takes too long to cut, creates smaller opening than square or rectangular cut

(Continued)

Forcing Entry Through Overhead Doors



Courtesy of Cedar Rapids (IA) Fire Department.

- When must be forced, best to use rotary saw to cut square or rectangular opening about 6 feet (2 m) high and nearly full width
- Once firefighters have interior access, should use lift mechanism to open fully

DISCUSSION QUESTION



What should be done with overhead doors during fire operations?

Fire Doors

- Movable assemblies designed to cover doorway openings in rated separation walls in event of fire in one part of building
- Components



(Continued)

Fire Doors

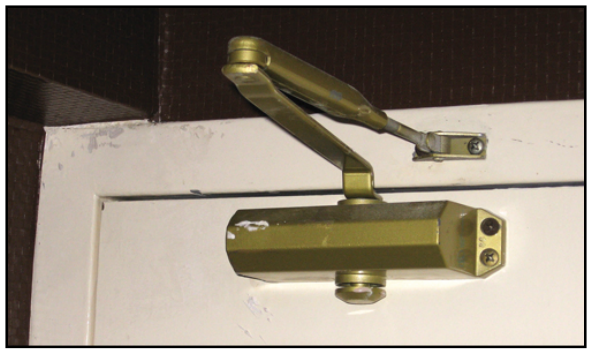
- Several standard types
- May be manually, mechanically, electronically operated
- May or may not be counterbalanced



Fire Door Operation

- Two standard means by which fire doors operate: self-closing and automatic-closing





(Continued)

Fire Door Operation

- Vertical sliding are normally open but close automatically
- Those that slide horizontally preferable to other types when space limited
- Overhead rolling may be installed where space limitations prevent installation of other types

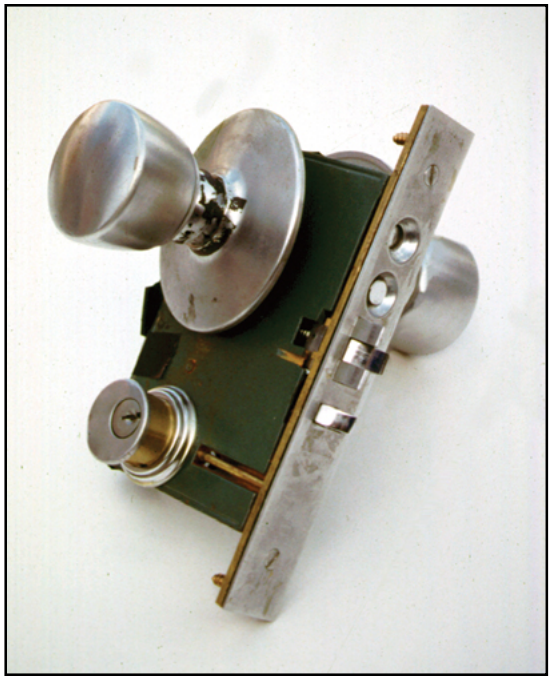
(Continued)

Fire Door Operation

- Most interior do not lock when they close
- Doors used on exterior openings may be locked
- Precautionary measure is to block open door to prevent closing and trapping firefighters

Mortise Lock

- Designed to fit into cavity in door
- Can be found on private residences, commercial buildings, industrial buildings



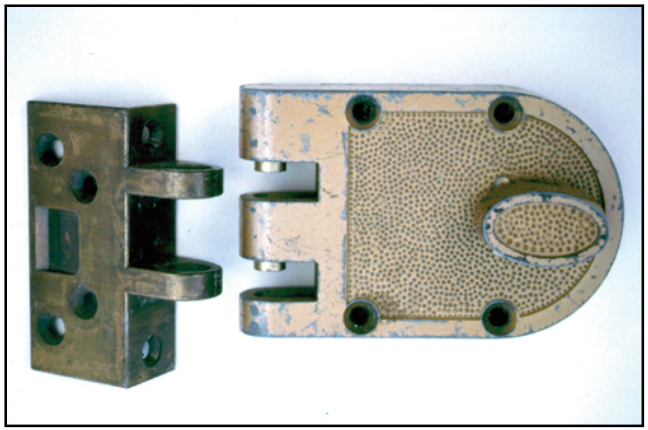
Bored (Cylindrical) Lock

- Installation involves boring two holes at right angles to one another: one through face of door, another in edge of door
- One type is key-in-knob lock



Rim Lock

- One of most common in use today
- Surface-mounted
- Used as add-on lock
- Found in all types of occupancies
- Can be identified from outside



Padlock

- Portable or detachable locking devices
- Two basic types
  - Standard
  - Heavy-duty



DISCUSSION QUESTION



Which type of lock do you think is the easiest to force? Why?

Rapid-Entry Lockbox System



- Can eliminate problems presented by locked doors
- All necessary keys, combinations kept in lockbox
- Lockbox located at high-visibility location on building's exterior

(Continued)

Rapid-Entry Lockbox System

- Only fire department carries key to open all boxes in jurisdiction
- Proper mounting is the responsibility of property owner
- Fire department responsibilities
- Unauthorized duplication of key prevented

Conventional Forcible Entry

- Use of standard fire department tools to force doors, windows to gain access
- Number of tools, tool combinations may be used



Breaking Glass

- One of fastest, least destructive techniques
- Either glass in door or sidelight broken
- Once glass broken, door can be unlocked from inside



(Continued)

Breaking Glass

- In some situations, may be more difficult, expensive
- Techniques for safely breaking glass



Forcing Swinging Doors

- Most common type is one that swings at least 90 degrees to open, close
- Most have hinges mounted on one side permitting swinging in both directions
- Can be inward, outward, both

(Continued)

Forcing Swinging Doors

- Double-acting swinging doors swing 180 degrees
- Forcing entry through all types of swinging doors involves basic skills



Forcing Outward-Swinging Doors

- Present problems for firefighters
- Often possible to use nail set to drive hinge pins out of hinges and remove doors



(Continued)

Forcing Outward-Swinging Doors

- May be possible to break hinges off with rambar or Halligan
- Can be forced by inserting blade of rambar or Halligan into space between door and doorjamb and prying that space open wide

Special Circumstances

- Additional measures may need to be taken to force a door
- Double-swinging doors
- Doors with drop bars
- Tempered plate glass doors



Through-the-Lock Forcible Entry

- Preferred for many commercial doors, residential security locks, padlocks, high-security doors
- Very effective, does minimal damage
- Requires good size-up of door and lock mechanism

(Continued)

Through-the-Lock Forcible Entry

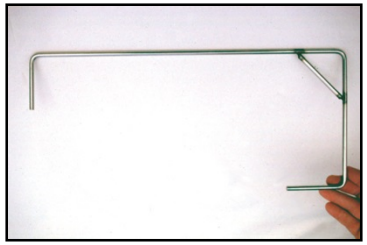
- Removing lock cylinder only half the job
- Special tools may be needed



A-Tool



K-Tool

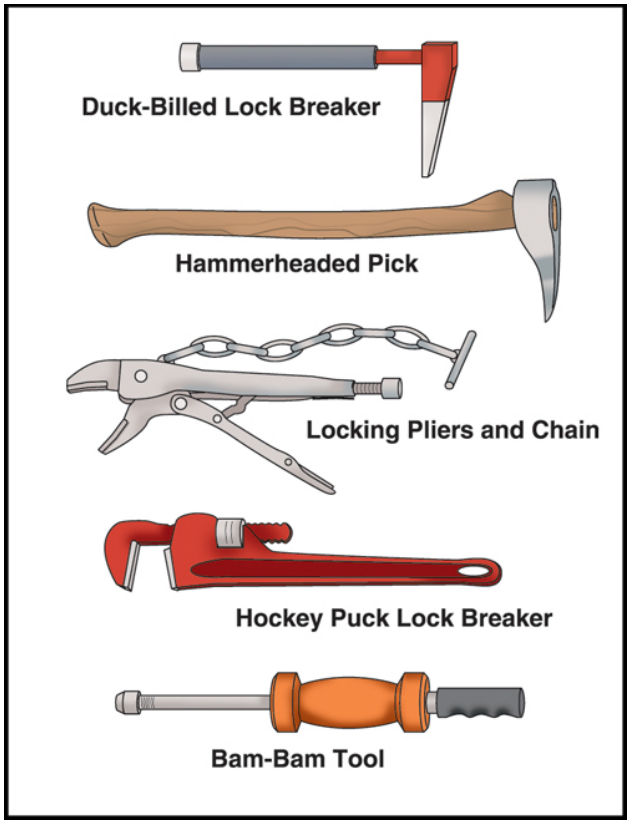


J-Tool



Shove Knife

Forcing Entry with Padlocks



- To force entry, either padlock or device to which fastened must be defeated
- Conventional forcible entry tools can be used

(Continued)

Forcing Entry with Padlocks

- Additional tools available to make forcible entry easier
- Size-up of lock important



Special Tools/Techniques for Padlocks

- If shackle exceeds ¼ inch (6 mm) and lock, including body, is case-hardened, conventional methods may not work
- Firefighters may need to use
  - Duck-billed lock breaker
  - Bam-bam tool



Cutting Padlocks with Saws or Cutting Torches

- Using a rotary saw with metal-cutting blade or cutting torch may be quickest
- High-security padlocks designed with heel and toe shackles



(Continued)

Cutting Padlocks with Saws or Cutting Torches

- Heel and toe shackles will not pivot if only one side is cut
- Cutting with power saw or torch can be dangerous

Gates and Fences

- Property owners often take additional measures to protect homes and businesses
  - Well-built, heavily secured doors, windows
  - Fences



Gaining Access Through Gates and Fences

- Barbed wire can be cut with bolt cutters
- When cutting chain-link, easier and faster to use rotary saw
- Wire fences should be cut near posts

(Continued)

Gaining Access Through Gates and Fences

- Alternative method of opening chain-link fence is to cut wire bands holding fence fabric to posts
- Fence gates often secured with padlocks or chains
- When livestock present, be careful to close/latch any gates

(Continued)

Gaining Access Through Gates and Fences

- A-frame ladders may be used to bridge masonry, ornamental metal fences
- Access through secure gate may be only way into gated communities



Hazards in Forcing Windows

- Breaking glass of wrong window
- Hazards with breaking glass

Double-Hung (Checkrail) Windows

- Have been popular in building construction
- Various materials
- Made of two sashes
- Usually secured by one or two thumb-operated locking devices



(Continued)

Double-Hung (Checkrail) Windows

- May be more securely fastened by window bolts
- Forcible entry techniques depend on various factors
- In emergency situations where window is best means of access, valuable time can be saved by doing several things

Hinged (Casement) Windows

- Wooden or metal frames
- One or two sashes mounted on side hinges that swing outward when crank assembly operated
- Locking devices vary



(Continued)

Hinged (Casement) Windows

- Can only be opened by operating crank mechanism
- Double casement windows have at least four locking devices as well as two crank devices

Projected (Factory) Windows

- Found in variety of buildings
- Often have metal sashes with wire glass; function by pivoting at top or bottom



(Continued)

Projected (Factory) Windows

- Classified by the way they swing when opened: projected-in, projected-out, pivoted-projected
- Most practical method of forcing is same as casement

(Continued)

Projected (Factory) Windows

- Metal frames, wire glass make rapid forcible entry difficult
- Do not enter unless cannot be avoided
- Often have security bars or screens to discourage entry

(Continued)

Projected (Factory) Windows

- Often cover large area, but moveable window sections small
- Usually located several feet (meters) off floor
- If another entry point unavailable, rotary saw can be used to cut window frame

Awning Windows

- Large sections of glass about 1 foot (3 m) high, as long as window width
- Constructed with metal or wood frame around glass
- Hinged along top rail, bottom rail swings out



Jalousie Windows

- Small sections about 4 inches (100 mm) high and as long as window width



- Panes held in moveable frame at ends
- Crank, gear housing at bottom
- Entry requires removal of several panes

Awning and Jalousie Windows

- Because relatively small, offer restricted access
- As alternative, if entry must be made through jalousie window, may be faster, more efficient to cut through wall around window assembly and remove

Other Common Window Types

- Hopper window
- Tilt-turn window
- Slider or gliding window
- Fixed or picture window

Hurricane Windows

- Designed to resist hurricane-force winds
- Use laminated glass with advanced polymer
- Intended to help keep building intact

(Continued)

Hurricane Windows

- Ionoplast layer sandwiched between two layers of glass resulting in laminated glass 100 times as rigid and five times as tear resistant as commonly used high-impact glass
- Identifying during preincident planning helps in tool and technique selection

High-Security Windows

- Window manufacturers have responded to increasing demand for security
- Should be identified during preincident planning
- Lexan® windows
- Barred or screened windows, openings

Breaching Walls

- Opening hole in a wall
- Should be done only after experienced firefighters with thorough knowledge of building construction have sized up and determined
  - Safe
  - Will accomplish purpose

(Continued)

Breaching Walls

- Breaching load-bearing walls in structure already weakened by fire can be very dangerous



Plaster or Gypsum Partition Walls

- Interior walls may or may not be load-bearing
- Reinforced gypsum walls



Brick or Concrete Block Walls



- Can be difficult to breach during emergency operations
- Battering ram may be used
- Power tools such as rotary saws with masonry blades or jackhammers are best

Concrete Walls

- Even slower, more labor-intensive than breaching masonry walls
- Often reinforced with steel rebar
- Breaching should only be done when absolutely necessary

(Continued)

Concrete Walls



- Fastest, most efficient tool is chain saw with diamond-tipped chain
- If chain saw unavailable, pneumatic jackhammer may be used

Metal Walls

- Prefabricated are common, but given right tools, firefighters have little difficulty breaching
- Should be breached only after size-up
- Usually constructed of overlapping light-gauge sheet metal panels fastened to studs

(Continued)

Metal Walls

- Panels may be attached by nails, rivets, bolts, screws, other fasteners
- Conventional forcible entry tools cut with relative ease
- Make sure no building utilities are located in area selected for cutting

(Continued)

Metal Walls

- Have charged hoseline or fire extinguisher at hand when cutting metal with rotary saw because of sparks
- Best to cut square or rectangular opening



(Continued)

Metal Walls



- If wall must be breached to allow water to be applied, penetrating nozzle can be driven through siding

Breaching Floors

- Almost as many types of floors/coverings as of buildings
- Subfloor construction is wood or concrete
- Either may be finished with variety of finishing materials

(Continued)

Breaching Floors

- Concrete slab floors common
- Not uncommon for floor to be classified according to covering instead of material from which constructed
- Feasibility of opening during fire fighting operation depends on several factors

(Continued)

Breaching Floors

- Wood floor does not in itself ensure easy penetration
- Type of floor construction should be determined during preincident surveys



Wooden Floors

- Joists can be spaced from 12 to 24 inches (300 to 600 mm) apart
- Wooden I-beams generally spaced 24 inches (600 mm) apart
- Before floor cut, carpets should be removed or rolled to one side

(Continued)

Wooden Floors

- Some power saws make neat cuts; others make rough cuts
- Circular saw makes neatest cuts; chain saw may be faster
- Better to supply power to electric saws from portable generator

Concrete Floors

- Reinforced to some degree
- Reinforcement depends on where floor located and loads designed to support
- Rarely any reason to open concrete floor

(Continued)

Concrete Floors

- Number of tools can be used to open
- Hand tools impractical
- Most efficient tool may be jackhammer



Summary

- Forcible entry is the technique used by firefighters to gain access into a structure whose normal means of entry is locked or blocked.

(Continued)

Summary

- When properly applied, forcible entry efforts do minimal damage to the structure or structural components and provide quick access for firefighters. Forcible entry should not be used when normal means of access are readily available.

(Continued)

Summary

- Firefighters may need to use forcible entry tools and techniques to breach a wall as a means of escaping from a burning building.

Review Questions

1. What are the four basic categories of forcible entry tools?
2. Why is the pick-head axe often used in structural fire fighting operations?
3. What tool is often used for ventilation purposes?

(Continued)

Review Questions

4. List three safety rules when using power saws.
5. List two basic maintenance procedures for the following: wooden handles, fiberglass handles, and power equipment.

(Continued)

Review Questions

6. What should firefighters do during door size-up?
7. What are the four basic types of locks?
8. What is conventional forcible entry?

(Continued)

Review Questions

9. What hazards are presented by breaking window glass?
10. When should a wall be breached?

Essentials of Fire Fighting,
5th Edition

Chapter 11 — Ventilation

Firefighter I

5th Edition ESSENTIALS OF FIRE FIGHTING
ifsta INTERNATIONAL FIRE SERVICE TRAINING ASSOCIATION

Chapter 11 Lesson Goal

- After completing this lesson, the student shall be able to identify reasons and needs for various types of ventilation within a structure, distinguish which types of ventilation are most effective to varying situations, and perform duties related to ventilating a structure following the policies and procedures set forth by the authority having jurisdiction (AHJ).

Specific Objectives

1. Describe reasons for fireground ventilation.
2. List considerations that affect the decision to ventilate.
3. Discuss factors that are taken into account when deciding the need for ventilation.

(Continued)

Specific Objectives

4. Discuss vertical ventilation.
5. List safety precautions to observe when undertaking vertical ventilation.
6. List warning signs of an unsafe roof condition.

(Continued)

Specific Objectives

7. Discuss roof coverings and using existing roof openings for vertical ventilation purposes.
8. Discuss ventilation considerations for various types of roofs.

(Continued)

Specific Objectives

9. Explain procedures for ventilation of a below-waterline decks.
10. List factors that can reduce the effectiveness of vertical ventilation.
11. Discuss horizontal ventilation.

(Continued)

Specific Objectives

12. Discuss considerations for horizontal ventilation.
13. Distinguish between advantages and disadvantages of forced ventilation.
14. Discuss negative-pressure ventilation.

(Continued)

Specific Objectives

15. Discuss positive-pressure ventilation.
16. Compare and contrast positive-pressure and negative-pressure ventilation.
17. Describe hydraulic ventilation.

(Continued)

Specific Objectives

18. List disadvantages to the use of hydraulic ventilation.
19. Explain the effects of building systems on fires or ventilation.

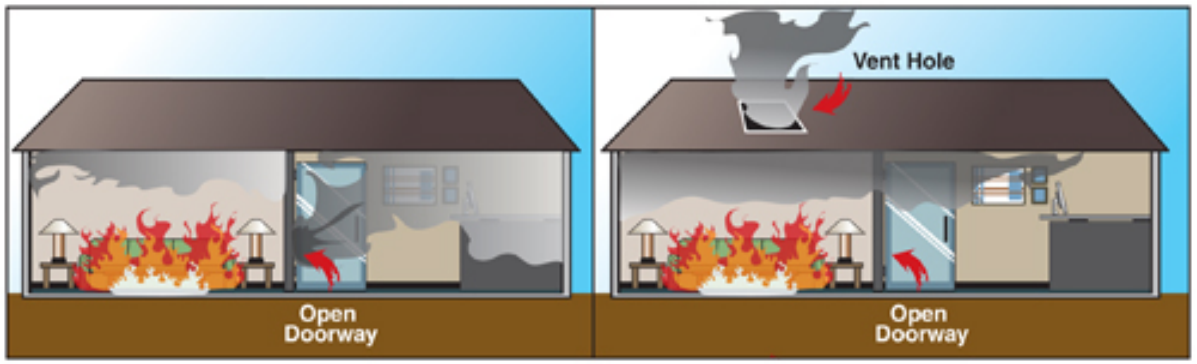
(Continued)

Specific Objectives

20. Ventilate a structure using mechanical positive-pressure ventilation. (Skill Sheet 11-I-3)
21. Ventilate a structure using horizontal hydraulic ventilation. (Skill Sheet 11-I-4)

Life Safety Reasons for Fireground Ventilation

- Increases firefighter safety by reducing interior temperature, increasing visibility
- Reduces chance of firefighters receiving steam burns when water applied



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Life Safety Reasons for Fireground Ventilation

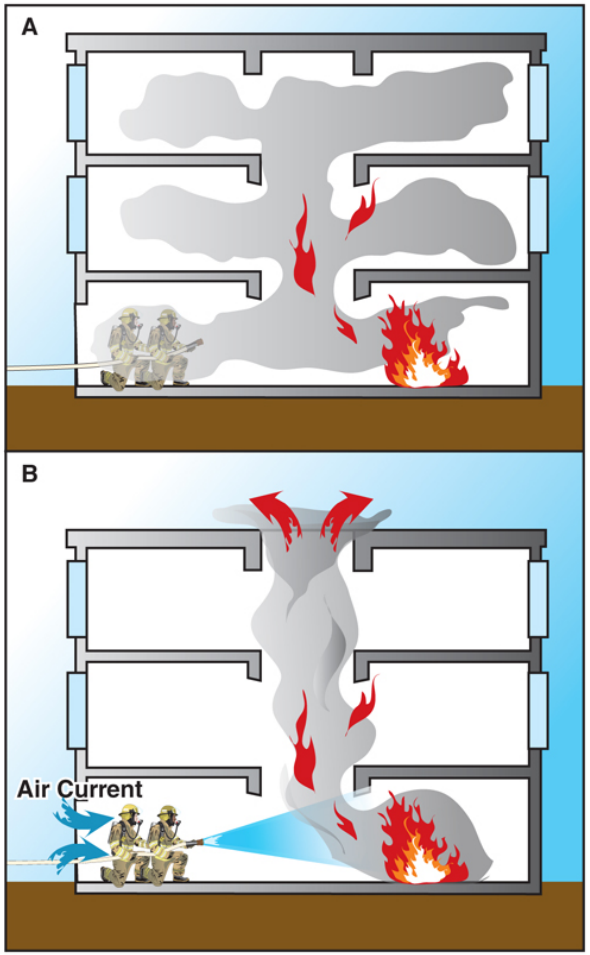
- Reduces likelihood of sudden, hazardous changes in fire behavior
- Simplifies, expedites search and rescue operations by removing smoke, gases that endanger trapped/unconscious occupants

Fire Attack and Extinguishment Reasons for Fireground Ventilation

- Permits firefighters to more rapidly locate fire, proceed with extinguishment
- When ventilation opening made in upper portion of building, chimney effect occurs

(Continued)

Fire Attack and Extinguishment Reasons for Fireground Ventilation



Fire Spread Control Reasons for Fireground Ventilation

- Effective ventilation
  - Reduces rate of smoke layer development
  - Can reverse process of smoke layer development
  - Reduces rate at which fire will spread over area

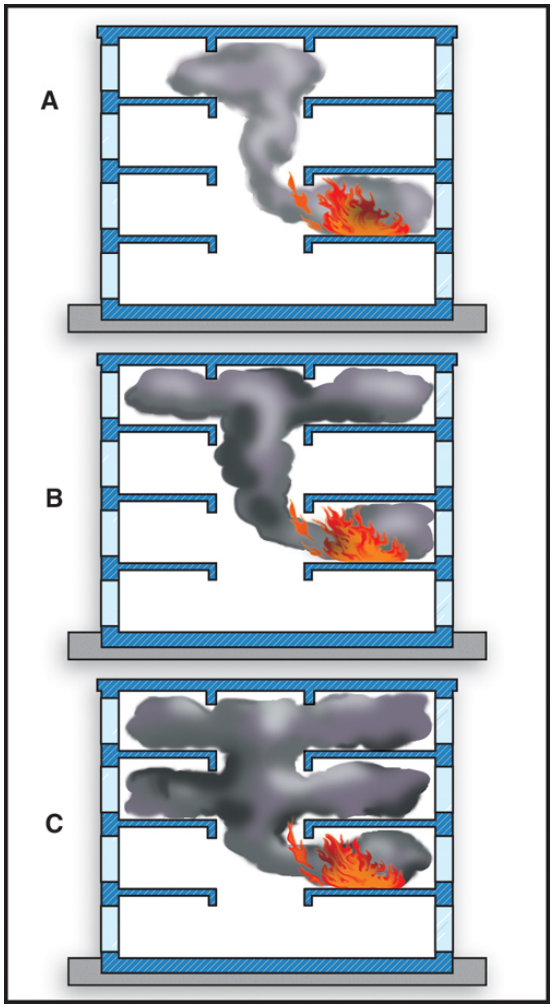
(Continued)

Fire Spread Control Reasons for Fireground Ventilation

- Even with proper ventilation, if fire not extinguished soon after ventilation completed, increased supply of fresh air will feed fire
- Ventilation should occur only after hoseline crews ready to move in, attack

(Continued)

Fire Spread Control Reasons for Fireground Ventilation



Reduction of Flashover Potential Reasons for Fireground Ventilation

- Flashover
  - Transition between growth, fully developed
  - As unventilated interior fire burns and flames, smoke, and gases extend, heat radiates back down until combustibles heated to ignition temperatures
  - Once ignition temperatures reached, contents will ignite

(Continued)

Reduction of Flashover Potential Reasons for Fireground Ventilation

- Ventilation helps prevent flashover from occurring
- Opening single door or window may not remove enough smoke, heat to prevent flashover

(Continued)

Reduction of Flashover Potential Reasons for Fireground Ventilation

- If fire producing significant amount of smoke and heat but limited by available oxygen, ventilating room may cause rapid ignition of hot fire gases in upper layer, initiating flashover

Reduction of Backdraft Potential Reasons for Fireground Ventilation

- When fire confined in compartment and does not break window or burn through to outside, will reduce oxygen level until flaming combustion no longer possible
- If air supply introduced, backdraft occurs

(Continued)

Reduction of Backdraft Potential Reasons for Fireground Ventilation

- To prevent backdraft conditions, carefully controlled ventilation must be provided
- Vertical ventilation often safest for this
- Signs of potential backdraft

DISCUSSION QUESTION



Do you know of any examples of fires in which backdraft occurred?

Property Conservation Reasons for Fireground Ventilation

- Rapid extinguishment reduces water, heat, smoke damage
- Timely, effective ventilation helps extinguish interior fires faster
- Smoke may be removed from buildings by natural or mechanical means



(Continued)

Property Conservation Reasons for Fireground Ventilation

- When smoke, gases, heat removed from burning vessel, fire can be confined
- If sufficient personnel, effective salvage operations can be initiated outside immediate fire area during fire control operations

Considerations Affecting Ventilation

- Is there need at this time?
- Where is ventilation needed?
- What type should be used?
- Do fire, structural conditions allow for safe roof operations?
- Are Vent Group personnel trained, equipped to ventilate the ship?

Life Safety Hazards

- First consideration is safety of firefighters and vessel occupants
- Life hazards in burning vessel generally lower if occupants awake
- If occupants were asleep, a number of possibilities must be considered

(Continued)

DISCUSSION QUESTION



What are some ways to determine if there are occupants still inside an effected area of a ship?

Life Safety Hazards

- Depending on fire conditions, ventilation may be needed before search and rescue begins
- Hazards from accumulation of smoke, gases in building

Visible Smoke Conditions



- Smoke accompanies most ordinary forms of combustion
- Density of smoke increases with amount of suspended particles
- Smoke conditions vary according to how burning has progressed

The Vessel Involved

- In addition to location of fire within the vessel, a ship's age, type, design must be considered
- Other factors include number and size of hatches, number and type of ventilation or damper openings, etc.

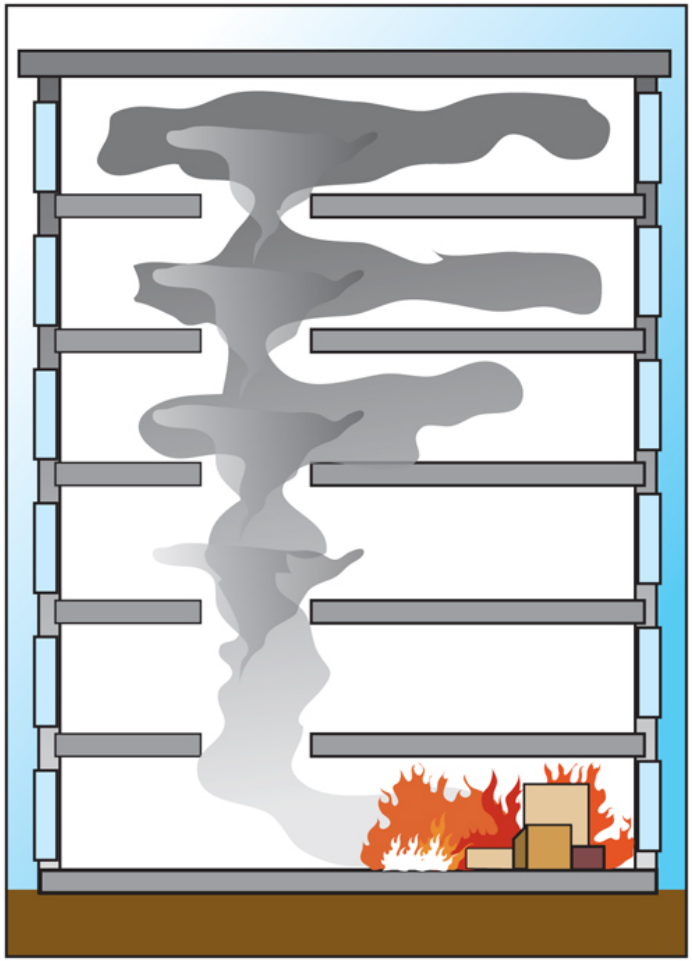
(Continued)

The Vessel Involved

- The ship's fire plans are always available to officers on fireground and may provide valuable information affecting ventilation

(Continued)

The Vessel Involved



- Multi-deck vessels have extra considerations

Spaces Below the Weather Deck

- Without effective ventilation, access into these decks is difficult because firefighters must descend through worst heat, smoke to get to seat
- Several features impede attempts at natural ventilation

(Continued)

Spaces Below the Weather Deck

- In some cases, creating openings needed may delay operation considerably or may be impossible based on the ship's design
- Ventilating considerations

(Continued)

Location and Extent of Fire

- First-arriving units must determine size, extent of fire as well as location
- Severity, extent of fire depend on number of factors

(Continued)

Location and Extent of Fire

- Phase to which fire has progressed is a primary consideration in selecting ventilation procedures
- Ways that vertical fire extension occurs

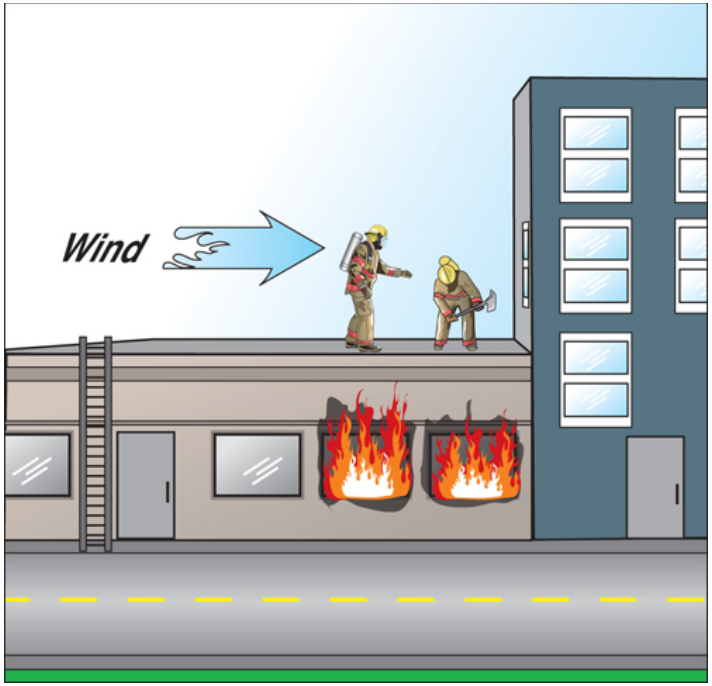
Selecting Place to Ventilate

- Ideal situation one with as much information as possible about fire, vessel, occupancy
- Many factors have bearing on where to ventilate

(Continued)

Selecting Place to Ventilate

- Many considerations before ventilating building



DISCUSSION QUESTION



Why is it important for ventilation to be coordinated with other operations such as fire attack?

Vertical Ventilation

- Opening roof/existing roof openings for allowing heated gases, smoke to escape
- Firefighters must understand basic types, designs of vessels

(Continued)

Vertical Ventilation — Preincident Inspections

- Identify
  - Number of horizontal and vertical hatches
  - Location and type of ventilation dampers
    - Automatic versus manual closing
  - Spaces protected by fixed suppression systems

Responsibilities During Vertical Ventilation — Officer in Charge

- Determine it can be done safely, effectively
- Consider location, duration, extent of fire
- Observe safety precautions

(Continued)

Responsibilities During Vertical Ventilation — Officer in Charge

- Identify escape routes
- Select place to ventilate
- Confirm with ship's crew before opening any ventilation damper
  - Opening a ventilation damper without authorization could have catastrophic results to crews operating below decks!

Responsibilities During Vertical Ventilation — Leader on Roof

- Ensure roof safe to operate on
- Ensure only required openings made
- Direct efforts to minimize secondary damage
- Coordinate crew's efforts with firefighters inside building

(Continued)

Safety Precautions During Vertical Ventilation

- Check wind direction with relation to exposures
- Work with wind at back/side to provide protection while opening

(Continued)

Safety Precautions During Vertical Ventilation

- Ensure all personnel wear full PPE including SCBA
- Keep other firefighters out of range of those swinging axes, operating saws
- Caution axe users to be aware of overhead obstructions

(Continued)

Fixed Vessel Openings

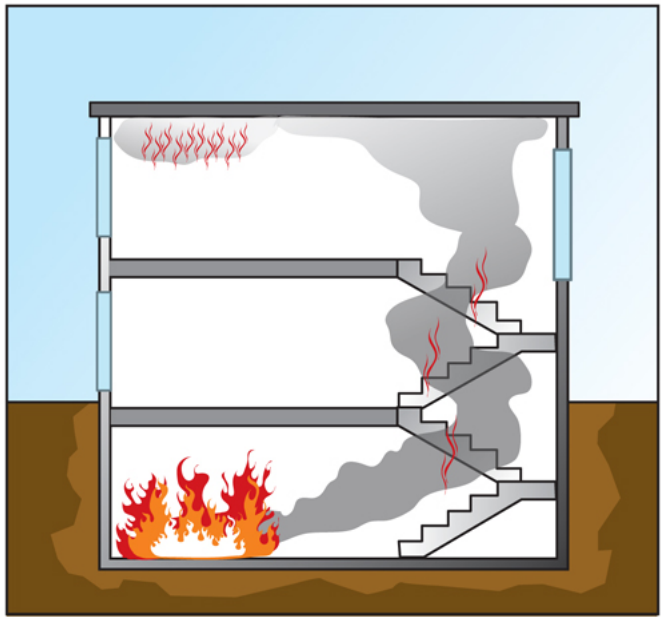
- Sometimes used for vertical ventilation
- Rarely in best location/large enough
- Based on vessel design, may be only form of vertical ventilation available

(Continued)

Fixed Vessel Openings

- Emergency escape hatches
- Engine Room dampers
- Elevator shafts
- Ventilating shafts
- Bulkhead doors

Spaces Below the Weather Deck



- In absence of built-in vents from below decks, heat and smoke from these lower space fires quickly spread upward

(Continued)

Factors Reducing Effectiveness of Vertical Ventilation

- Improper use of forced ventilation
- Indiscriminant window breaking
- Fire streams directed into ventilation openings

(Continued)

Factors Reducing Effectiveness of Vertical Ventilation

- Explosions
- Burn-through of roof, floor, wall
- Additional openings between attack team, upper ceiling

Horizontal Ventilation

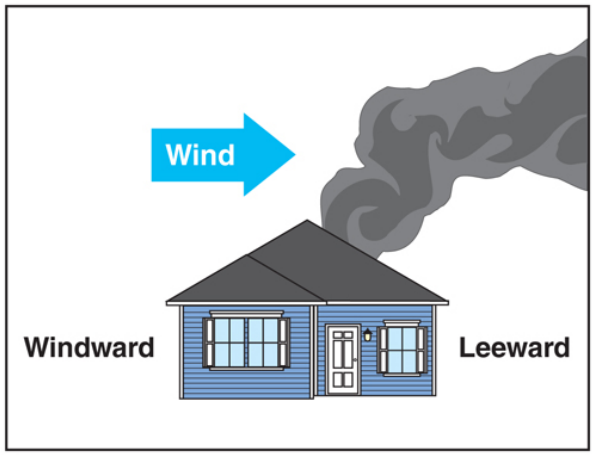
- Venting of heat, smoke, and gases through horizontal openings
- Certain structures lend themselves to this application

(Continued)

Horizontal Ventilation

- Many aspects of vertical ventilation apply to horizontal ventilation; different procedure must be followed
- Besides direct flame contact, horizontal extension can occur in several ways

Horizontal Ventilation Considerations — Weather



- Must always be considered
- Wind has most potential influence; can aid or hinder horizontal ventilation
- Wind direction
- Setting up natural horizontal ventilation

http://www.youtube.com/watch?v=QKqKa0gp8Ho

DISCUSSION QUESTION



What are some other weather conditions that should be considered before performing horizontal ventilation?

Horizontal Ventilation Considerations — Exposures

- Internal — Include vessel occupants, any uninvolved rooms/portions of building
- External

(Continued)

Horizontal Ventilation Considerations — Exposures

- Because horizontal ventilation does not release heat and smoke directly above fire
  - Routing necessary
  - Routes may be same needed for evacuation
  - Effects on rescue, exit must be considered

(Continued)

Horizontal Ventilation Considerations — Exposures



- Because heat, smoke, fire can be discharged below highest point of vessel
  - Also danger that rising gases will ignite portions of building above exit point
  - Rising gases may be drawn into vents above exit point

(Continued)

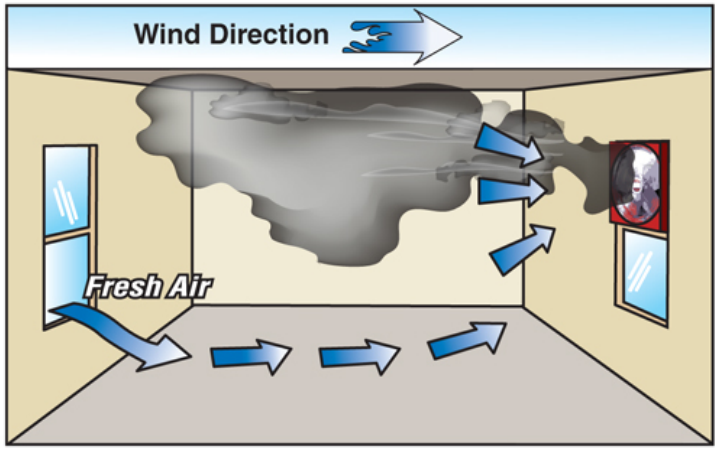
Horizontal Ventilation Considerations — Exposures

- Because heat, smoke, fire can be discharged below highest point of vessel (cont.)
  - Unless for rescue, a ship should NOT be ventilated until charged hoselines in place at entry point
  - Charged hoselines should be ready at intermediate point where fire might spread

(Continued)

Precautions Against Upsetting Horizontal Ventilation

- Opening a door/window on windward side of building prior to ventilation exit opening on leeward side may pressurize building, intensify fire, cause fire spread



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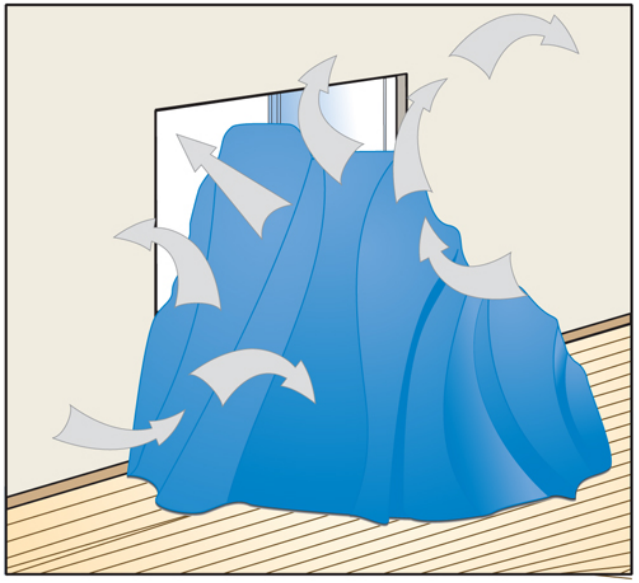
Precautions Against Upsetting Horizontal Ventilation

- Take advantage of air currents
- If established currents blocked, positive effects may be reduced/eliminated



Advantages of Forced Ventilation

- Supplements, enhances natural ventilation
- Ensures more control of air flow
- Speeds removal of contaminants
- Reduces smoke damage
- Promotes good public relations

Disadvantages of Forced Ventilation

- May cause fire to intensify, spread
- Depends on power source
- Requires special equipment

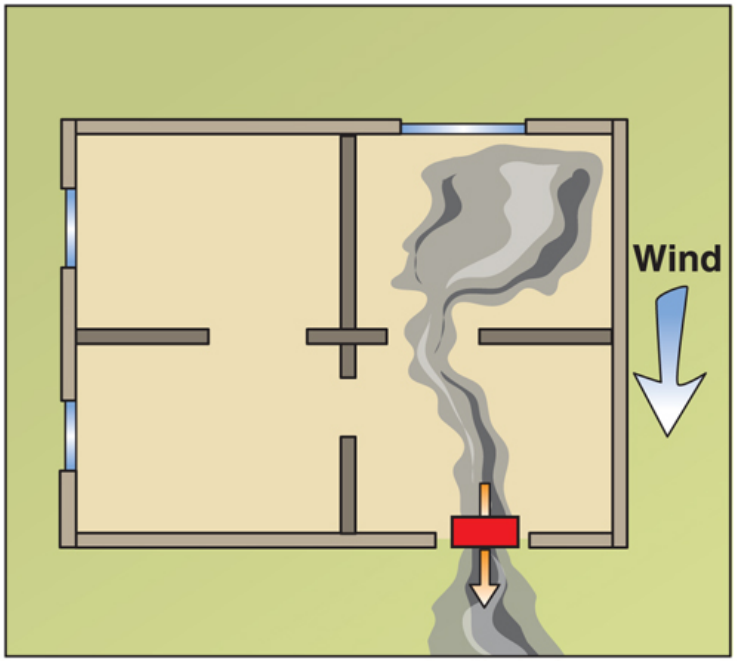
Negative-Pressure Ventilation (NPV)

- Oldest type of mechanical forced ventilation techniques — Using fans to develop artificial circulation/enhance natural ventilation

(Continued)

Negative-Pressure Ventilation (NPV)

- Fans placed in windows, doors, roof vent openings to exhaust smoke, heat, gases



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Negative-Pressure Ventilation (NPV)

- NPV operations
  - Fan should be positioned to exhaust in same direction as prevailing wind
  - Technique uses wind to supply fresh air
  - If prevailing wind too light, fans can be positioned on windward side of vessel to blow air into the ship
  - **Keep the ship's swing in mind if at anchor or adrift!**

(Continued)

Negative-Pressure Ventilation (NPV)

- If open areas around smoke ejector not properly sealed
  - Air can recirculate into the vessel
  - Atmospheric pressure pushes air back through spaces; smoke reenters room
  - To prevent recirculation, cover area around fan

(Continued)

Negative-Pressure Ventilation (NPV)

- Flow of smoke, other gases to exit opening should be kept straight as possible

(Continued)

Negative-Pressure Ventilation (NPV)

- Avoid opening windows near exhaust fan because this can reduce efficiency
- Remove all obstacles to airflow

(Continued)

Negative-Pressure Ventilation (NPV)

- Do not allow intake side of fan to become obstructed
- When ventilating potentially flammable atmospheres, only exhaust fans with intrinsically safe motors, power cable connections should be used

(Continued)

Negative-Pressure Ventilation (NPV)

- Exhaust fans should be turned off when moved; carry by handles
- Before starting exhaust fans, be sure no one near blades; other materials not in position to be drawn into fan
- Discharge stream of air should be avoided

(Continued)

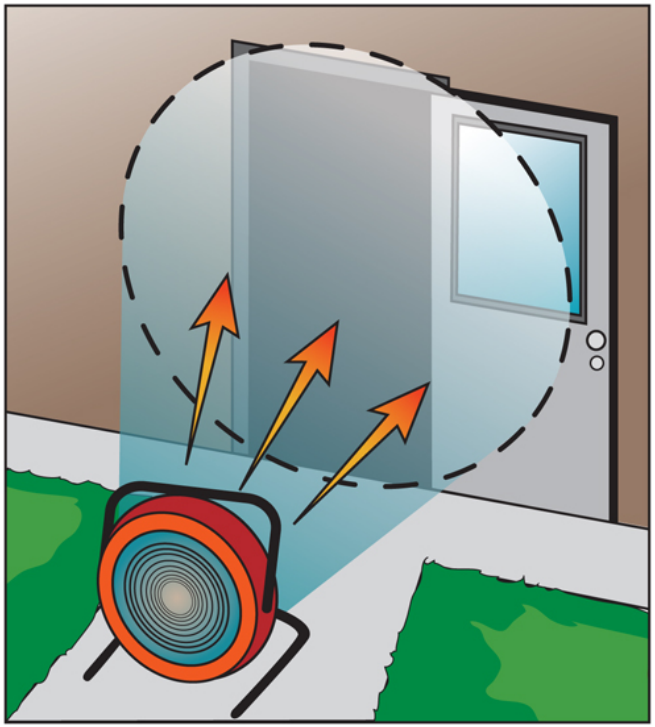
Positive-Pressure Ventilation (PPV)

- Forced ventilation technique that uses high-volume fan to create slightly higher pressure inside than that outside



(Continued)

Positive-Pressure Ventilation (PPV)



- As long as pressure higher inside building, smoke within the vessel forced through ventilation exit opening

(Continued)

Positive-Pressure Ventilation (PPV)

- Location where PPV set up is entry point
  - Once location selected, create exit opening opposite
  - Size of exit opening varies with size of entry opening, capacity of blower
  - Exit opening may be window/doorway

(Continued)

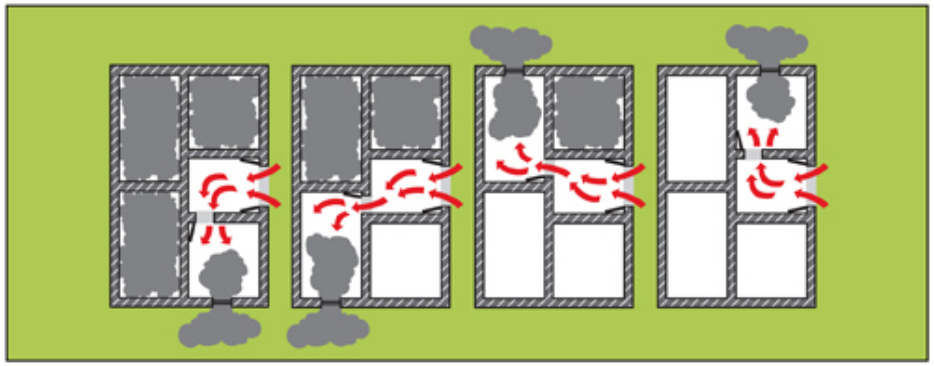
Positive-Pressure Ventilation (PPV)

- Once exit opening created
  - Blower placed 4-10 feet (1.2-3 m) outside open entry point
  - Smoke then expelled from exit opening
  - To maintain positive pressure inside, important that no other exterior doors/ windows are opened during operation

(Continued)

Positive-Pressure Ventilation (PPV)

- By selectively opening, closing interior doors and exterior windows, it is possible to pressurize one room/area at a time



(Continued)

Positive-Pressure Ventilation (PPV)

- Several considerations for using PPV to ventilate multideck vessels
- Requires good fireground discipline, coordination, tactics

(Continued)

Positive-Pressure Ventilation (PPV)

- Main problem in aboveground operations — Coordinating opening, closing of doors in stairwell
- To control openings/pressure leaks, put one person in charge of pressurizing process

(Continued)

Positive-Pressure Ventilation (PPV)

- To ensure effective PPV operation
  - Take advantage of existing wind
  - Make certain cone of air from blower covers entire entry opening
  - Reduce size of area being pressurized to speed up process by selectively opening, closing interior doors

(Continued)

Positive-Pressure Ventilation (PPV)

- To ensure effective PPV operation
  - Keep size of exit opening in proportion to entry opening
  - Avoid creating horizontal openings by breaking glass/removing doors

Advantages of PPV Compared to NPV

- Firefighters can set up PPV without entering smoke-filled environment
- PPV usually effective with horizontal or vertical ventilation
- Removal of smoke, heat more efficient with PPV

(Continued)

Advantages of PPV Compared to NPV

- Velocity of air currents within a ship minimal and minimally disturb vessel contents/debris
- Fans powered by internal combustion engines operate more efficiently in clean, oxygen-rich atmospheres

(Continued)

Advantages of PPV Compared to NPV

- Placement of fans does not interfere with ingress/egress
- Cleaning, maintenance of fans for PPV less than those for NPV
- PPV effective in most types of vessels

(Continued)

Advantages of PPV Compared to NPV

- Heat, smoke may be directed away from unburned areas/paths of exit with PPV

Disadvantages of PPV

- Intact structure required
- Interior carbon monoxide levels may be increased if exhaust from fans allowed to enter
- Hidden fires may be accelerated, spread throughout the vessel

DISCUSSION QUESTION



In what types of fires do you think PPV would be more effective? In what types of fires will NPV work better?

Hydraulic Ventilation

- May be used in situations where other types of forced ventilation unavailable
- Used to clear spaces or decks of smoke, heat, steam, gases after fire controlled

(Continued)

Hydraulic Ventilation



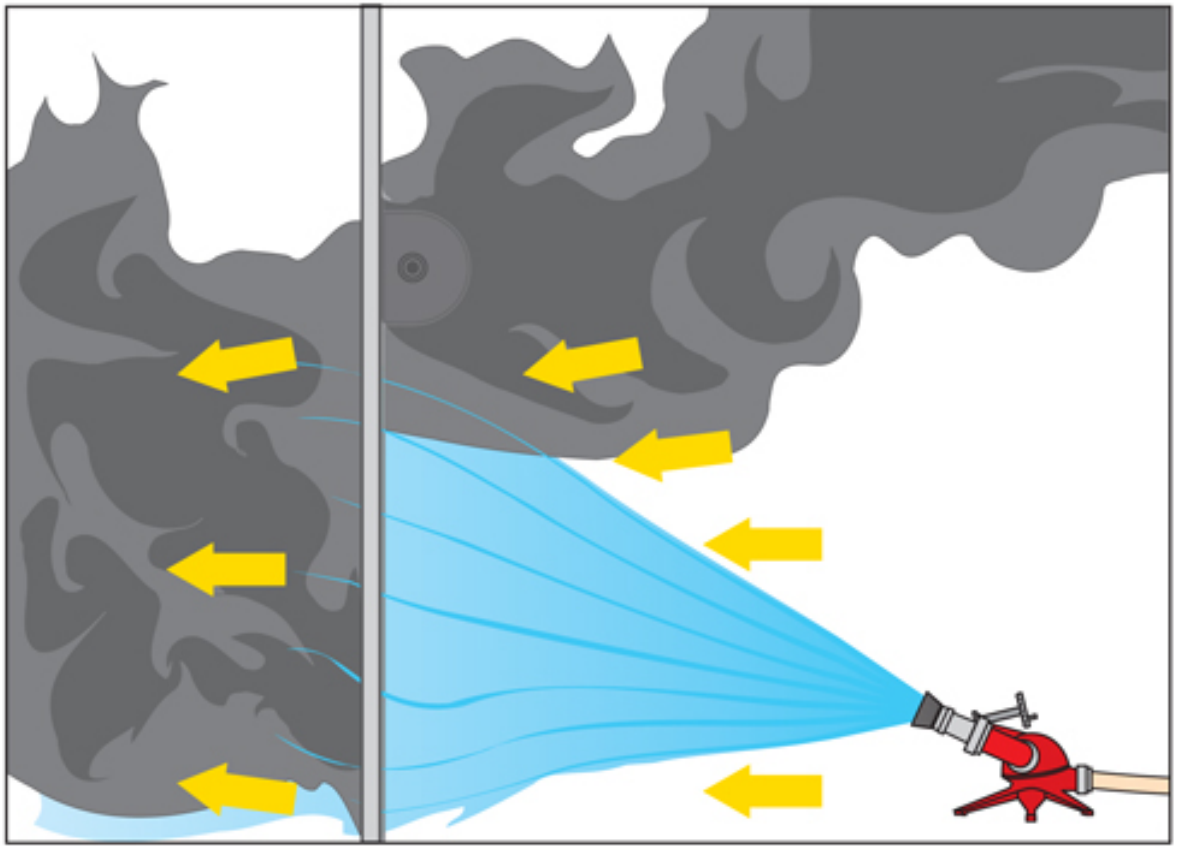
- Uses air movement created by fog stream to help draw products of combustion out of vessel

Performing Hydraulic Ventilation

- Fog stream set on wide fog pattern that covers 85-90 percent of window/door opening from which smoke will be pushed out
- Nozzle tip should be at least 2 feet (0.6 m) back from opening
- Larger the opening, faster the process

(Continued)

Performing Hydraulic Ventilation



Disadvantages to Hydraulic Ventilation

- May increase amount of water damage
- Drain on available water supply
- If freezing, increase in ice on ground
- Firefighters operating nozzle must remain in heated, contaminated area
- Operation may be interrupted when nozzle team leaves to replenish air

Building Systems

- Most large vessels have built-in HVAC systems
- Systems can significantly contribute to spread of smoke, fire throughout structure

Building System Operations

- Usually controlled from panel on the bridge or in engineering
- Wherever located, often diagram of duct system and information on smoke detection, fire suppression systems built into HVAC ductwork

(Continued)

DISCUSSION QUESTION



Who should operate vessel systems to assist in ventilation?

Vessel System Operations

- Systems designed to shut HVAC system down automatically when smoke/fire detected in ducts

Fire Personnel

- Should be familiar with location, operation of controls allowing them to shut down HVAC system
- May need to shut HVAC system down during fire; clearing system of smoke, restoring to operation responsibility of Ship's Master or Chief Engineer

(Continued)

Fire Personnel

- Should check combustibles adjacent to ductwork for fire extension due to conduction

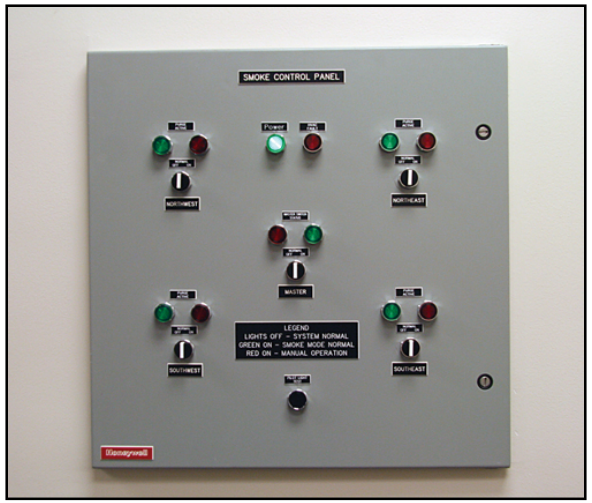
Smoke Control Systems

- Many vessels equipped with built-in smoke control systems
- Designed to confine fire to as small an area as possible
- Achieve confinement by automatic closure of doors, partitions, hatches, fire dampers

(Continued)

Smoke Control Systems

- Usually have system diagram in same location as control panel; panel should indicate where alarm originated, which automatic closers activated



Summary

- Ventilating a burning vessel allows heat, smoke, and other products of combustion to escape to the atmosphere. It also allows clear, cool air to be drawn into the vessel. This allows firefighters to see better, locate victims easier, and find the seat of the fire sooner. It also limits fire spread and channels the heat and smoke away from any trapped victims.

(Continued)

Summary

- To perform horizontal and vertical ventilation safely and effectively, firefighters must understand fire behavior and know the various ventilation methods. Firefighters must have a knowledge of vessel construction.

Review Questions

1. What are the reasons for fireground ventilation?
2. What are the signs of a potential backdraft?
3. What questions should be asked when deciding to ventilate?

(Continued)

Review Questions

4. List three factors that help determine where to ventilate.
5. What is the difference between horizontal ventilation and vertical ventilation?

(Continued)

Review Questions

6. List four safety precautions for vertical ventilation.
7. What is trench ventilation?
8. Why is conventional basement fire ventilation important?

(Continued)

Review Questions

9. What structures lend themselves to the application of horizontal ventilation?
10. Describe two ways to accomplish forced ventilation.

VESSEL TYPES & CONSTRUCTION











COMMON CONSTRUCTION MATERIALS

Fiber-glass

Aluminum

Wood

Steel

Ferro cement

Hybrid or Combination

FIBER-GLASS

- Fiber Reinforced Plastic (F.R.P.)
- Most common boat building material
- Reinforcing filaments & Hull material consists of usually four different components
  - Gelcoat
  - Fiberglass
  - Resin (flammable or inflammable)
  - Core material (optional – Balsa, wood, plastic, foam)





HAND LAY-UP METHOD

- Most common and economical method
- Industry standard





CHOPPER GUN

- Special equipment required
- Environmentally unfriendly
- Thickness control variable
- Poor density to strength
- Fast lay-up





VACUUM BAGGING/MOLDING

- Modern method- environmentally friendly
- Enhances hand lay-up
- Very Strong
- Expensive



FIBERGLASS FRAMES AND STRINGERS



Fire Properties of Fiber-Glass

Fiber-Glass is a non-conductor of electricity and a poor conductor of heat. In cases of a fire it can be vented much more easily than a metal structure. However, it does have some disadvantages such as the following:

- Fiberglass is a combustible material and creates a very heavy fuel load.
- Once ignited, fiberglass produces large quantities of dense smoke and toxic gasses.
- Fiberglass exposed to fire may melt and allow a vessel on fire to sink
- Fiberglass that uses carbon fiber for reinforcement may release carbon fragments during a fire. These fragments become airborne and are a respiratory hazard. Fragments are also conductive and can cause failures in electronics and power transmission equipment.

Aluminum

- Commonly used to make boats of various sizes up to the super structures of larger vessels.
- Corrosion resistant.
- Light weight metal.
- Moderate strength.





Nomenclature

- Frame – A part of the vessel that supports the hull transversely running across the breadth of the vessel

- Longitudinal or Stringer – A part of the vessel that supports the hull running lengthwise from bow to stern

Frames and Stringers





Riveted Aluminum

- Smaller lighter boats
  - Jon boats
  - Dinghy's
  - Ponga’s
  - Center Consoles



Welded Aluminum

- Medium to large vessels.



- Large vessel superstructures.



FIRE PROPERTIES OF ALUMINUM

Aluminum has moderate strength and does not hold heat as long as steel. Certain specific alloys that combine light weight, strength, and corrosion resistance have been developed for marine environments. The NFPA states that aluminum can burn vigorously in the presence of other burning materials but it also has the following disadvantages:

- Produces Aluminum Oxide when burnt.
- Conducts heat faster than steel in all directions.
- Conducts electricity.
- Has low melting point and gives little or no warning before failure.

Furthermore, fire extension through melted aluminum bulkheads can cause structural collapse and aluminum ladders are especially dangerous collapse hazards.

Wood

- Pound for pound wood is very strong
- Less popular due to high maintenance
- Generally found in vessels shorter than 200 feet in length.



Wood construction

- Wood Planks



- Plywood over wood frames



Floating Structures





- Floating Structures are usually not fitted with self propulsion.
- Electrical panels, Batteries, cables / wires
- Amenities consist of everything found in homes such as air-cond, oil-fired heating systems, dishwashers, clothes washers/dryers, gas grills, TV/computers etc.

FIRE PROPERTIES FOR WOOD

Wood has the advantages of being a poor conductor of heat and electricity and can be vented by using appropriate fire service tools. Wood vessels have the following obvious disadvantages:

- Wood is a combustible material and creates a very heavy fuel load.
- Once ignited, wood produces large quantities of dense smoke and toxic gasses.
- Wood is a high maintenance material, subject to rot and hidden structural weaknesses.
- Varnishes on top of wood are hazardous

Steel

- Typically on large and heavy vessels
- Welded construction
- Subject to corrosion
- May be combined with other materials



FIRE PROPERTIES FOR STEEL

- Steel is characterized by high strength, is non combustible in ordinary fires, and will yield before it fails. Steel is the preferred material from the standpoint of fire protection. If steel is observed to deform due to heat, water can be applied to directly to stop the deformation and restore much of its strength. The disadvantages of steel are:
  - Steel conducts heat in all directions and retains the heat
  - Steel conducts electricity and is a concerning factor if the fire threatens electrical insulation
  - Steel compartments are often water/airtight making them very difficult to ventilate. Expect oxygen depleted atmospheres.
  - **As steel expands, the structure distorts and may jam door and hatch fittings.**

Ferro-cement

- Cement over metal frame
- Large pleasure boats
- Popular in the 70’s
- Often “back-yard” built boats



Cement Construction

- Ferro-cement is most commonly applied to a mixture of Portland cement and sand reinforced with layers of woven or expanded steel mesh and closely spaced small-diameter steel rods rebar. It can be used to form relatively thin, compound curved sheets to make hulls for boats.







Sail Boats













Power Boats









Commercial Boats









Cruise Vessels









Cargo Vessels





Questions ?

Chapter 13 - Shipboard Firefighting Operations



Shipboard Fire Operations

- Terminal Learning Objective:
  - At the conclusion of this course, officers and supervisors shall have an understanding of the roles and responsibilities of all personnel involved in the initial response to a shipboard fire as well as how to gather the information necessary to achieve a safe and successful operation.

Enabling Objectives

1. Discuss how to properly conduct a size up of the vessel. (1005-4.1.3)
2. Address how and where to safely tie up to the vessel. (1005-4.1.3)
3. Address how to locate the ship's fire plan and properly assess the nature of the emergency with the ship's crew. (1005-4.1.4, 4.3.4 4.4.2, 4.4.3, 4.5.2)

Enabling Objectives

4. Discuss how to create an Initial Action Plan using the RECEO-VS model based on available resources and information.
5. Address how to identify different types of shipboard fires and their behavior based on their location. (1005-4.2.1)
6. Discuss how to properly identify and employ fire boundary cooling zones. (1005-4.3.2)

Enabling Objectives

7. Address the use of the vessel's fixed fire suppression systems. (1005-4.2.2, 4.5.6)
8. Given a ship's fire plan, accurately identify pertinent information based on the Initial Action Plan (1005-4.1.4, 4.2.1, 4.3.3)

Initial Assignment to Vessel Fires

602 and 604

603

- 501
- Minimum two officers

605

- Minimum two officers
- Transport Vessel





Initial Response

- Getting Dispatched to the Call
  - Where is the ship located: Pier, Underway, Dry Dock?
  - What kind of vessel is it?
    - Passenger
    - Freight
    - Fishing
    - Private
  - Do you already see smoke showing while enroute?

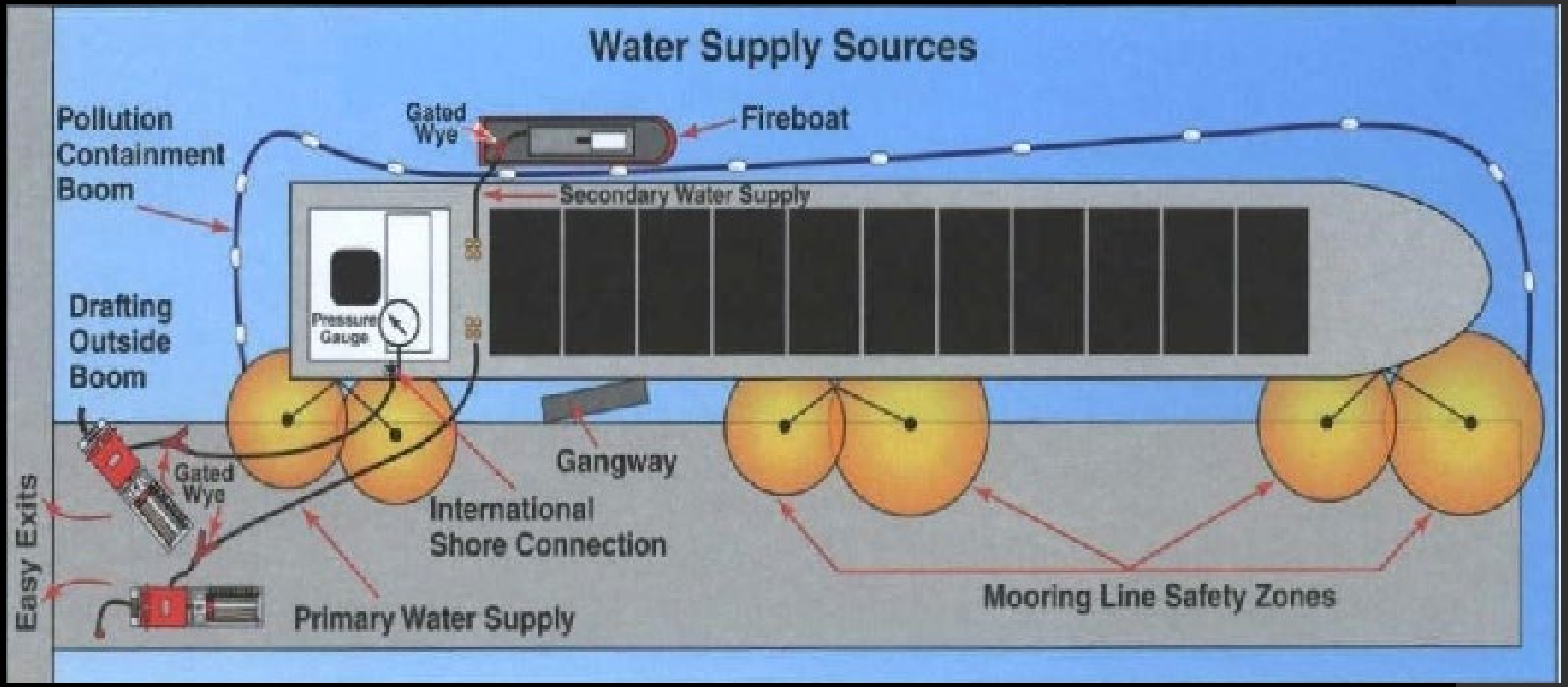
Initial Response

- Arriving On Scene
  - Do you have any visible signs of an emergency?
    - Smoke and flames showing, light haze of smoke, nothing showing, etc.
  - Perform a 360 degree size up of the vessel and look for:
    - Blistering paint
    - Smoke from the dampers or vents
    - Listing or trimming of the vessel
    - General behavior of the crew and/or passengers: calm vs. panic

Getting Onboard

- Vessels On a Pier
  - Depending on the vessel's size, may allow for both landside and waterside access.
  - Be sure to maintain mooring line safety zones.
  - What physical access is available to move personnel and equipment?

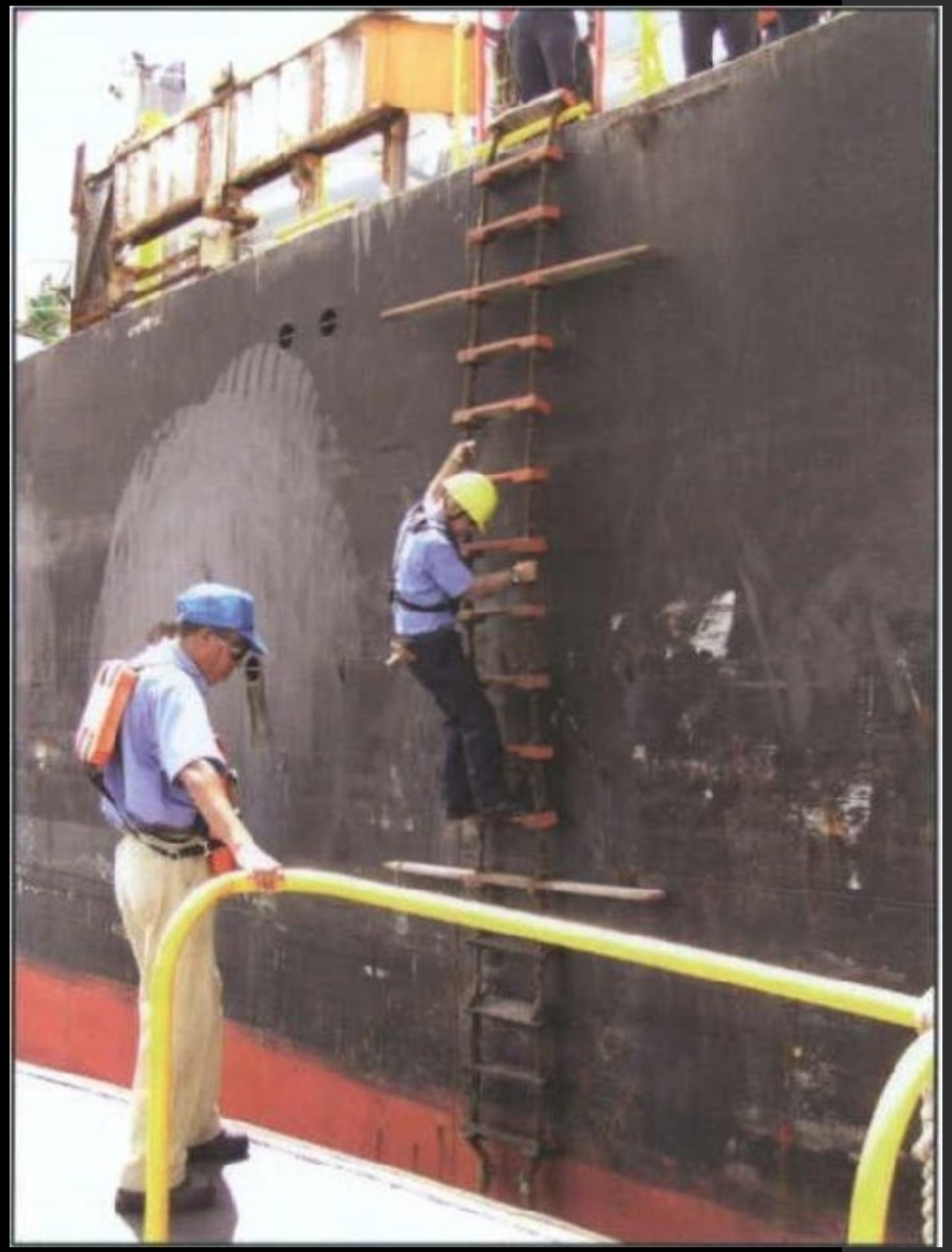



Water Supply Sources
Pollution Containment Boom
Gated Wye
Fireboat
Secondary Water Supply
Pressure Gauge
Drafting Outside Boom
Gangway
Gated Wye
International Shore Connection
Primary Water Supply
Mooring Line Safety Zones
Easy Exits

Getting Onboard

- Underway Vessels
  - Can be very difficult on large vessels.
  - Look for available cleats that can hold the fire boat.
  - Tie the boat up based on the probable location of the fire if possible.





Getting Onboard

- Fires On the Weather Deck

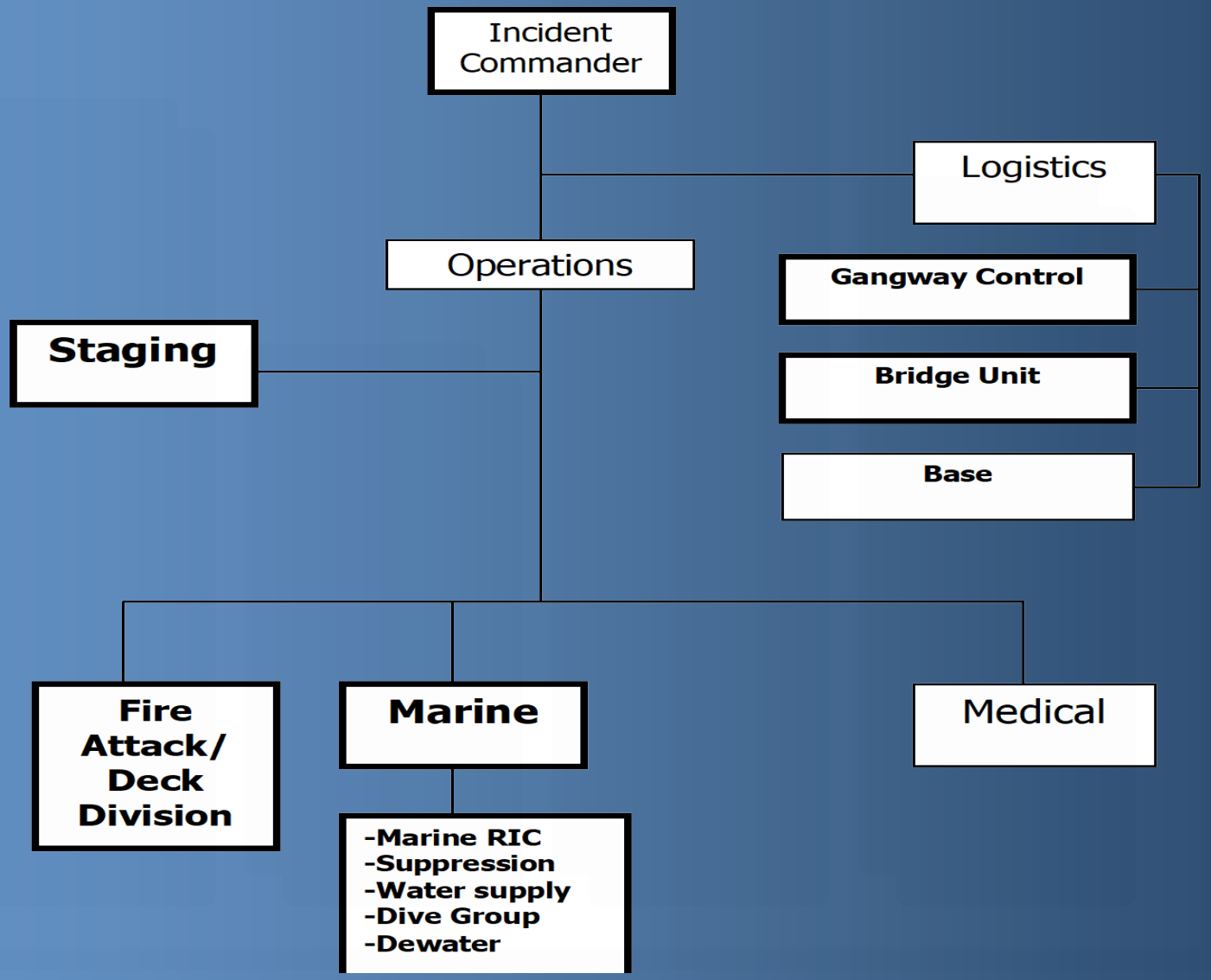
  - May be only way aboard the boat.
  - On a passenger vessel, an aggressive attack of the fire may be required in order to stabilize the situation.
  - Consider using the fire boat's monitors to create a water curtain to keep officers and the vessel safe if in close proximity to the fire.

Getting Onboard

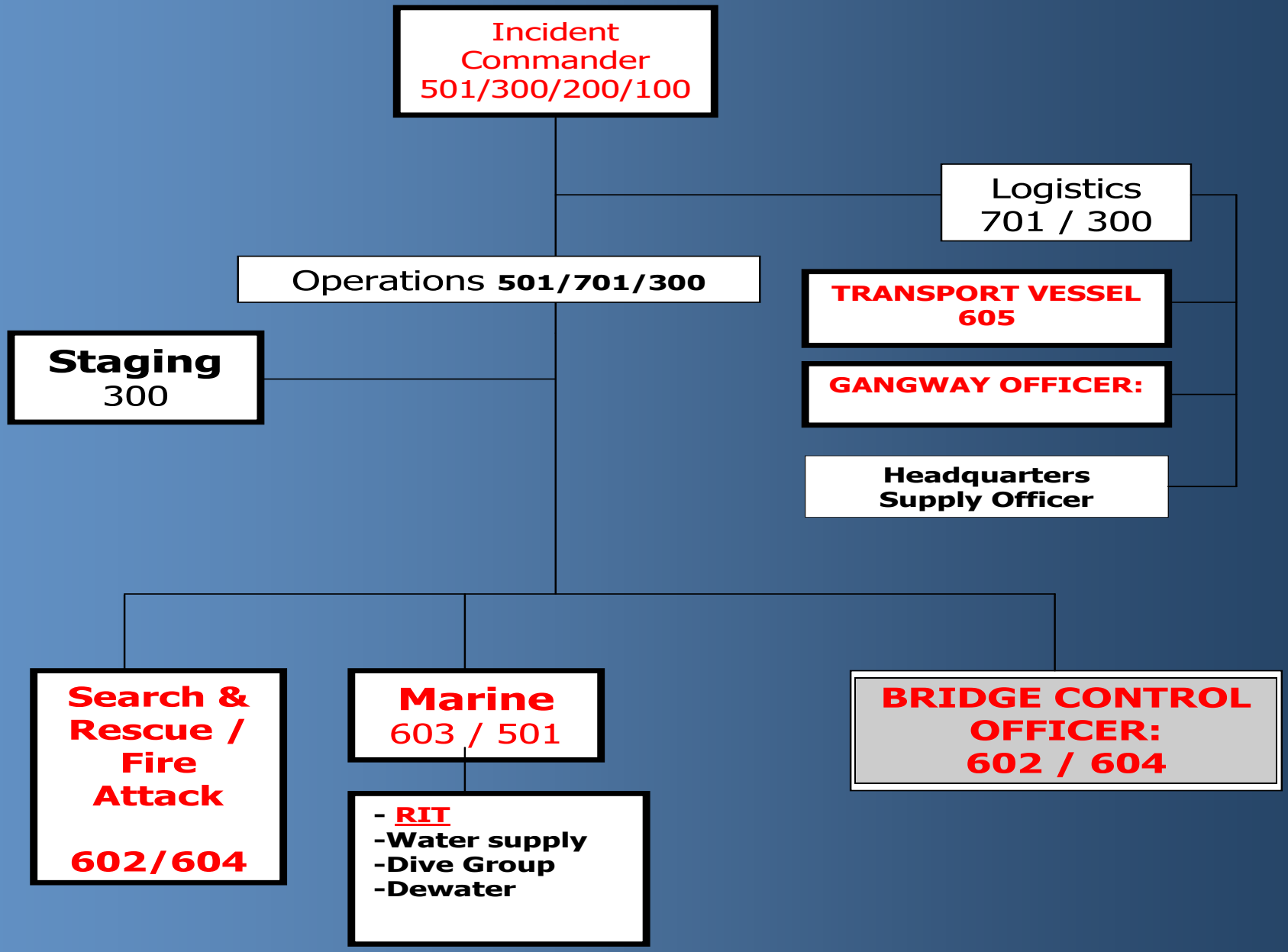
- General Expectations
  - Possible panic of passengers and crew
  - If a passenger vessel, is the crew effectively mustering them?

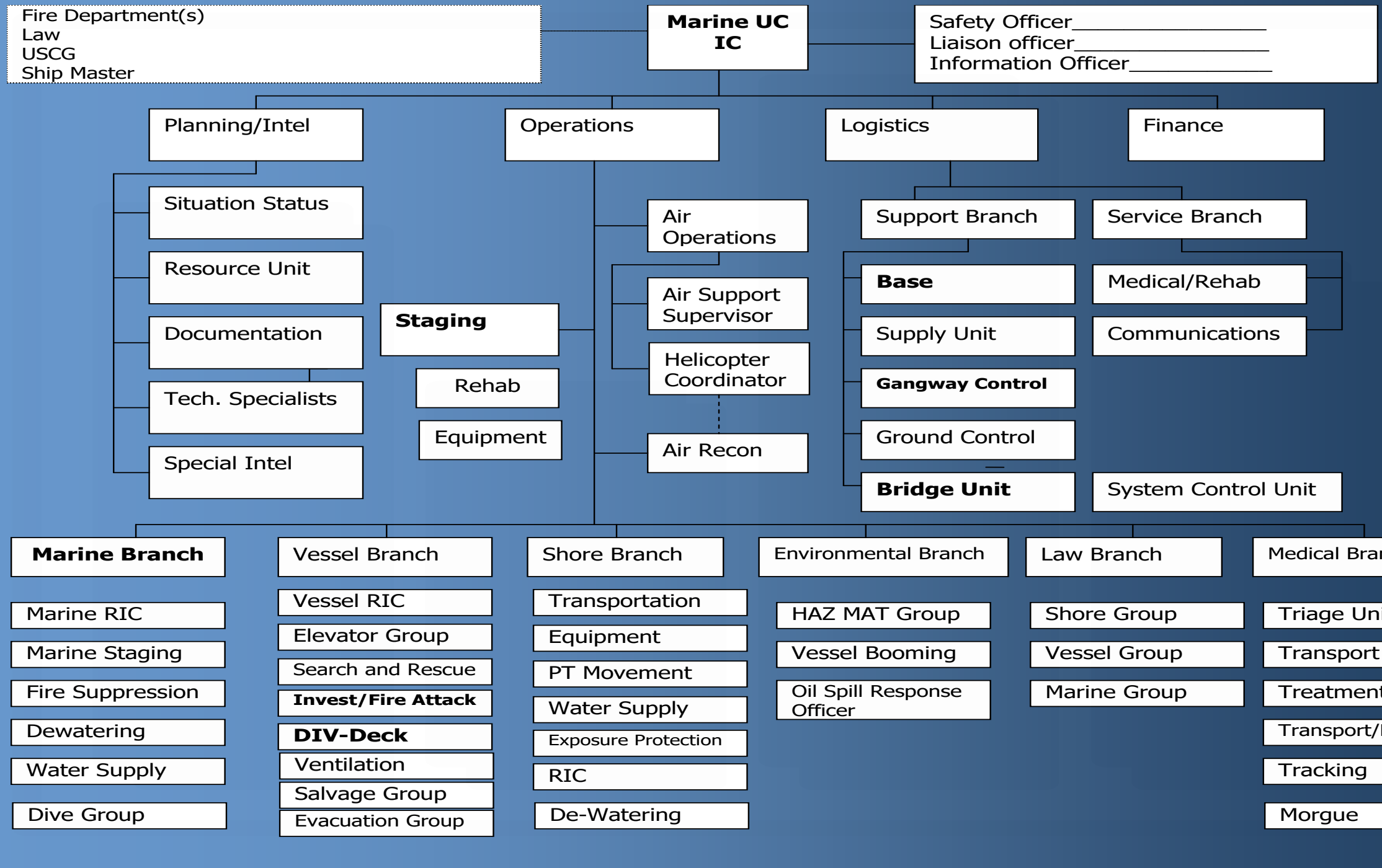
    If not, HPD crewmember may have to assist as rescue operations cannot begin until a full muster is obtained
  - If the vessel is foreign flagged, prepare for possible language and cultural barriers

Basic Shipboard ICS Organization
1st Alarm Assignment



Basic Shipboard ICS Organization
1st Alarm Assignment




Fire Department(s)
Law
USCG
Ship Master
Marine UC IC
Safety Officer_____
Liaison officer_____
Information Officer_____
Planning/Intel
Operations
Logistics
Finance
Situation Status
Resource Unit
Documentation
Tech. Specialists
Special Intel
Staging
Rehab
Equipment
Air Operations
Air Support Supervisor
Helicopter Coordinator
Air Recon
Support Branch
Service Branch
Base
Supply Unit
Gangway Control
Ground Control
Bridge Unit
Medical/Rehab
Communications
System Control Unit
Marine Branch
Marine RIC
Marine Staging
Fire Suppression
Dewatering
Water Supply
Dive Group
Vessel Branch
Vessel RIC
Elevator Group
Search and Rescue
Invest/Fire Attack
DIV-Deck
Ventilation
Salvage Group
Evacuation Group
Shore Branch
Transportation
Equipment
PT Movement
Water Supply
Exposure Protection
RIC
De-Watering
Environmental Branch
HAZ MAT Group
Vessel Booming
Oil Spill Response Officer
Law Branch
Shore Group
Vessel Group
Marine Group
Medical Branch
Triage Unit
Transport
Treatment
Transport/Hos
Tracking
Morgue

BA'S are **G**oo**D**

Bridge

Attack

Staging

Gangway

Division

Initial Assignment Deployment
Underway Ship Fire

- 1st Fire Boat **Bridge Control Officer**
  Liaison with Vessel Master or 1st Officer
- 2nd Fire Boat **Fire Attack / Investigation / S & R**
- 603 **Incident Command**
  Gangway Control / Staging
- 605 **Transport Vessel**

BRIDGE CONTROL OFFICER



Bridge Control Officer

- Officer(s) of the first arriving vessel

- Responsible for notifying the Incident Commander of the vessel information

- Responsible for the Vessel Master's information regarding the incident up to the current time. Events Prior to FD arrival.

- Begins obtaining information called for by the 'Bridge Control Officer's Checklist

- Other crewmember of the first arriving vessel should generally remain with the fire boat and begin an accountability system as other vessels arrive

- Escort's an English speaking officer off the ship (as necessary) to the IC/Operations command post as a Liaison between the Master and Department

Bridge Control Officer

Vessel Information

Vessel Name:_____ **Vessel Registry:**_____

Vessel Type:_____ **Vessel Cargo:**_____

Vessel Master/Captain:_____ **Cell #:**_____

# of Crew Members:_____ **All Accounted for: YES / NO**

# of Passengers:_____ **All Accounted for: YES / NO**

Vessel: LOADING or OFF LOADING **Vessel Stability: BAD / FAIR / GOOD**

Vessel Fire Pumps Operational: YES / NO **Max Pressure Vessel can Handle:**_____

Ships Agent:_____ **Cell #**_____

Incident Information

Location of Fire:_____ **What's Burning:**_____

How Long has it Been Burning:_____ **Additional Info:**_____

Vessels Crew Fire Fighting YES / NO **Entry Point:**_____

At What Time:_____ **# of Crew Members:**_____

Compartment Fire Fighting System Activated: YES / NO **Time:**_____

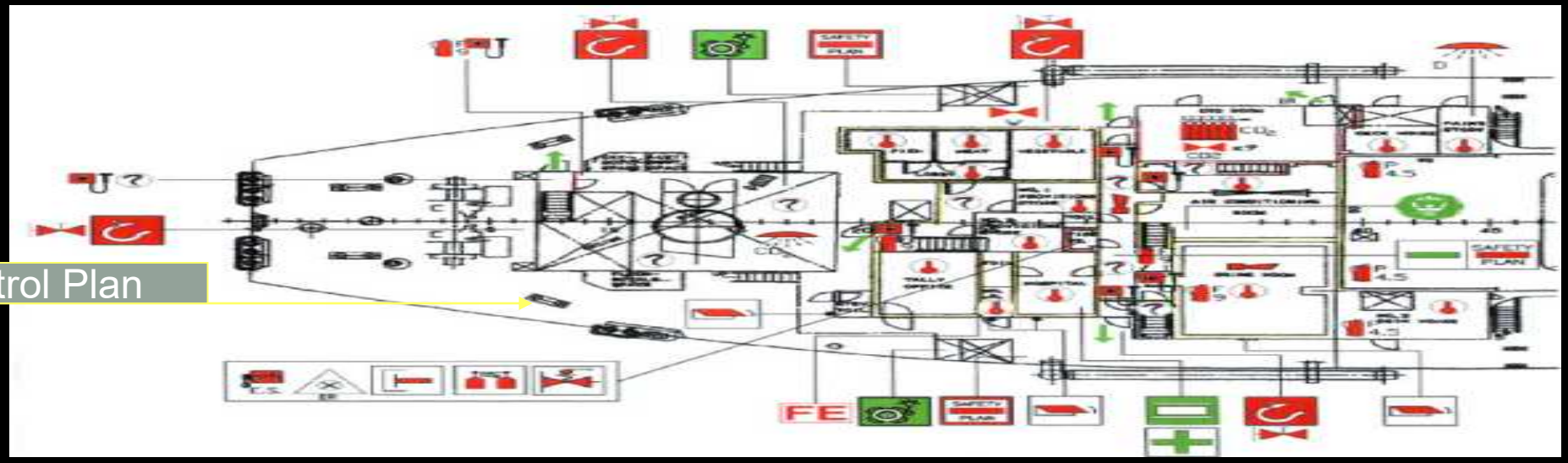
Type of System:_____

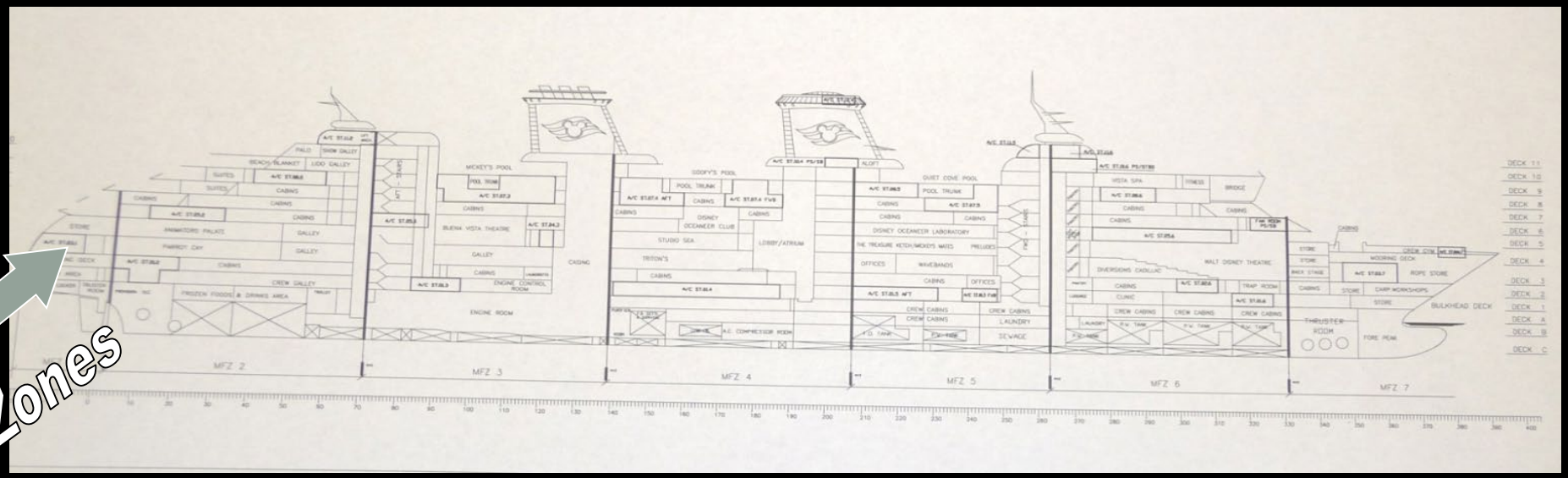
Bridge Control Officer

- Fire control room
  - Contains vessel's fire control plan
  - Vessel emergency procedures plan
  - Fire detection annunciator panels
  - Fixed fire suppression system controls (i.e., CO2)
  - Controls for remote-op. water tight and fire doors
  - Controlling the ventilation system
  - Controls for power systems
  - Controls for fuel systems
  - Documents that would assist in controlling the fire.

Ship's Fire Control Plan

Fire Control Plan





Fire Zones

Vessel Fire Control Plan

- Information contained in the plan:
  - Vessel Fire Control Stations
  - Primary / Secondary ingress / egress routes
  - Fire-resistant bulkheads and hatches
  - Locations and types of fixed fire suppression systems and their associated alarms
  - Location of ventilation systems and controls
  - Location of International Shore Connector

Second Arriving Vessel

- Fire Attack / Investigation / S&R
  - While enroute, check with first arriving vessel for tie up location
  - Once aboard, immediate concern is identifying exposures that could threaten escape from the vessel and keeping them cool
  - If the fire's location or size is unverified, begin investigation to locate the problem
  - Ensure to check all hatches or doors for heat using a TIC or water stream prior to opening; never use your hand!

Second Arriving Vessel

- Additional Responsibilities
- Check with Bridge Control Officer to see if muster has been completed
  - Search and Rescue realistically can't start until a full muster is complete
- If an immediate rescue is determined to be necessary, perform risk vs gain analysis and inform IC / first arriving vessel of your plan

Opening Watertight Hatches

- There are several types of watertight hatches aboard vessels, to include:
  - Power-Driven Watertight Hatches
  - Quick-Acting Watertight Hatches
  - Nonquick –Acting Watertight Hatches
- Never open a closed and locked watertight hatch without prior permission of the vessel Master

Opening Watertight Hatches

- Power-Driven Hatches
  - Extremely powerful hatches designed to crush anything in it's way
  - Can be closed at the door or from remote locations; some are automatic
  - Have the ability to open even if the vessel suffers a power loss
- https://www.youtube.com/watch?v=a1CJ8LBgDyM

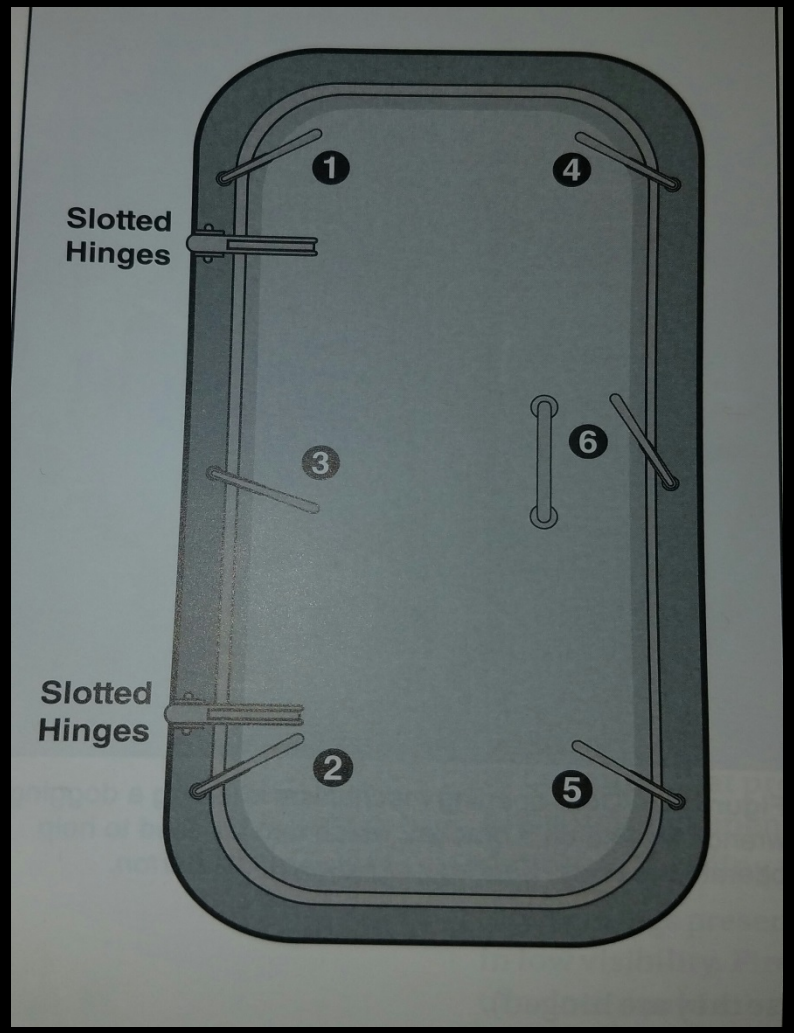
Opening Watertight Hatches

- Quick-Acting Hatches
  - Operated by either a single handle or wheel
  - Goes through two stages as it opens
  - The first stage partially unlocks the dogs, but prevents full opening
  - This safety function allows built up pressure behind the hatch to release without allowing the hatch to open



Opening Watertight Hatches

- Nonquick-Acting Hatches
  - Uses 4 to 8 ‘dogs’ to secure the hatch
  - Dogs must be opened individually before the hatch will open
  - Open the hinge side dogs first as indicated in the picture
  - This will allow built up pressure to escape without the hatch forcefully opening



Third Arriving Vessel

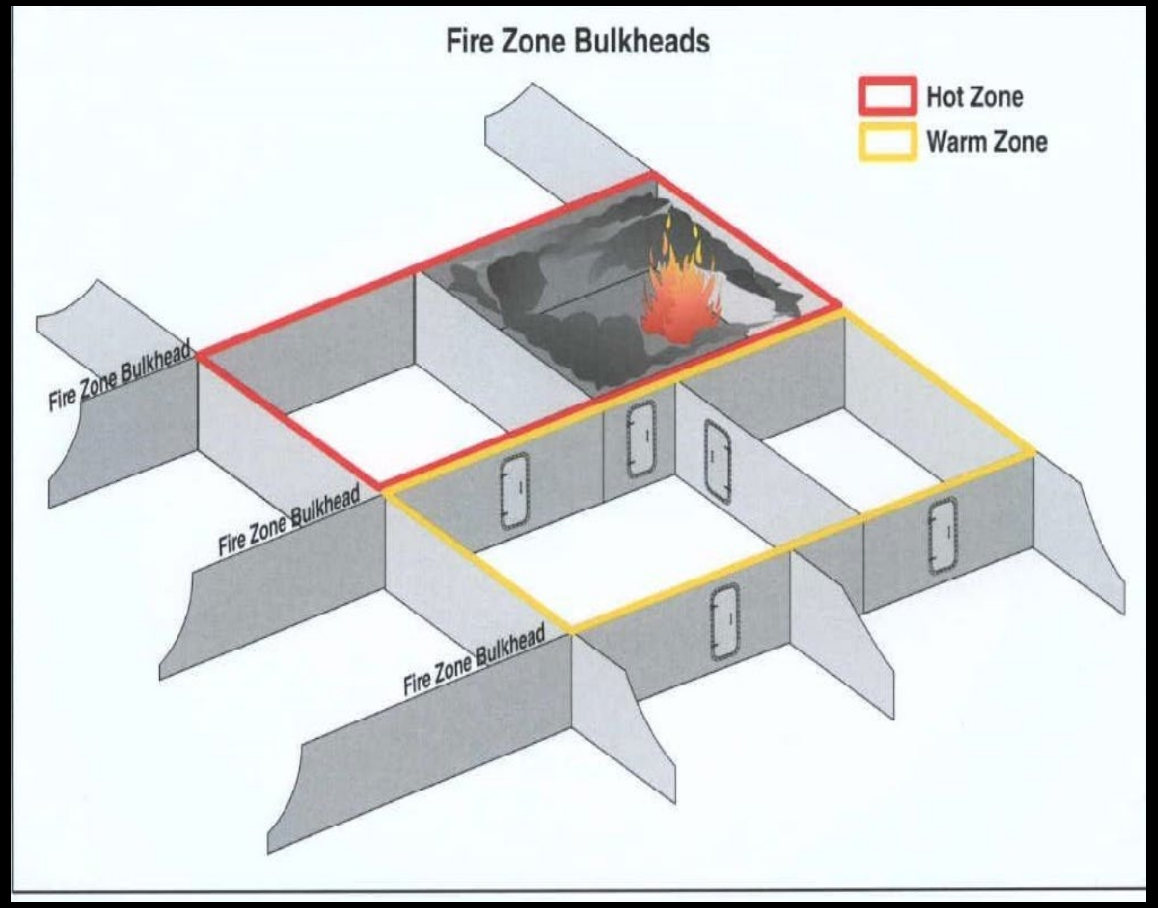
- Should include:
  - Either 501, a lieutenant, or both to assume the role of Incident Commander and begin to develop the Initial Action Plan (IAP)
  - Two additional officers or corporals who can assist operations already underway or begin to fill the next two operational roles
    - Gangway Officer
    - Staging Officer

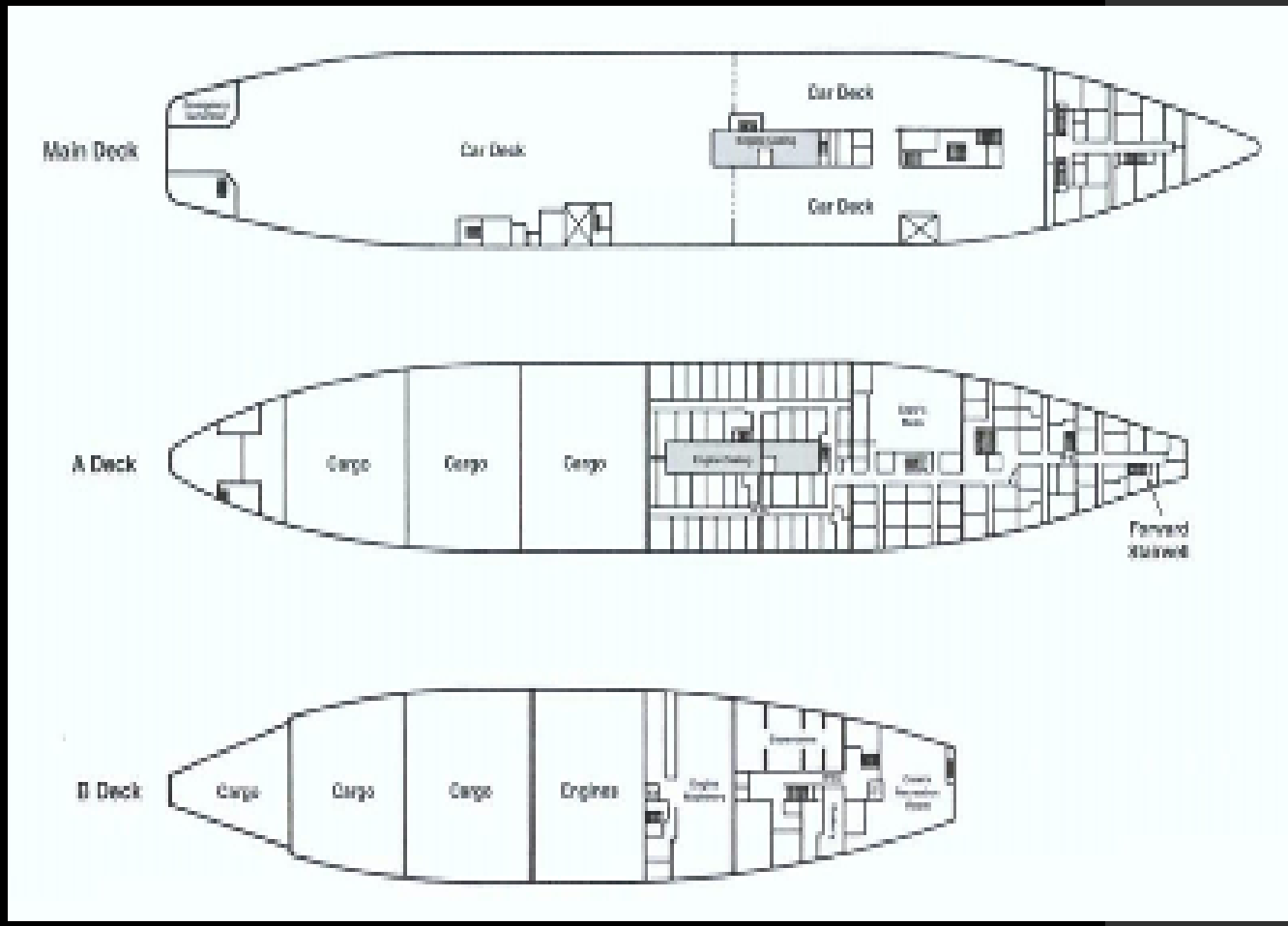
Assess the Situation

- Determining type of fire based on it's location:
  - Accommodation Space Fires
    Class A - Most similar to structure fires
  - Galley Fires
    Class A and K – Usually equipped with specialized suppression systems
  - Machinery Space / Pump Room Fires
    Class B and C – Usually requires use of a fixed fire suppression system
  - Freight Fires
    ???? – Could be just about anything; dependent upon type of freighter

Initial Action Plan

- Developing the Initial Action Plan (IAP)
  - Locate the ship's fire plan and use it to determine:
    - Most threatened exposures and presence of any Haz Mat
    - Locate the ship's Vertical Fire Zones if present and ensure all hatches and doors of those zones are secured
    - Identify the fire cooling boundaries surrounding the effected compartments.


Fire Zone Bulkheads
Hot Zone
Warm Zone
Fire Zone Bulkhead
Fire Zone Bulkhead
Fire Zone Bulkhead


Main Deck
Car Deck
Car Deck
Car Deck
A Deck
Cargo
Cargo
Cargo
Forward Stairwell
B Deck
Cargo
Cargo
Cargo
Engines

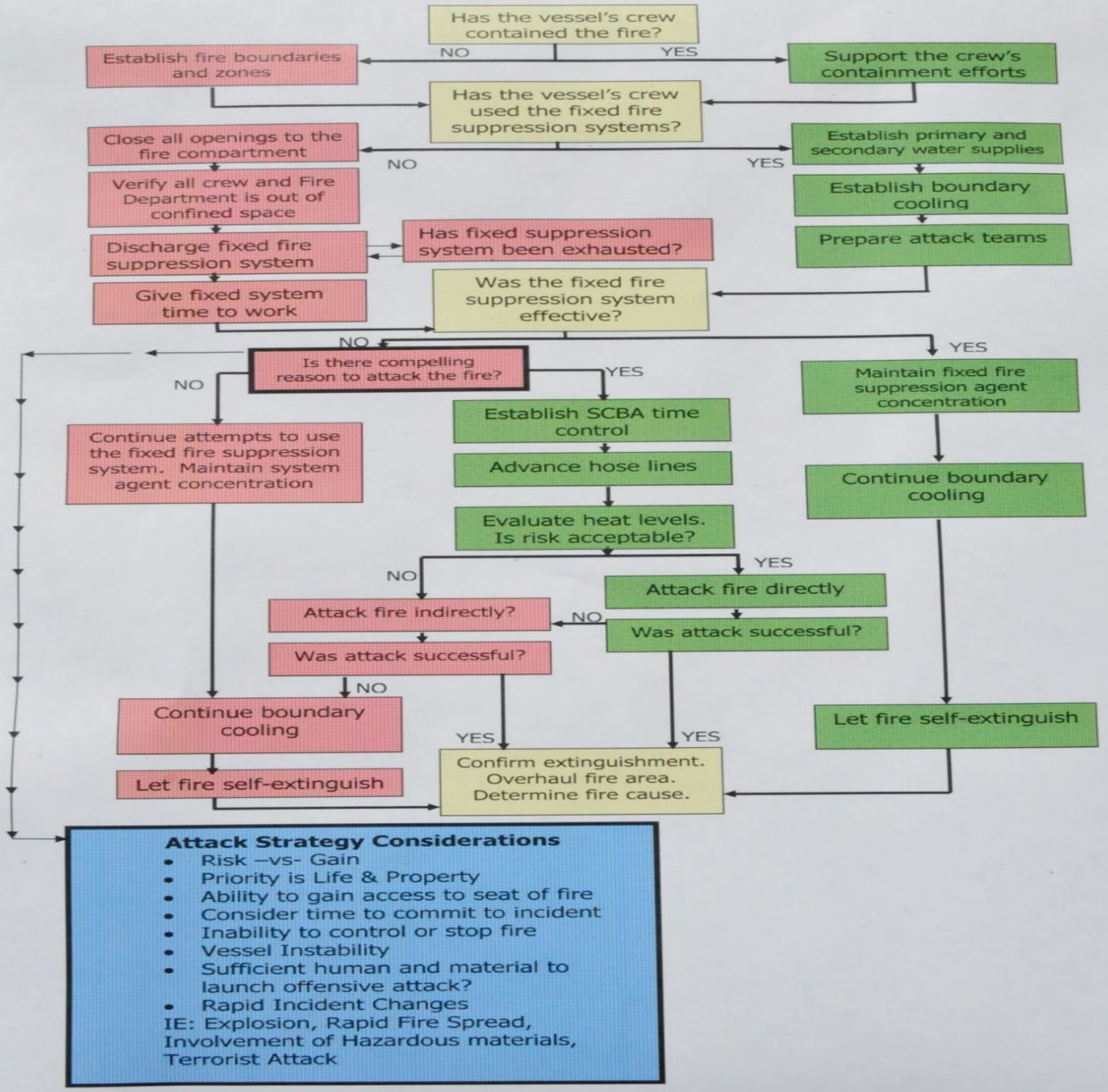
Initial Action Plan

- Developing the IAP
  - Based on the previous information and available resources, use the R.E.C.E.O. – V.S. model to develop an IAP
  - Due to the nature of ship fires, Rescue and Exposure protection may have to be accomplished simultaneously
  - Once muster is complete, determine the need for search and rescue efforts; remember to consider the possibility of stowaways (specifically on dinner and party cruises)
  - *If search and rescue is necessary, ensure all personnel are familiar with all available egress routes from the spaces to be searched using the ship's fire plan BEFORE ENTERING!*

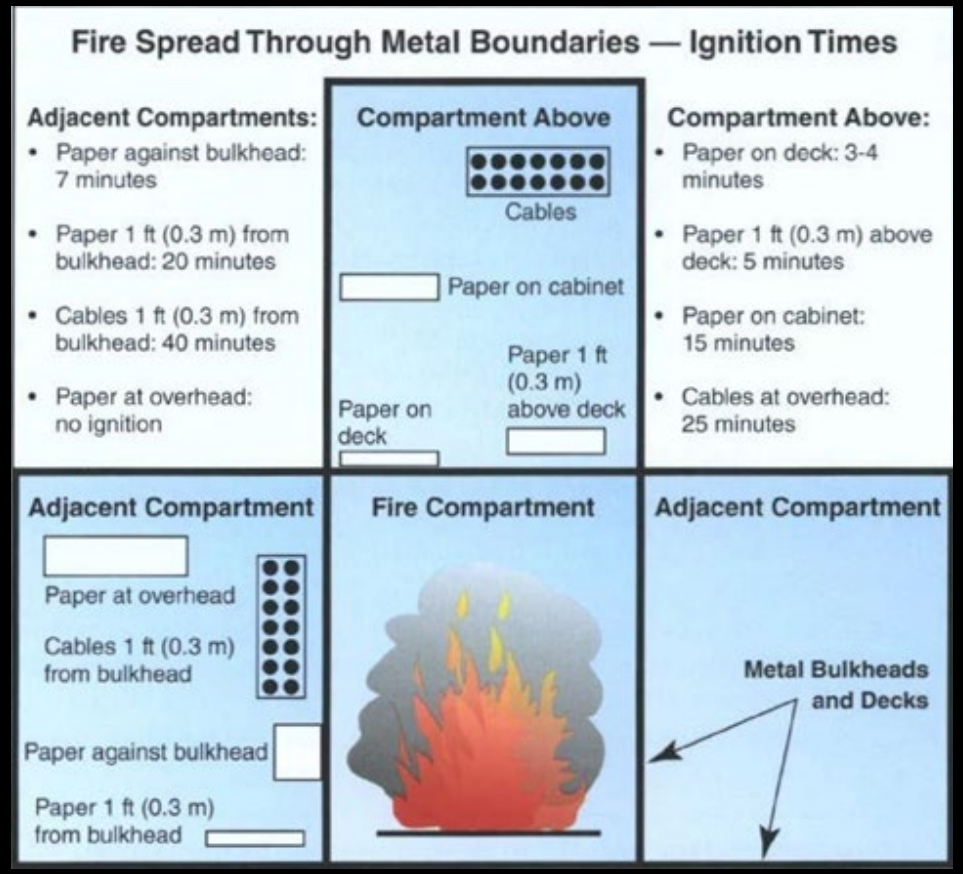
Initial Action Plan

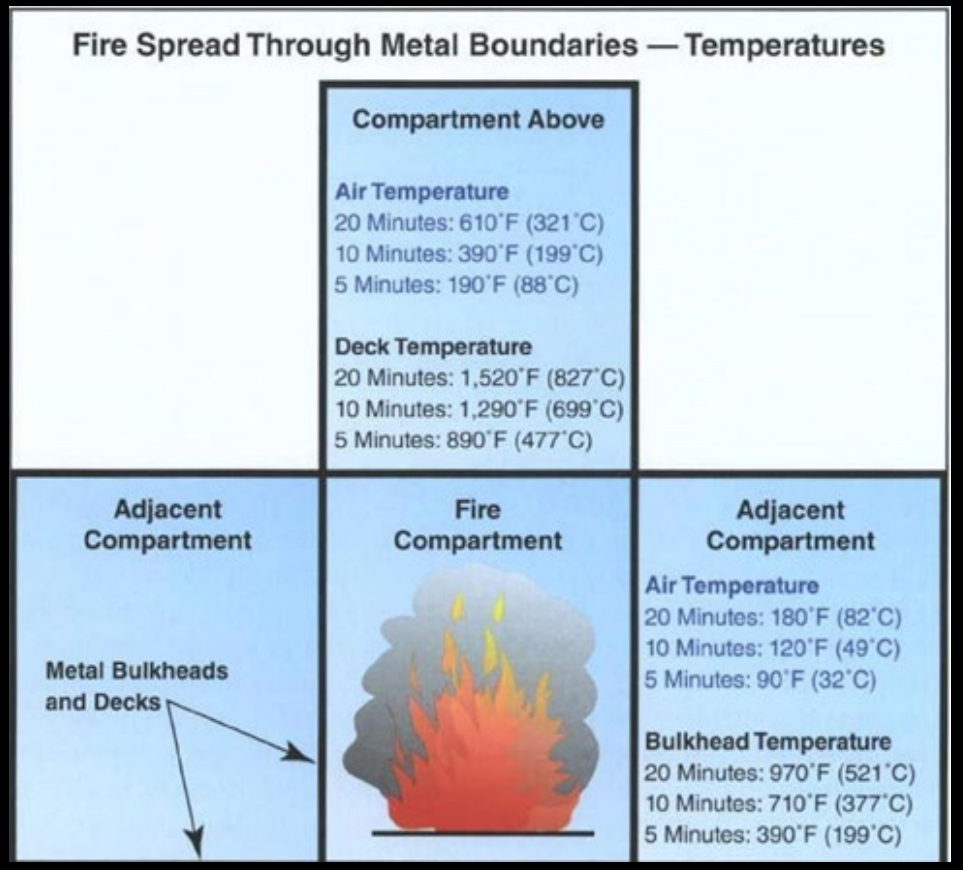
- Offensive versus Defensive Operations
  - Mainly determined by number of available firefighters and necessity to immediately combat the fire due to life safety concerns
  - This decision should be made by the Unified Command that should be assembling by this time using the following decision making tree:

SHIP FIRE DECISION TREE



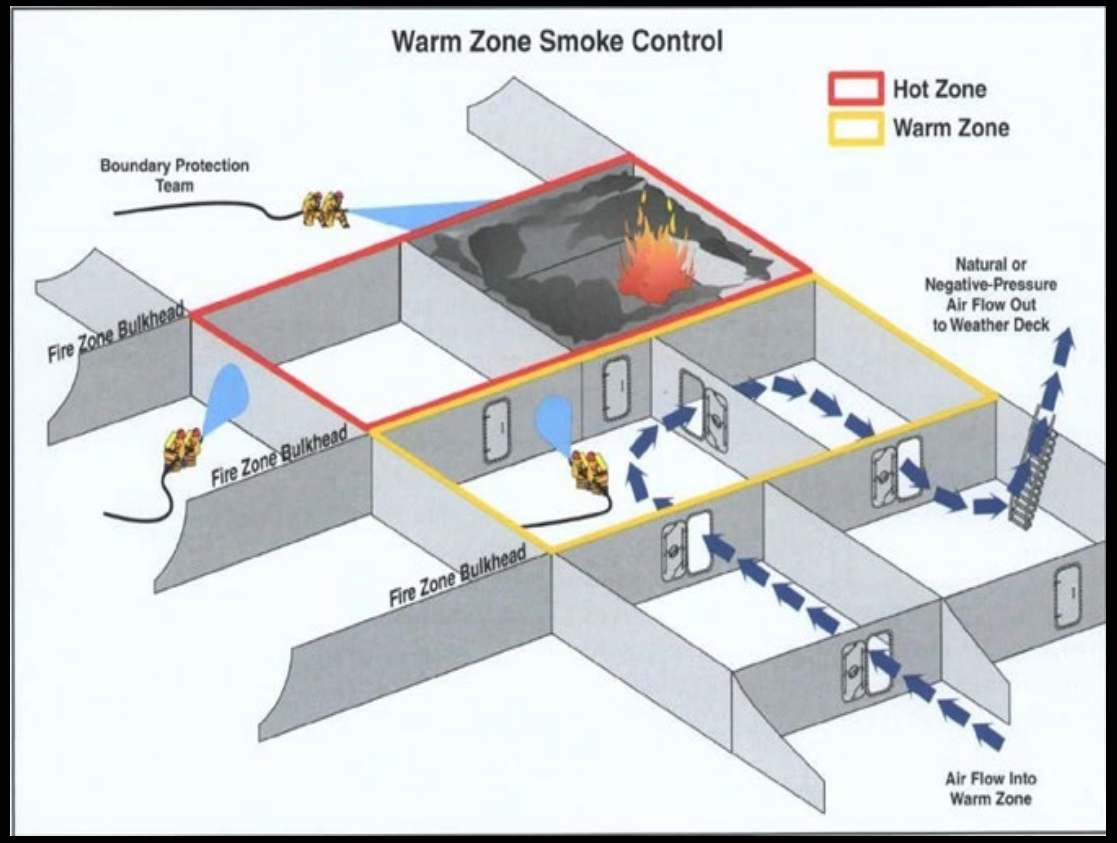
Exposure and Containment Considerations



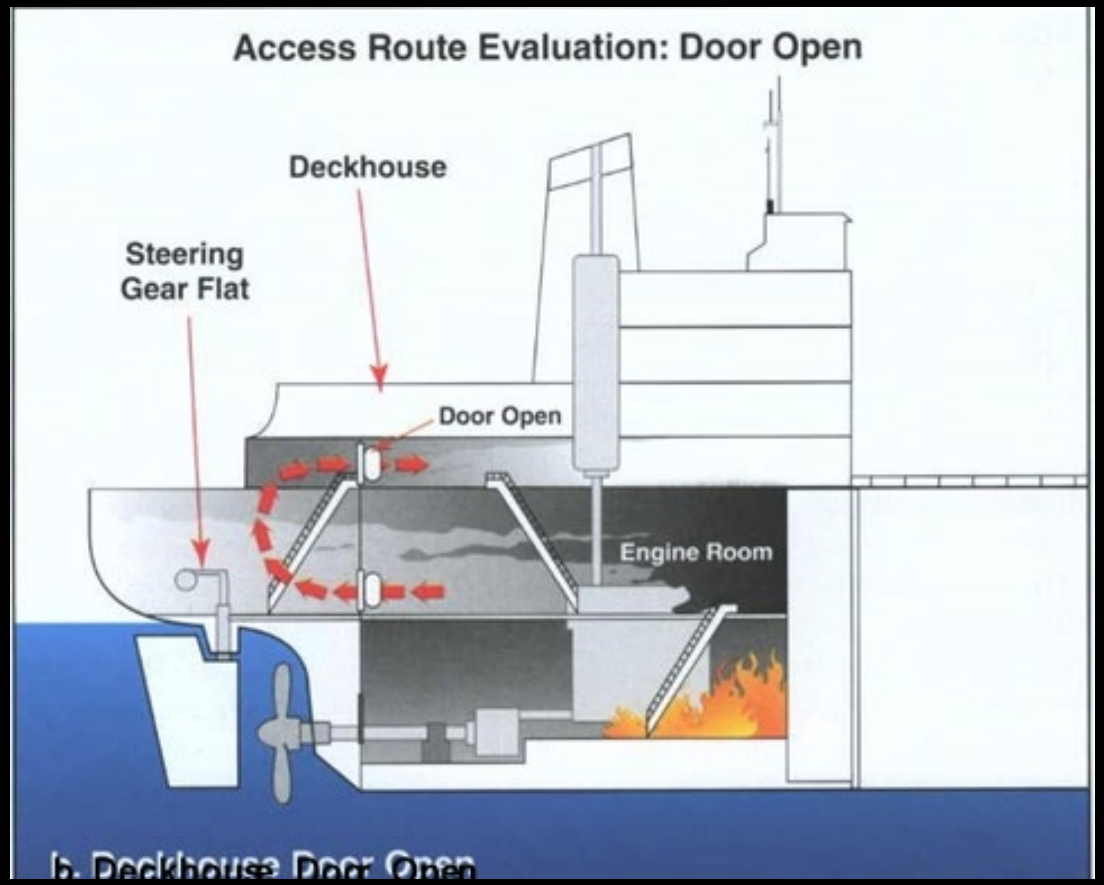


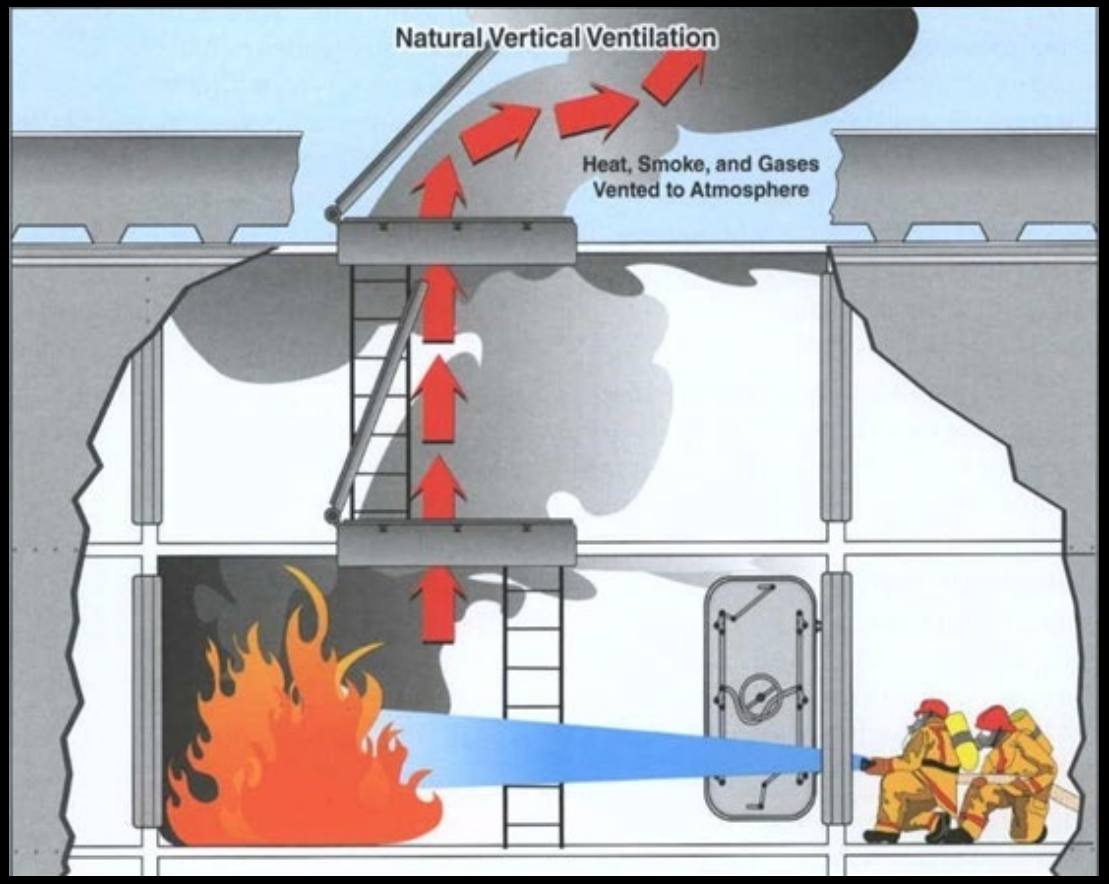
Exposures and Containment

- Fire Boundary Cooling
  - Six-sided box
  - If number of firefighters does not allow for that many hose teams, priority boundaries should be determined by unified command based on what is exposed to the fire
  - Long-term, air and manpower intensive operation



Ventilation Considerations





Extinguishment

- Direct Attack Method
  - Use of multiple hose lines to enter effected spaces
  - Usually unrealistic in vessel fires due to extreme heat
- Indirect Attack Methods
  - Use of the ship's fixed fire suppression systems
  - Long-term oxygen exclusion through sealed fire zones
  - While preferred, these methods can last several days and may require re-charging of fixed suppression systems

Gangway Officer

- Responsibilities:
  - This officer keeps track of all personnel getting on or off of the effected vessel
  - Locates and marks safest route to the staging area (as necessary)
  - Ensures safety of primary escape routes for all personnel on the vessel

Staging Officer

- Responsibilities:
- **Staging is normally located 1 Fire Zone away or Two decks below**
- **Staging can be located off the vessel (Example: small vessels)**
- **Maintains personnel, equipment and supplies**
- **Establishes a medical treatment / rehabilitation area**
- **Staging request necessary staffing, supplies and equipment directly from Logistics/Base**

Practical Exercises

- Table Top Exercises
  - Using several different vessel fire plans, identity the key components for a successful shipboard fire operation.

Questions?

Marina Fire S.O.G.

Fire Refresher 2019

S.O.G.
(Standard Operating Guideline)

- Used by all fire departments in San Diego County
- Already in use by HPD in law enforcement operations, just not in a written form:

  For example, how we handle 459 alarms or hot stops.

S.O.G.

- What is an SOG?
  - While every fire is different, there are certain tasks and actions that must be accomplished at EVERY fire within a classification.
  - An SOG identifies those constant tasks and recommends the best and safest ways to accomplish them.
  - With those tasks identified and spelled out how to accomplish them, officers can begin to train to those tasks on a repetitive basis, building muscle memory and removing the mystery and guess work of fire operations.

Marina Fire S.O.G.

- Written in conjunction with Member City Fire Depts.
- Designed specifically for a complete Firestorm fleet.
- Identifies the tasks for each arriving vessel in order, as well as supervisory ranks.

Prior to Arrival

- Provide dispatch an ETA.
- Switch boat radio to land-side fire's radio channel.
- Using the Slip and Pier book, identify the best access and ideal place to tie up.
- Prep the vessel for fire fighting operations (turn on fire breaker, bring equipment up from v-birth, attach 2.5" supply line or attack line to the wye gate, open valve for fixed air system, etc)

Marina S.O.G. Review

- First Arriving Vessel
  - Evaluate for Rescue
  - If no rescue needed, tie up the vessel between land and the fire, upwind if possible.
  - Position vessel as close to the fire as safely possible.
  - Deploy supply and / or attack lines as needed based on position

- Second Arriving Vessel
  - If first vessel not performing water supply function, assume that role.
  - Otherwise, tie up the vessel between the fire and end of the pier.
  - Ensure there are no persons trapped on the pier by the fire; evacuate as needed.
  - If no evacuation is needed, deploy supply and / or attack lines as needed to cover exposures; ensure to coordinate with Incident Command.

Marina S.O.G. Review

- Third Arriving Vessel
  - Before leaving SIS, pick up extra SCBA tanks located in equipment room.
  - Contact Incident Command for assignment; be prepared for possible dewatering or monitor operations.

- Monitor Use
  - Should not necessarily be used as the primary knock down tools unless directed by I.C.
  - Use of the monitors on occupied docks is a ***very*** dangerous operation and requires stringent safety rules, especially if the vessel is underway while monitors are in operation.
  - Full accountability of all personnel on scene that they are clear of the potential monitor streams shall be verified before monitors are employed.

Hose Deployment Review

- Vessel Positioning and Hose Deployment
  - Once vessel is tied down, operator and crewman should quickly confer on which hose line (Pre-Connect vs HRP) should be pulled.
  - If located 1-3 slips from the fire, the Pre-Connect 1.75” attack line should be pulled to get water immediately to the fire.
  - If 3 or more slips away from the fire, deploy and charge the 2.5” supply line with the wye gate first, then hand carry and charge a high rise pack from the wye gate.
  - In all cases, the initial hose deployment should be accomplished with a minimum of two personnel to prevent ‘catching’ of the line.

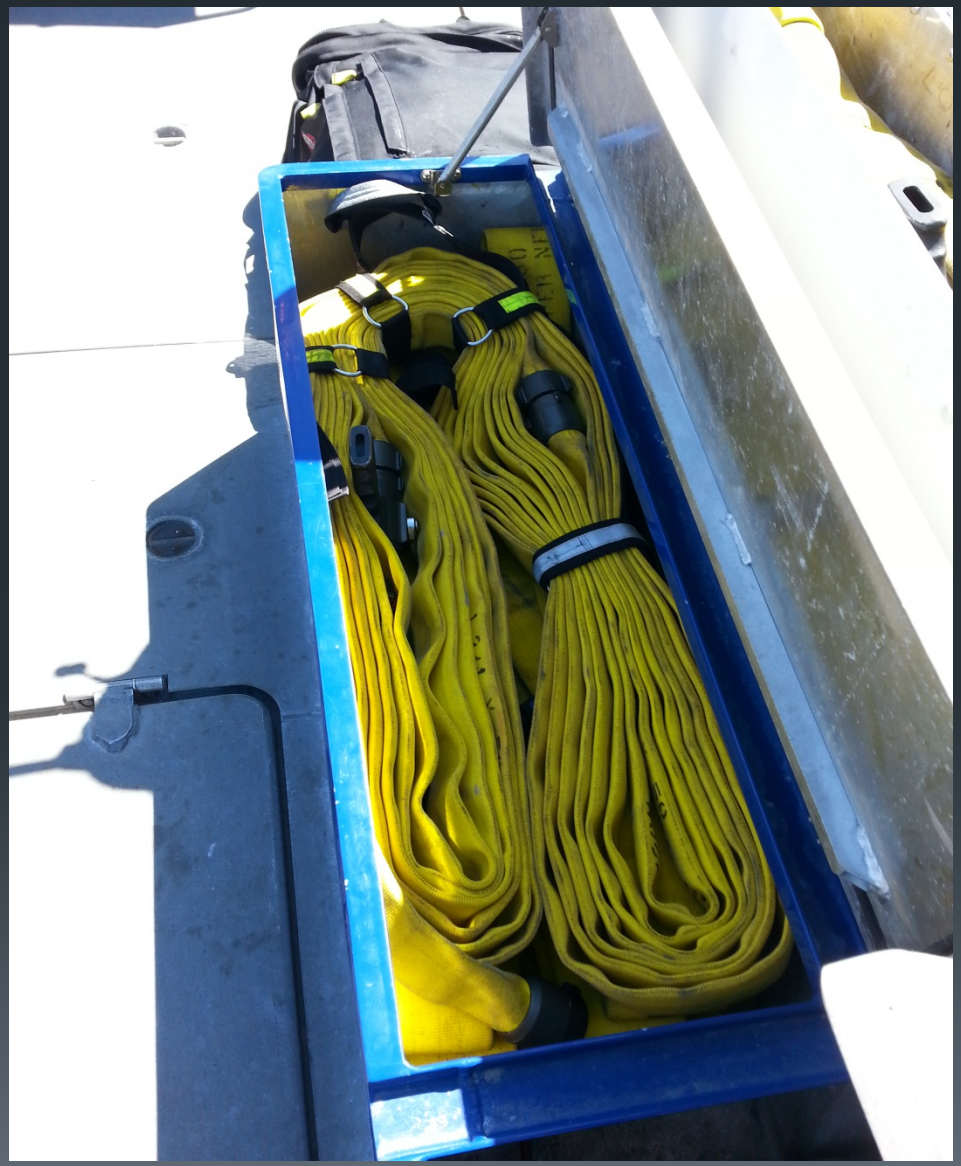
Hose Deployment



Attack Line



Hose Deployment



Hose Deployment



Supply Line



Hose Deployment



Hose Deployment



Hose Deployment



Questions?

Reference Sheet

San Diego Harbor Police Department
SOP 428: Immigration Violations

Officers SHALL NOT:

- Question regarding immigration status for immigration enforcement purposes
- Detain for civil immigration violations or warrants
- Make or participate in arrests for civil immigration violations or warrants
- Detain for criminal immigration violations aside from 1326(a)
- Use immigration authorities as interpreters for law enforcement matters relating to individuals in custody

Officers SHALL:

- Determine if a U Visa or T Visa is necessary for your case
    - If YES: Forward request to Investigations Lieutenant for Follow-Up

Officers MAY:

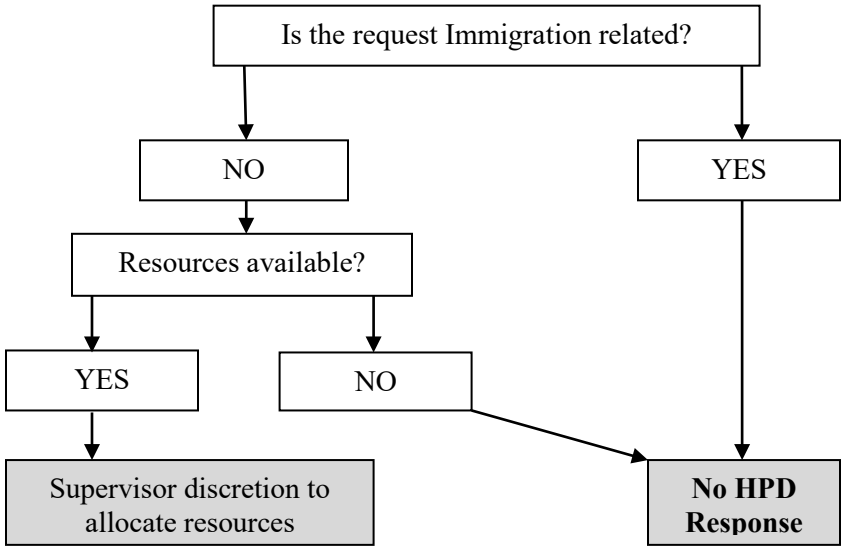
- Investigate, enforce, detain or arrest for violations of 8 U.S.C. § 1326(a) if:
    - Violation was detected during **unrelated** L.E. activity
    - Prior removal was for aggravated felony conviction under 8 U.S.C. § 1326(b)(2) "Enhancement"
    - Supervisor notified and provides approval

**** MUST** contact Federal Immigration officials to verify whether the United States Attorney General has granted the individual permission for reentry and whether the violation is subject to enhancement

Supervisor Responsibilities:

428.5 FEDERAL REQUESTS FOR ASSISTANCE

- FlowChart:



428.6 DETENTIONS

Supervisor respond to the scene of any detention related to an 8 U.S.C. § 1326(a) violation.

Determine the following:

- Was the detention was for reasons unrelated to 1326(a).
- Was contact made with federal immigration officials to:
  - Verify if the United States Attorney General has granted the individual permission for reentry
  - Verify whether the violation is subject to enhancement
- Verify that the detention was not prolonged due only to unresolved questions about the individual's immigration status

If an arrest for an 8 U.S.C. § 1326(a) violation is intended:

- Ensure transfer requirements are satisfied (SEE 428.7.5)
- Determine whether it is appropriate to:
  1. Transfer the person to federal authorities (or)
  2. Transfer the person to jail

428.7 INFORMATION SHARING

- Permitted for authorized ICE Inquiries
    - i.e., 10-29 information
- Prohibited from sharing "personal information" other than public record
    - Personal information = anything beyond that which is necessary for a 10-29

428.7.1 IMMIGRATION DETAINERS (Primarily Jail Related)

DO NOT hold an individual based solely on a federal immigration detainer

**Consult full policy before taking any action

If the person is the subject of a notification request, notification may be made prior to release from custody if the subject fits one or more of the following:

- Judicial probable cause determination for a serious or violent felony (see PC 667.5(c) or 1192.7(c))
- Judicial probable cause determination for a felony punishable by time in a state penitentiary
- Prior conviction for offense listed in Government Code§7282.5(a).
- Current registrant on the California Sex and Arson Registry
- Outstanding federal felony arrest warrant
- The information is available to the public

428.7.2 NOTICE TO INDIVIDUALS (If transferring to ICE)

- Give subject a copy of documentation received from ICE regarding a hold, notification or transfer request along with information as to whether we intend to comply with the request
- If we provide ICE with notification that an individual is being, or will be, released on a certain date, the same notification shall be provided in writing to the individual and to his/her attorney or to one additional person who the individual may designate

428.7.3 ICE INTERVIEWS

Before any interview regarding civil immigration violations takes place between ICE personnel and an individual in HPD custody:

- HPD SHALL provide the individual with a written consent form that explains the purpose of the interview, that the interview is voluntary and that he/she may decline to be interviewed or may choose to be interviewed only with his/her attorney present

(Treat this like we do TSA civil investigations; once our business is done and the person released, ICE can proceed per their policies.)

428.7.5 TRANSFERS TO IMMIGRATION AUTHORITIES

DO NOT transfer an individual to immigration authorities unless one or more of the following applies; then you MAY transfer custody to immigration authorities:

- Authorized by a judicial warrant or judicial probable cause determination.
- Conviction within the past 15 years of a felony listed in Government Code § 7282.5(a)(3), or within the past five years of a crime punishable as either a felony or a misdemeanor (wobbler) listed in Government Code § 7282.5(a)(3).
- Current registrant on the California Sex and Arson Registry.
- Outstanding federal felony arrest warrant.
- The individual has been convicted at any time of a felony that is presently punishable by imprisonment in state prison.
- The individual has been convicted of certain specified aggravated felonies identified in section 101(a)(43)(A)-(P) of the federal Immigration and Nationality Act (8 U.S.C. § 1101(a)(43)(A)-(P)).

Transfer is NOT authorized if:

- Conviction for straight misdemeanor
- Misdemeanor convictions for crimes affected by Proposition 47

428.10 U VISA AND T VISA NONIMMIGRANT STATUS

If you have a victim or witness who is unlawfully in the country, you may be able to seek protection from deportation proceedings.

U visa = Victims and witnesses of certain qualifying crimes (8 USC§ 1101(a)(15)(U)).

T visa = Qualifying victims of human trafficking (8 USC § 1101(a)(15)(T)).

- Request for assistance in applying for U visa or T visa status forwarded in a timely manner to the Investigations and Intelligence Section Lieutenant
- Complete the process and the documents needed for indicating the individual is a victim for the T visa application within 15 business days of the first encounter with the victim, regardless of whether it is requested by the victim (Penal Code § 236.5).
- Complete the process and the documents needed certifying victim cooperation for a U visa or T visa application within 90 days of a request from the victim or victim's family. If the victim is in removal proceedings, the certification shall be processed within 14 days of the request.

DEFINITIONS:

8 U.S.C. § 1326(a): Section outlining when any alien who has been denied admission, excluded, deported, or removed or has departed the United States while an order of exclusion, deportation, or removal is outstanding, and thereafter enters, attempts to enter, or is at any time found in, the United States-

Unless (A) prior to their re-embarkation at a place outside the United States or his application for admission from foreign contiguous territory, the Attorney General has expressly consented to such alien's reapplying for admission; or (B) with respect to an alien previously denied admission and removed, unless such alien shall establish that he was not required to obtain such advance consent under this chapter or any prior Act. Shall be fined under title 18, or imprisoned not more than 2 years, or both.

Civil Immigration Violations: Typically related to overstaying a work or travel Visa.

Detainers: A detainer serves to advise another law enforcement agency that immigration authorities seek custody of an alien presently in the custody of that agency, for the purpose of arresting and removing the alien. The detainer is a request that such agency advise immigration authorities, prior to release of the alien, in order to arrange to assume custody, in situations when gaining immediate physical custody is either impracticable or impossible

Hold request: A federal Immigration and Customs Enforcement (ICE) request that a local law enforcement agency maintain custody of an individual currently in its custody beyond the time he or she would otherwise be eligible for release in order to facilitate transfer to ICE.

Notification request: An Immigration and Customs Enforcement request that a local law enforcement agency inform ICE of the release date and time in advance of the public of an individual in its custody.

Transfer request: An Immigration and Customs Enforcement request that a local law enforcement agency facilitate the transfer of an individual in its custody to ICE.

PORT of SAN DIEGO

Immigration Violations

Standard Operating Procedure 428

Port of San Diego HARBOR POLICE

Immigration Violations: SOP 428

Purpose

To become familiar with updated Harbor Police SOP 428. This procedure serves to establish expectations, provide guidelines, and guide performance relating to immigration and interacting with federal immigration officials.

Objective

To gain an essential understanding of SOP 428, immigration violations, and interactions with federal immigration officials.

Immigration Violations: SOP 428



Overview

- General Purpose
- California Values Act
- Civil Immigration Violations
- Criminal Immigration Violations
- Interactions with Federal Officers
- U and T Visa Requirements
- Supervisor Responsibilities
- Frequently Asked Questions

Immigration Violations: SOP 428

General Purpose

- To make personal and professional commitments to equal enforcement of the law and equal service to the public

- To recognize the dignity of all persons, regardless of their national origin or immigration status

- To encourage crime reporting and cooperation in the investigation of criminal activity for all individuals, regardless of immigration status

- To comply with the California Values Act



Immigration Violations: SOP 428

The California Values Act (Govt Code §7284)

Defines the factors under which LE agencies engage in immigration enforcement-related activities

- Immigrants are valuable and essential members of the California community
- A relationship of trust between California's immigrant community and law enforcement is essential for public safety
- Trust and cooperation are critical to the success of the Harbor Police mission



***We don't want people to fear cooperating with us because of their immigration status**

Immigration Violations: SOP 428

Civil Immigration Violations

Civil Immigration Violations typically involve matters such as overstaying a work or travel Visa

- Currently, there are very few violations being handled as civil violations



Immigration Violations: SOP 428

Civil Immigration Violations



Officers shall NOT:

- Inquire into an individual's immigration status for immigration enforcement purposes
- Detain anyone, for any amount of time, for a civil violation of immigration laws
- Take any action regarding civil immigration violations/warrants

Immigration Violations: SOP 428

Criminal Immigration Violations

- Unlawful entry is a misdemeanor (usually not committed in our presence)
- Unlawful re-entry can be a misdemeanor or felony, depending on the original reason for removal
    - I.E. If removed following a conviction for an aggravated felony, a subsequent re-entry may elevate it to a felony



Immigration Violations: SOP 428

Criminal Immigration Violations

Harbor Police officers do NOT enforce criminal violations of Immigration Law.

Exceptions [under 8 U.S.C. § 1326(a)]:

- Discovered during separate, lawful detention
- Prior removal was for aggravated felony conviction [under 8 U.S.C. § 1326(b)(2)]
- Shall NOT be detained due to questions of immigration status

* A *Significant* burden of proof is necessary



Immigration Violations: SOP 428

In-Custody Subjects

Persons in lawful custody for non-immigration violations:

- Shall notify the person if a hold or notification request was received from ICE and shall inform them if HPD intends to comply with the request
- If an in-custody ICE interview of the subject is granted, HPD shall:



- Inform the person that the interview is voluntary
- Provide a written consent form explaining the purpose
- HPD must then hold at least 1 community meeting the following year

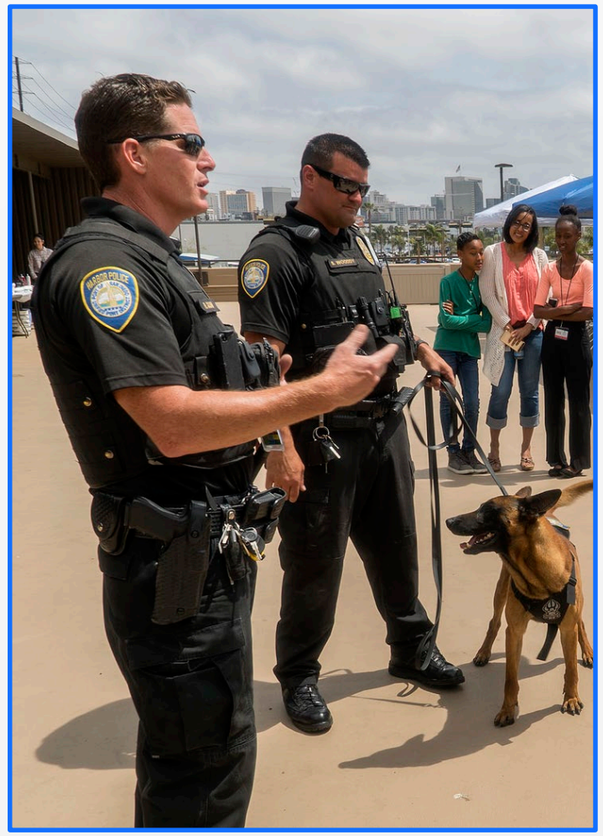
Immigration Violations: SOP 428

Interactions with Federal Officers

Requests for assistance:

- Not required to respond to notification or transfer requests
- Requests for other assistance at supervisor discretion
  - Supervisor considerations:
    - The assistance is not immigration related
    - We have the appropriate resources available

- May respond to officer safety related requests for cover (10-88, 11-99)



Immigration Violations: SOP 428

Interactions with Federal Officers (cont'd)



Officers MAY:

- Share information for the purposes of a records check

Officers SHALL NOT:

- Provide personal information to Federal Officer
- Hold based solely on an immigration detainer
- Transfer someone to ICE custody unless specific circumstances exist (*Significant burden of proof is necessary)
- Use immigration authorities as interpreters for law enforcement matters relating to individuals in custody

Immigration Violations: SOP 428

U and T Visa Non-Immigrant Status



U Visa:

- Temporary immigration benefits to victims and witnesses of certain qualifying crimes

T Visa:

- Available for certain qualifying victims of human trafficking

Any request for assistance in applying for U visa or T visa status should be forwarded to the Investigations and Intelligence Section Lieutenant for follow-up

Immigration Violations: SOP 428

Supervisor Responsibilities

Evaluate requests for assistance:

✓ The assistance is not immigration related

✓ We have appropriate resources available

Respond to any detention/arrest for 8 U.S.C. § 1326(a):

✓ Must verify all qualifications have been met

✓ Determine appropriate disposition

- Transfer to ICE
- Transfer to Jail



Immigration Violations: SOP 428

Frequently Asked Questions

1. Can I ask someone if they're unlawfully in the country?
No, unless for U or T Visa inquiries.

2. What can I do if I have a victim or witness who is unlawfully in the country, and I don't want them deported before my case is adjudicated?
Determine if U or T Visa is applicable. If yes, contact Investigations Lieutenant

3. What do I do if ICE calls and asks for our assistance?
You are not required to respond. Direct request to a Supervisor.

Immigration Violations: SOP 428

Frequently Asked Questions

4. Can I detain someone for being in the country unlawfully?
No.

5. Can I arrest someone for being in the country unlawfully?
Only for 8 U.S.C. § 1326(a), *but* a significant burden of proof is required.

6. If I find out a person is unlawfully in the country, can I tell ICE where to find them?
No.

7. If I book someone for a state charge who is unlawfully in the country, can I have ICE meet them when they're released?
No.

Immigration Violations: SOP 428

Frequently Asked Questions

8. What if ICE wants to interview someone in my custody?
Must provide consent form and inform the subject that it is voluntary.

9. If I'm legally detaining someone who is unlawfully in the country, can I have ICE come pick them up?
Generally no, unless multiple specified requirements are satisfied.

10. Are there any other restrictions I should be aware of?
The Harbor Police Department shall not use immigration authorities as interpreters for law enforcement matters relating to individuals in custody.


Questions?
PORT of SAN DIEGO
Public Safety
Port of San Diego
HARBOR POLICE

SAN DIEGO HARBOR POLICE DEPARTMENT
MICRO TRANSPORTATION OPERATIONS
AIRPORT OPERATIONS

COURSE GOAL:

The course will provide each student with the minimum topics of micro transportation operations at the San Diego International Airport. The micro transportation vehicles used are a three-wheeled electric powered vehicle manufactured by Trikke Tech Inc. The topics include: General Operating Principles, Policy Aspects, Defensive Operation Techniques, and Maneuvering Course Exercises.

The course consists of a hands-on/practical micro transportation vehicle operation for in-service officers. This training is presented in a 6-hour format to allow enough time for proper demonstration, practical exercises, and all necessary safety considerations.

MICRO TRANSPORTATION OPERATIONS

COURSE OBJECTIVES:

The student will:

1. Demonstrate knowledge of micro transportation skills and techniques on each of the required three-wheeled vehicles. The micro transportation vehicles used are a three-wheeled electric powered vehicle manufactured by Trikke Tech Inc.

2. Demonstrate a minimum standard of psychomotor skills with every technique and exercise, to include:
    A. General Operating Principles
    B. Relevant Policies
    C. Maneuvering Course Exercises

    Minimum standards of performance shall be tested by an instructor observing the trainee during their performance of each technique and exercise. If the student does not meet minimum standards, as established by the presenter, remediation will be provided until the standard is met, or the student is unable to the minimum standards.

MICRO TRANPORTATION OPERATIONS COURSE OUTLINE

I. INTRODUCTION/ORIENTATION

A. Introduction, Registration and Orientation
B. Course Objectives/Overview/Exercises, Evaluation/Testing
C. Safety Briefing

II. SAFETY AND INSPECTIONS

A. Pre-shift Inspections
    1. Overall Damage Inspection
    2. Tires
        a. Pressure
        b. Wear
        c. Proper installation (Check tightness)
    3. Storage Bags (proper attachment and removal)
    4. Brake Inspection
        a. Pad wear
        b. Brake engagement
        c. Visual inspection of braking system
    5. Ensure all light modes and siren are all in working order
    6. Inspect all lighting for proper function and visibility
    7. Fold/Unfolding the Trikke
    8. Overall Cleanliness

B. Start Up/Shut Down
    1. Battery installation
        a. Locking pin position
        b. Groove alignment
        c. Proper engagement
    2. Key (On/Off)
    3. Display Set up (Use of different operational modes)
    4. Set Brakes
    5. Shut Down
        a. Set Brakes
        b. Fully unlock battery prior to removal
        c. Set kickstand and steady vehicle

C. Operator Safety Equipment
    1. Helmets (Mandatory)
    2. Reflective Vests (Night ramp operation)
    3. Eye Protection (Recommended)
    4. Gloves (Optional)

III. GENERAL OPERATION

A. Body Positioning and Handlebar Adjustment
    1. Knees slightly bent
    2. Lean slightly forward during handlebar adjustment
    3. Standing with weight towards balls of the feet

B. Standing Mount and Dismount
    1. Set rear brakes (minimum)
    2. One foot at a time
    3. Maintain control with both hands

C. Throttle Control
    1. Throttle Grip
        a. Grip handgrip where web of hand is right of throttle
        b. Allow thumb and fingers (forefinger or forefinger/middle combination) to grip throttle
        c. Twist throttle with thumb and fingers only
        d. Do not use “motorcycle grip”

D. Starting/Acceleration
    1. Always have both hands on the handlebars
        a. Operate throttle with thumb and index finger
        b. Place heels of feet against rear stoppers
        c. Make small adjustments to stance to prevent locking out elbows and knees
    2. Mounted/Standing Start
        a. Knees slightly bent
        b. Slightly lean forward while accelerating
        c. Do not lean back or shift center of gravity behind rear wheels
    3. Rolling/Kick Start
        a. Walking start
        b. Push/kick start (one foot push off)
        c. Smooth and slow throttle control

E. Stopping/Braking
    1. Always have both hands on the handlebars
    2. Panic/Emergency Braking
        a. Threshold braking vs Locked wheel braking
        b. Two-wheel braking (Patroller)
        c. Three-wheel braking (Defender)
        d. Rolling friction vs Static friction (skid)
    3. Normal Braking Techniques
        a. Two-wheel even braking (Patroller)
        b. Three-wheel even braking (Defender)

c. Don’t “ride the brakes” Slow carve for prolonged slowing/stopping

F. Turning
    1. Leaning (in) when turning
    2. Look where you want to go, not at the obstacle or down (“Where the eyes go, the hands follow”)
    3. Avoid standing with knees locked regardless of speed
    4. Driving point through a turn (look through turn)
        a. Entry (High)
        b. Apex (Low)
        c. Exit (High)

G. Terminal and Ramp Operations
    1. General Operations
        a. Slowdown in crowds
        b. Make eye contact with pedestrians/drivers
        c. Assume people may not immediately see you
        d. Pedestrian traffic (terminals and sidewalks)
        e. Do not operate at excessive speeds (other airport employees notice and question speed)
        f. Slow before making drastic turning movements
    2. Sidewalks, Terminals, Ramp
        a. Operate with “due regard” of pedestrian traffic
        b. Pedestrian traffic is unpredictable
        c. Operate within the “shadow of the terminal.”
        d. DO NOT OPERATE ON ESCALATORS
    3. General Operations
        a. Slowdown in crowds
        b. Make eye contact with pedestrians/drivers
        c. Assume people may not immediately see you
        d. Pedestrian traffic (terminals and sidewalks)
        e. Do not operate at excessive speeds (other airport employees notice and question speed)
        f. Slow before making drastic turning movements
    4. Ramp Operations
        a. Day ramp operations
            i. NEVER operate in movement area
            ii. Use lights (white driving or red/blue) when traversing around ramp equipment and aircraft for visibility.
            iii. Wear department issued vest for greater visibility.
        b. Night ramp operations
            i. NEVER operate in movement area

ii. Use white driving lights always while traversing around ramp equipment and aircraft for visibility. Red and blue are optional.
iii. Wear department issued vest for greater visibility. (Mandatory)
iv. Always use Defender model Trikke at night.

H. Environmental Considerations
    1. Operator limitations
    2. Vehicle limitations
    3. Weather conditions
    4. Flooring (tile, stone, carpet, wet)
    5. Surface conditions (concrete, asphalt, grass)

I. Higher Speed Operations
    1. Use lights and sirens (not continuous) or verbal commands to alert public while operating at higher speeds.
    2. Operate with “Due Regard” to pedestrian and vehicular traffic.
    3. Avoid higher speed operation when not necessary to avoid complaints

IV. DEFENSIVE OPERATION

A. Defensive Operator
    1. High Visual Horizon
    2. Scans and slows for hazards, pedestrian, etc.
    3. Maintain professional attitude
        a. Avoid being overconfident
        b. Avoid being impatient
        c. Preoccupation/distractions
        d. Speed Discipline

B. Collision Avoidance
    1. Space Cushion
        a. Five second rule
        b. Perception / Reaction time (Speed)
        c. Scanning ahead (10-15 second rule)
    2. Cross Traffic and Roadway Crossing
        a. Clear left, right, then left again
        b. Don’t turn wheels until ready to turn
        c. Maintain high visual horizon/scan for hazards
    3. Normal Operation
        a. Signal (hand)
        b. Look over shoulder (other traffic bicycles, etc.)

c. Use verbal commands to direct pedestrian traffic
d. Use physical gestures to direct/inform public of intent
e. **REMEMBER** People can't hear you approach, alert pedestrians and vehicles with lights, siren, and/or verbal commands

V. HARBOR POLICE POLICY

A. Policy review
    1. Written material

B. California Law (or applicable State Laws)
    1. California Vehicle Code Review
    2. San Diego County Regional Airport Authority Codes Review

VI. MANUEVERING COURSE EXERCISES

A. Collision Avoidance Maneuvers
    1. Instructor(s) will demonstrate proper technique first
    2. Students will perform exercise

B. Negotiating a Crowded Area
    1. Instructor(s) will demonstrate proper technique first
    2. Students will perform exercise demonstrating proper vehicle positioning to avoid rear-wheel cheat during maneuvering through simulated crowd.

C. Steering Course (Slow and higher speed)
    1. Instructor(s) will demonstrate proper technique first
    2. Students will perform exercise with proper steering and speed control.

D. Confined Space Turn (Elevator, sidewalk, etc.)
    1. Instructor(s) will demonstrate proper technique first
    2. Students will perform exercise using proper lane positioning to successfully turn vehicle at designated pivot points.

E. Emergency Stop
    1. Instructor(s) will demonstrate proper technique first
    2. Students will perform exercise using proper techniques.

F. Walking the Trikke (Behind and from handlebars)

1. Instructor(s) will demonstrate proper technique first
2. Students will perform exercise

G. Curbs and Obstacles
    1. Traveling up/down curbs
    2. Trailing arm obstacle negotiation

H. Rolling Dismount/Tactical Dismount
    1. Instructor(s) will demonstrate proper technique first
    2. Students will perform exercise

I. Accelerating/Braking/Backing
    1. Instructor(s) will demonstrate proper technique first
    2. Students will perform exercise

J. Airport/Terminal Ride
    1. Students will follow instructor(s) throughout terminals and AOA negotiating obstacles in a safe manner
    2. Students will demonstrate previous instructed riding techniques as needed and requested by instructor(s)
    3. Students will always operate Trikke Vehicles with “due regard”

Boat Accident Reporting
&
California Statistics



Webster Definition of Accident

- A happening that is not expected, foreseen or intended. An unfortunate occurrence or mishap, sudden fall, collision, etc., Usually resulting in physical injury as in a traffic accident.

USCG Definition of Accident

- A vessel accident means a collision, accident or other casualty involving a vessel as described in 651 (a) H & N.

Definition of Vessel (651 H&N)

- **"Vessel"** includes every description of watercraft used or capable of being used as a means of transportation on water except:

- A seaplane on water
- A watercraft on a permanently fixed course i.e. cable ferry boat
- Water skis, an aquaplane or similar device.

656 (a) H&N Duty of Operator

- It is the duty of the operator of a vessel involved in a collision, accident, or other casualty, so far as the operator can do so without serious danger to his or her own vessel, crew, and passengers, to render to other persons affected by the collision, accident, or other casualty that assistance that is practicable and necessary in order to save them from, or minimize any, danger caused by the collision, accident, or other casualty.

656 (b) H&N Good Samaritan Rule

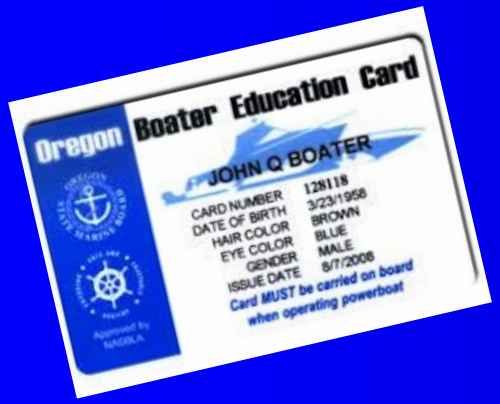
- No person shall be held civilly liable when acting in good faith while rendering assistance.

Why Do We Take Boat Accidents

- Find the cause of the accident
- Determine who was responsible and liable for the accident
- For insurance purposes
- Statistics
- Accident data
- Manufacture defects
- Law Revisions.

VESSEL OPERATOR CARD PROGRAM

Senate Bill 941 was signed by Governor Brown on September 18, 2014, requiring power boat operators to take a boating safety course and pass an exam in order to receive a Vessel Operator Card.



January 1, 2018 –20 years or younger
January 1, 2019 –25 years or younger
January 1, 2020 –35 years or younger
January 1, 2021 –40 years or younger
January 1, 2022 –45 years or younger
January 1, 2023 –50 years or younger
January 1, 2024 –60 years or younger
After January 1, 2025 – All Regardless of Age

Beginning in 2018, the California State Parks Division of Boating and Waterways will implement the new Vessel Operator Card Program.

Accident Data

DRIVES THE SYSTEM

- Enforcement – efforts should be concentrated in high traffic areas involving high accident rates or violations of law.
- Regulations- Target specific issues
- Information – Posters, signs & general info
- Engineering – Standards and Regulations
- Education – Boating education material.

Are Statistics Valid?

- Only 5-10% of non-fatal accidents are reported

- Why are accidents not reported?
- Unaware of reporting criteria
- Avoid insurance claims
- Ignorance of the law
- BUI laws
- Avoid prosecution.

USCG STATS

- The data collected helps the Coast Guard identify boat defects and boater behaviors that cause injuries and take lives.

- The more accurate and complete the accident report, the better job that federal, state and territorial agencies can do to make boating a safe recreational activity.

USCG STATS

- In 2015, the Coast Guard counted 4,158 accidents that involved 626 deaths, 2,613 injuries and approximately $42 million dollars of damage to property. All recreational boating accidents.

- Compared to 2014, the number of accidents increased 2.3%, the number of deaths increased 2.6%, and the number of injuries decreased 2.4%.

- Where cause of death was known, 76% of fatal boating accident victims drowned. Of those drowning victims, 85% were not wearing a life jacket.

USCG STATS

- 71% of deaths occurred on boats where the operator did not receive boating safety instruction.
- Eight out of every ten boaters who drowned were using vessels less than 21 feet in length.
- Operator inattention, operator inexperience, improper lookout, machinery failure, and excessive speed rank as the top five primary contributing factors in accidents.
- Alcohol use is the leading known contributing factor in fatal boating accidents. Its listed as the leading factor in 17% of deaths.

USCG STATS

- Twenty-two children under age thirteen lost their lives while boating in 2015. Twelve children died from drowning. Two children of those who drowned were wearing a life jacket; half of the remaining ten children who were not wearing a life jacket were not required to do so under State law.

- Where data was known, the most common types of vessels involved in reported accidents were open motorboats (45%), personal watercraft (19%), and cabin motorboats (17%).

- Where data was known, the vessel types with the highest percentage of deaths were open motorboats (46%), kayaks (12%), and canoes (11%).

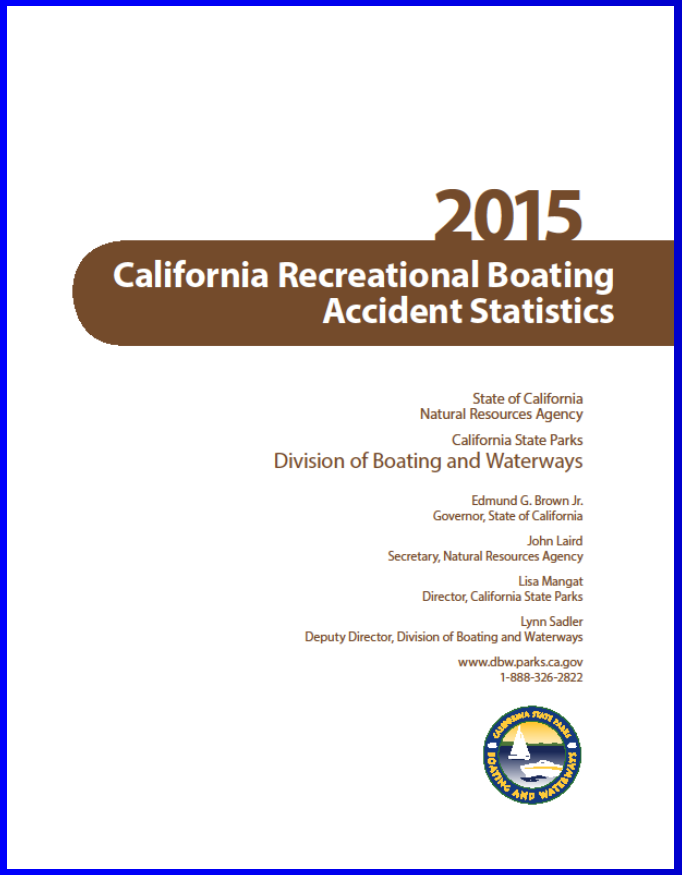
TOP 5 STATES-REGISTERED VESSELS

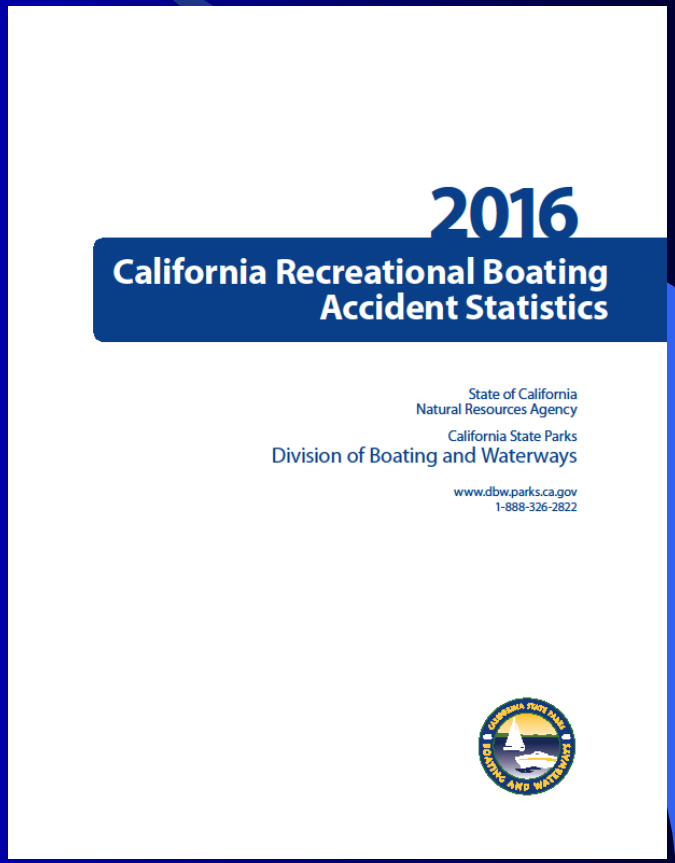
- Florida 899,895
- **California 855,243**
- Minnesota 808,783
- Michigan 803,391
- Wisconsin 628,743

CA Registered Vessels

- 12,173,395 registered vessels in US
- 855,243 vessels registered in CA
- 155,855 PWC's registered in CA

STATE OF CALIFORNIA 2015





Vessel Accident Reporting



EPO

Enabling Performance Objectives:

1. Define what a boating accident is
2. Identify the most common causes of vessel accidents
3. Properly prepare a Summary Cause vessel accident report

BOATING ACCIDENT DEFINED

- A collision, accident or other casualty involving a vessel as defined in section 651 of the Harbors and Navigation Code. A vessel is considered to be involved in a boating accident whenever the occurrence results in:
- 1. Damage by or to the vessel or its equipment
- 2. An injury or loss of life to any person
- 3. The disappearance of any person aboard under circumstances that indicate the possibility of death or injury.

REPORTING REQUIREMENTS (CA)

- 656 H&N – *a peace officer shall immediately, by the quickest means available, forward reports of a death or disappearance to Department of Boating and Waterways.*

- Minor Injury vs. Serious Injury (*Complaint of pain or hospitalization*)
- Hit and Run

- Total property damage exceeds $500 or complete loss of vessel
- Minor $500 < Major $500 >

Public boaters must also submit report to DBW
(Online – ABC Booklet)

DEPARTMENT OF BOATING AND WATERWAYS RESPONSIBILITIES (CA)

What happens to the reports we take?



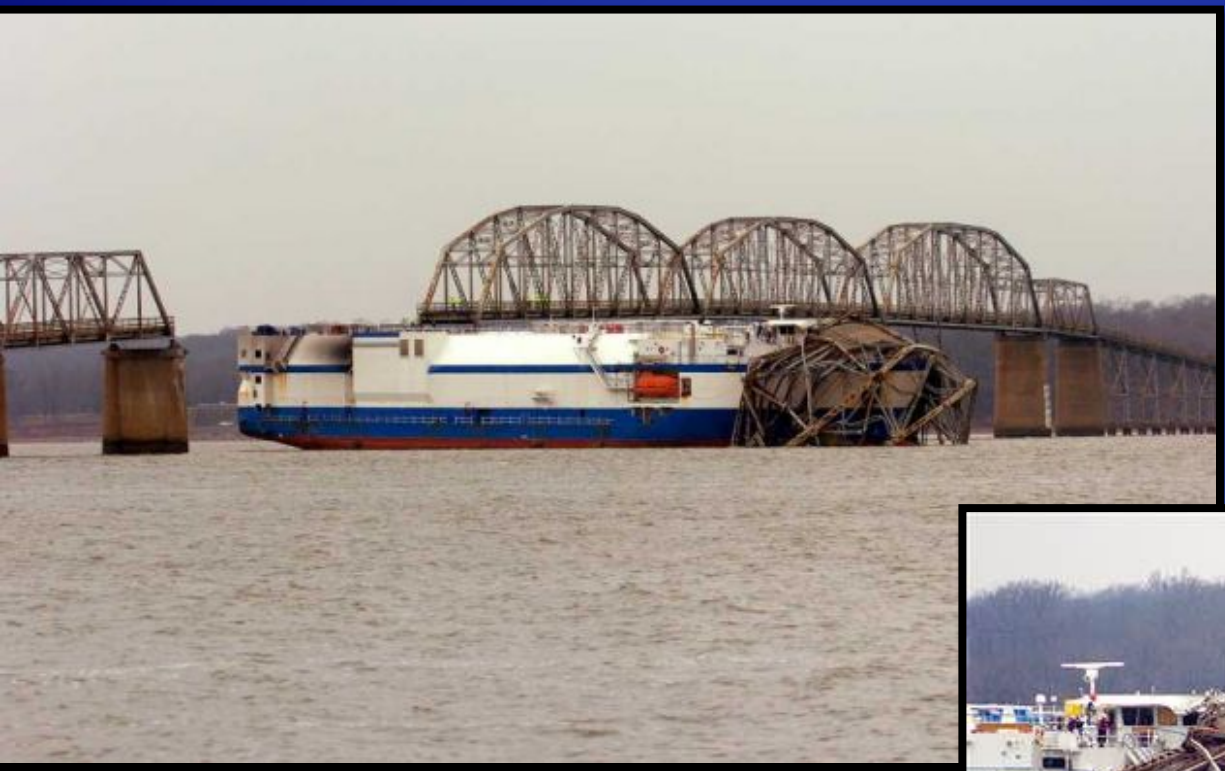








WHAT IS A REPORTABLE BOATING ACCIDENT?





EXAMPLES OF VESSEL ACCIDENTS TYPES:

- Flooding / Swamping
- Grounding
- Skier Mishap
- Falls Overboard
- Ejected from a Vessel
- Collision with a fixed object
- Fire / Explosion / Person Burned
- Electrocution
- Slips and Falls
- Sailing Craft Rigging Failure

REPORTABLE ACCIDENT

- A fire, explosion, sinking, or other occurrence involving a vessel, if its installed or associated equipment or appendages failed, malfunctioned, or otherwise caused or contributed to the accident or casualty. (Vessel could be docked, moored or anchored)



REPORTABLE ACCIDENT

- A person is burned, otherwise injured, or dies from exposure or immersion that is the result of an accident involving the vessel where its equipment or appendages contributed to the accident or casualty



REPORTABLE ACCIDENT

- A person dies, is injured, or vessel / property damage results from any occurrence or incident that was caused by careless or improper use of the vessel.







NON-REPORTABLE ACCIDENTS

- A person dies or is injured from self inflicted wounds, alcohol poisoning, ingestion of drugs, controlled substances or poison; or from gun shot wounds

VIDEO OF FLARE GUN!!!

- A person dies or is injured from assault by another person or persons while aboard a vessel
- A person dies or is injured from natural causes while aboard a vessel

NON-REPORTABLE ACCIDENTS

- A person dies or is injured while swimming for pleasure from a **vessel** that **IS NOT underway** the vessel is anchored, moored or docked).

- A person dies or is injured in swimming to retrieve an object or a vessel that is adrift from its mooring or dock, **having departed from the shore or pier**

NON-REPORTABLE

- Damage, injury or death results from a fire on shore or a pier that spreads to a vessel or vessels
- A person dies or is injured or property damage results from an ice boat accident. An ice boat is not considered to be a vessel



- A person drowns or is injured while surfing. (A surfboard is not a vessel)

NON-REPORTABLE

- Damage, injury or death on a docked or moored vessel resulting from storms, unusual tidal, sea or swell conditions: or when a vessel gets underway in those conditions in an attempt to rescue persons put in peril





- Damage to a docked or moored vessel due to theft or any vandalism

NON-REPORTABLE

- Deaths, injury or damage on a docked, moored or anchored non-propelled houseboat or other vessel used primarily as a permanent residence





- A person dies or is injured while using underwater breathing apparatus (i.e. snorkeling or scuba diving and the **vessel did not** contribute to the casualty





NON-REPORTABLE

Racing Vessels

Small sailing vessels






Reportable?

MAIN CATEGORIES OF BOATING ACCIDENTS:



- Accidents (around or on vessel)
- Collisions
- Capsizing/swamping
- Fires/explosions









VEHICLE VS. VESSEL











INVESTIGATION

The investigation begins with the Emergency Response

- Location
- Vessel description (s)
- Injuries
- Type of accident



- Arrival; Care for the injured and avoid any further injury or damage

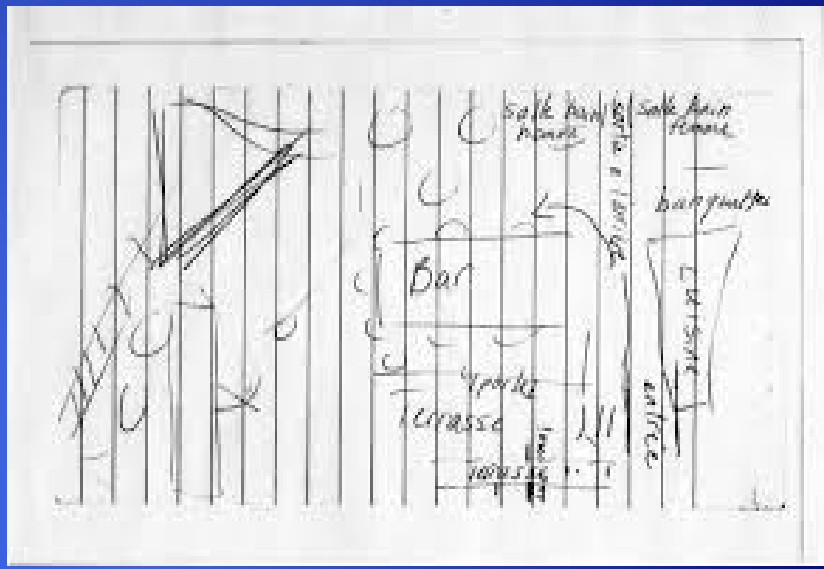
ARRIVAL ON SCENE FOR A COLLISION

- Stabilize the scene
- Fact finding
- Make a sketch of the scene
- Examine thoroughly
- Photograph evidence
- Mark location (float / MOB)













WITNESS STATEMENTS

- Gather as many statements as possible
- Do not let them leave scene without providing statements (if possible)

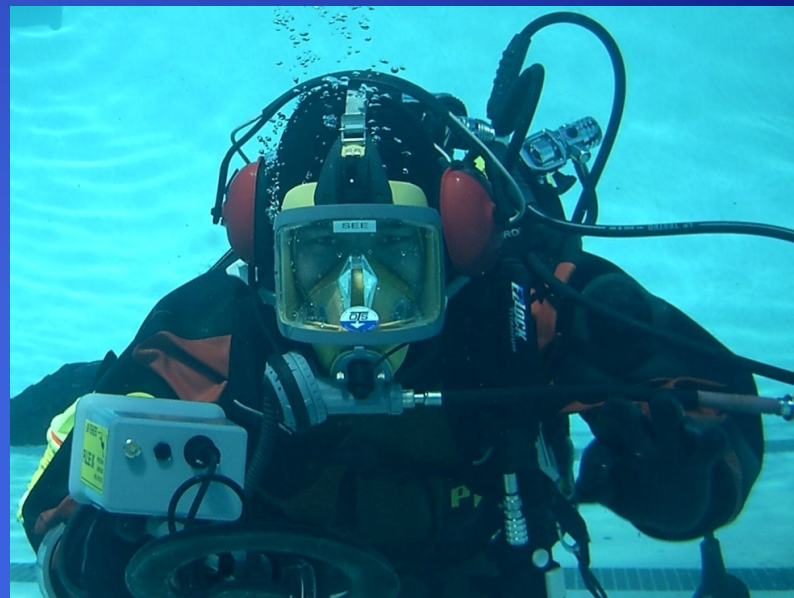
TOOLS OF THE TRADE



- Binoculars
- Buoys to mark sunken objects
- Scuba gear
- Grappling hooks (dragging gear)
- Lifesaving equipment
- Navigational charts
- GPS
- Photographic equipment
- Range finder
- Video equipment
- Protractor
- Tape measure
- String line
- Line level
- Mirror
- Evidence tags-n-bags
- Multimeter
- Misc. Tools







TWO TYPES OF REPORTS:

- **Simple Narrative**
  - Generally Property Damage Only Accidents (under $500)
  - No Injuries (Beyond first-aid = band aid)
  - No prosecution desired
    - Simple Narrative consisting of 2-3 headings:
      - **Scene / Facts (?)**
      - **Summary**
      - **Cause**

- **Investigation (Long Narrative)**
  - Some type of injury
  - Hit and Run
  - Prosecution possible
  - Requires extensive investigation
    - Expanded Narrative consisting of multiple headings

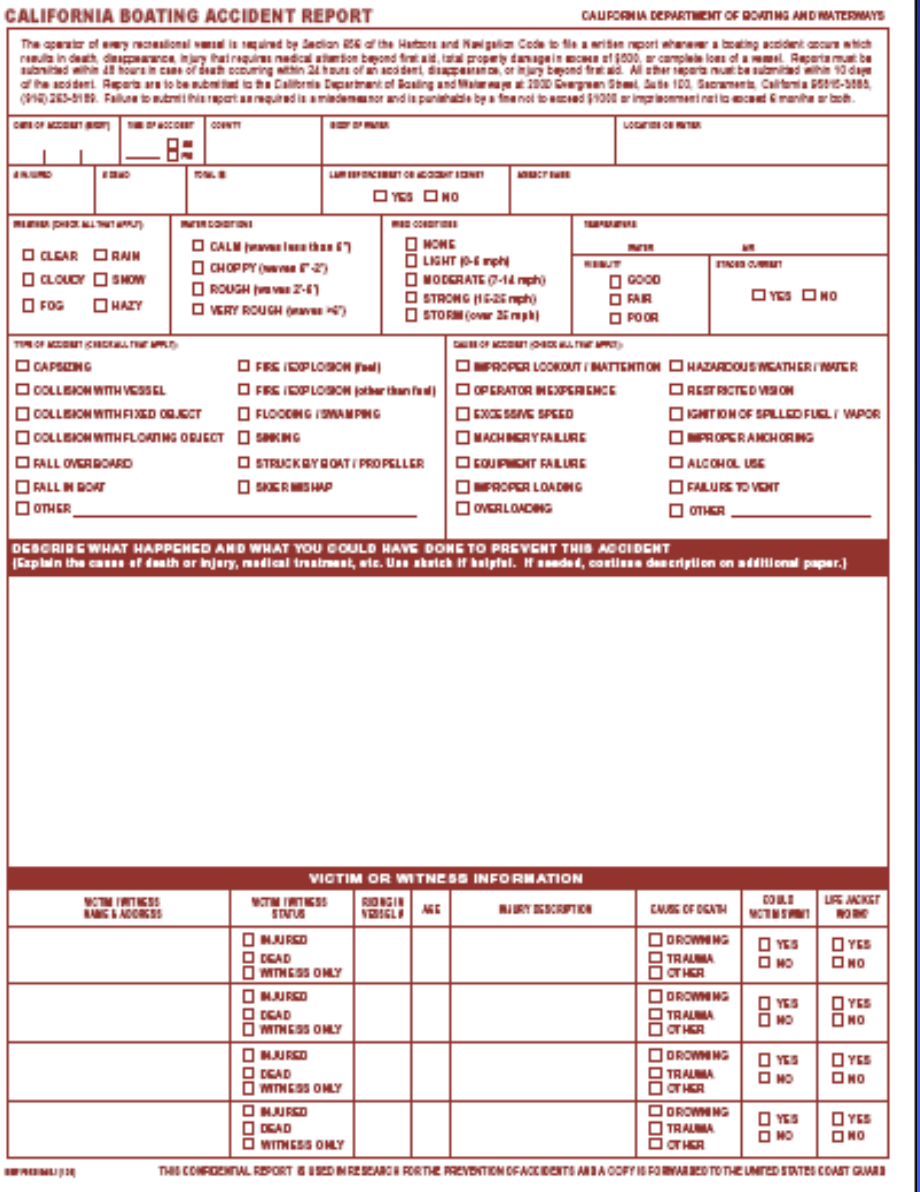
VESSEL ACCIDENT REPORT WRITING FORMAT:

- Facts
- Scene
- Statements
- Injuries
- Vessel information
- Passenger information
- Other property damage
- Area of Impact
- Chemical Test
- Opinions and conclusions
- Recommendations
- Attachments
- Diagram





B.A.R. FORMS



CALIFORNIA BOATING ACCIDENT REPORT

CALIFORNIA DEPARTMENT OF BOATING AND WATERWAYS

The operator of every recreational vessel is required by Section 656 of the Harbors and Navigation Code to file a written report whenever a boating accident occurs which results in death, disappearance, injury that requires medical attention beyond first aid, total property damage in excess of $500, or complete loss of a vessel. Reports must be submitted within 48 hours in case of death occurring within 24 hours of an accident, disappearance, or injury beyond first aid. All other reports must be submitted within 10 days of the accident. Reports are to be submitted to the California Department of Boating and Waterways at 2000 Evergreen Street, Suite 100, Sacramento, California 95815-3888, (916) 263-0999. Failure to submit this report as required is a misdemeanor and is punishable by a fine not to exceed $1000 or imprisonment not to exceed 6 months or both.

DATE OF ACCIDENT (MO/DAY) | TIME OF ACCIDENT ☐ AM ☐ PM | COUNTY | BODY OF WATER | LOCATION ON WATER

INJURED | # DEAD | TOTAL ☒ | LAW ENFORCEMENT ON ACCIDENT SCENE ☐ YES ☐ NO | AGENCY NAME

WEATHER (CHECK ALL THAT APPLY): ☐ CLEAR ☐ RAIN ☐ CLOUDY ☐ SNOW ☐ FOG ☐ HAZY

WATER CONDITIONS: ☐ CALM (waves less than 6") ☐ CHOPPY (waves 6"-2') ☐ ROUGH (waves 2'-6') ☐ VERY ROUGH (waves >6')

WIND CONDITIONS: ☐ NONE ☐ LIGHT (0-6 mph) ☐ MODERATE (7-14 mph) ☐ STRONG (15-25 mph) ☐ STORM (over 25 mph)

TEMPERATURE — WATER | AIR

VISIBILITY: ☐ GOOD ☐ FAIR ☐ POOR

STRONG CURRENT: ☐ YES ☐ NO

TYPE OF ACCIDENT (CHECK ALL THAT APPLY):

- ☐ CAPSIZING
- ☐ COLLISION WITH VESSEL
- ☐ COLLISION WITH FIXED OBJECT
- ☐ COLLISION WITH FLOATING OBJECT
- ☐ FALL OVERBOARD
- ☐ FALL IN BOAT
- ☐ FIRE / EXPLOSION (fuel)
- ☐ FIRE / EXPLOSION (other than fuel)
- ☐ FLOODING / SWAMPING
- ☐ SINKING
- ☐ STRUCK BY BOAT / PROPELLER
- ☐ SKIER MISHAP
- ☐ OTHER _____

CAUSE OF ACCIDENT (CHECK ALL THAT APPLY):

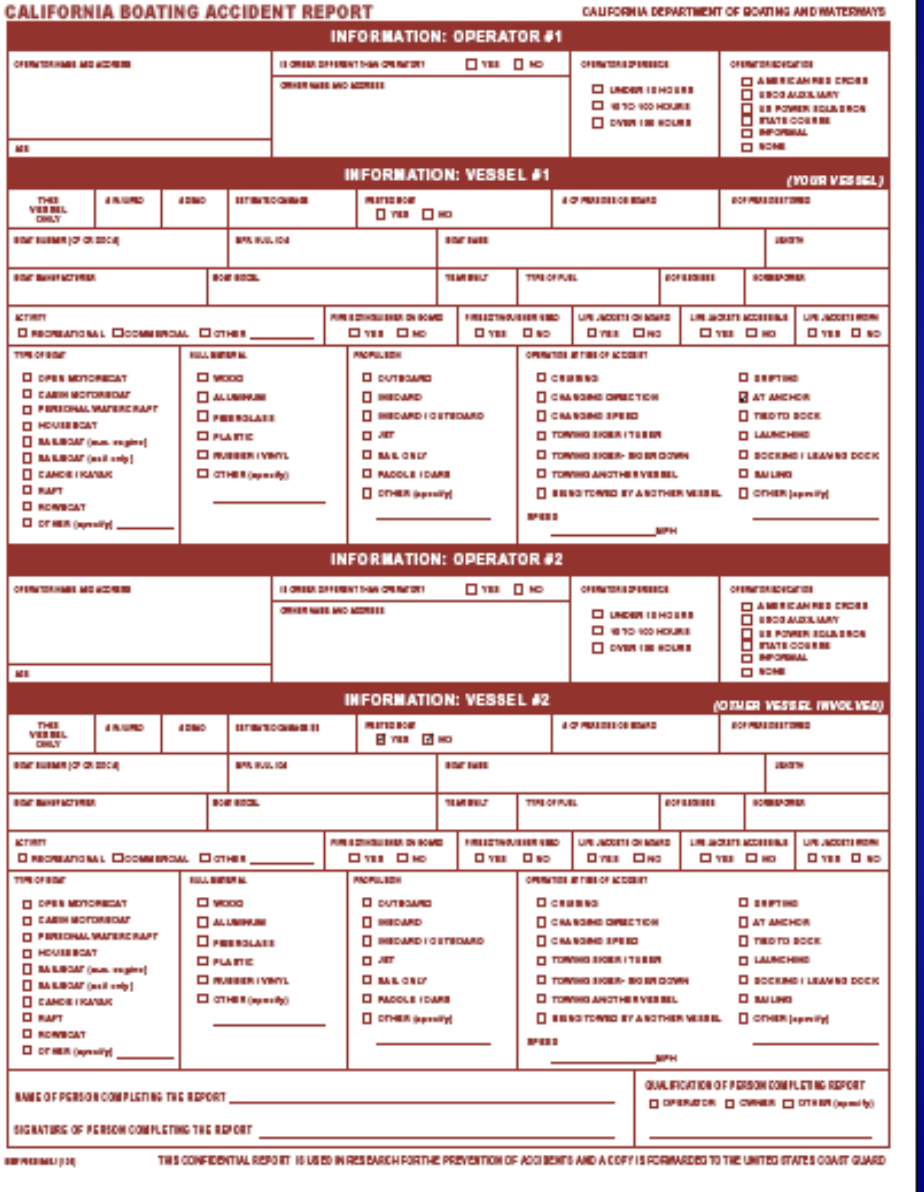
- ☐ IMPROPER LOOKOUT / INATTENTION
- ☐ OPERATOR INEXPERIENCE
- ☐ EXCESSIVE SPEED
- ☐ MACHINERY FAILURE
- ☐ EQUIPMENT FAILURE
- ☐ IMPROPER LOADING
- ☐ OVERLOADING
- ☐ HAZARDOUS WEATHER / WATER
- ☐ RESTRICTED VISION
- ☐ IGNITION OF SPILLED FUEL / VAPOR
- ☐ IMPROPER ANCHORING
- ☐ ALCOHOL USE
- ☐ FAILURE TO YIELD
- ☐ OTHER _____

DESCRIBE WHAT HAPPENED AND WHAT YOU COULD HAVE DONE TO PREVENT THIS ACCIDENT
(Explain the cause of death or injury, medical treatment, etc. Use sketch if helpful. If needed, continue description on additional paper.)

VICTIM OR WITNESS INFORMATION

VICTIM / WITNESS NAME & ADDRESS	VICTIM / WITNESS STATUS	RIDING IN VESSEL #	AGE	INJURY DESCRIPTION	CAUSE OF DEATH	COULD VICTIM SWIM?	LIFE JACKET WORN?
	☐ INJURED ☐ DEAD ☐ WITNESS ONLY				☐ DROWNING ☐ TRAUMA ☐ OTHER	☐ YES ☐ NO	☐ YES ☐ NO
	☐ INJURED ☐ DEAD ☐ WITNESS ONLY				☐ DROWNING ☐ TRAUMA ☐ OTHER	☐ YES ☐ NO	☐ YES ☐ NO
	☐ INJURED ☐ DEAD ☐ WITNESS ONLY				☐ DROWNING ☐ TRAUMA ☐ OTHER	☐ YES ☐ NO	☐ YES ☐ NO
	☐ INJURED ☐ DEAD ☐ WITNESS ONLY				☐ DROWNING ☐ TRAUMA ☐ OTHER	☐ YES ☐ NO	☐ YES ☐ NO

THIS CONFIDENTIAL REPORT IS USED IN RESEARCH FOR THE PREVENTION OF ACCIDENTS AND A COPY IS FORWARDED TO THE UNITED STATES COAST GUARD



CALIFORNIA BOATING ACCIDENT REPORT

CALIFORNIA DEPARTMENT OF BOATING AND WATERWAYS

INFORMATION: OPERATOR #1

OPERATOR NAME AND ADDRESS | IS OPERATOR DIFFERENT THAN OPERATOR? ☐ YES ☐ NO | OTHER NAME AND ADDRESS | AGE

OPERATOR'S EXPERIENCE: ☐ UNDER 10 HOURS ☐ 10 TO 100 HOURS ☐ OVER 100 HOURS

OPERATOR'S EDUCATION: ☐ AMERICAN RED CROSS ☐ USCG AUXILIARY ☐ US POWER SQUADRON ☐ STATE COURSE ☐ INFORMAL ☐ NONE

INFORMATION: VESSEL #1 (YOUR VESSEL)

THIS VESSEL ONLY | # INJURED | # DEAD | ESTIMATED DAMAGE | TOWED BOAT ☐ YES ☐ NO | # OF PERSONS ON BOARD | DOP PERSONS

BOAT NUMBER (CF OR DOCK) | BOAT HULL NO. | BOAT NAME | LENGTH

BOAT MANUFACTURER | BOAT MODEL | YEAR BUILT | TYPE OF FUEL | DOP ENGINES | HORSEPOWER

ACTIVITY: ☐ RECREATIONAL ☐ COMMERCIAL ☐ OTHER _____

FIRE EXTINGUISHER ON BOARD	FIRE EXTINGUISHER USED	LIFE JACKETS ON BOARD	LIFE JACKETS ACCESSIBLE	LIFE JACKETS WORN
☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO

TYPE OF BOAT:
- ☐ OPEN MOTORBOAT
- ☐ CABIN MOTORBOAT
- ☐ PERSONAL WATERCRAFT
- ☐ HOUSEBOAT
- ☐ SAILBOAT (aux. engine)
- ☐ SAILBOAT (sail only)
- ☐ CANOE / KAYAK
- ☐ RAFT
- ☐ ROWBOAT
- ☐ OTHER (specify) _____

HULL MATERIAL:
- ☐ WOOD
- ☐ ALUMINUM
- ☐ FIBERGLASS
- ☐ PLASTIC
- ☐ RUBBER / VINYL
- ☐ OTHER (specify) _____

PROPULSION:
- ☐ OUTBOARD
- ☐ INBOARD
- ☐ INBOARD / OUTBOARD
- ☐ JET
- ☐ SAIL ONLY
- ☐ PADDLE / OARS
- ☐ OTHER (specify) _____

OPERATION AT TIME OF ACCIDENT:
- ☐ CRUISING
- ☐ CHANGING DIRECTION
- ☐ CHANGING SPEED
- ☐ TOWING WATER SKIER / TUBER
- ☐ TOWING WATER SKIER - BEING DOWN
- ☐ TOWING ANOTHER VESSEL
- ☐ BEING TOWED BY ANOTHER VESSEL
- ☐ DRIFTING
- ☒ AT ANCHOR
- ☐ TIED TO DOCK
- ☐ LAUNCHING
- ☐ DOCKING / LEAVING DOCK
- ☐ SAILING
- ☐ OTHER (specify) _____

SPEED _____ MPH

INFORMATION: OPERATOR #2

OPERATOR NAME AND ADDRESS | IS OPERATOR DIFFERENT THAN OPERATOR? ☐ YES ☐ NO | OTHER NAME AND ADDRESS | AGE

OPERATOR'S EXPERIENCE: ☐ UNDER 10 HOURS ☐ 10 TO 100 HOURS ☐ OVER 100 HOURS

OPERATOR'S EDUCATION: ☐ AMERICAN RED CROSS ☐ USCG AUXILIARY ☐ US POWER SQUADRON ☐ STATE COURSE ☐ INFORMAL ☐ NONE

INFORMATION: VESSEL #2 (OTHER VESSEL INVOLVED)

THIS VESSEL ONLY | # INJURED | # DEAD | ESTIMATED DAMAGE | TOWED BOAT ☒ YES ☐ NO | # OF PERSONS ON BOARD | DOP PERSONS

BOAT NUMBER (CF OR DOCK) | BOAT HULL NO. | BOAT NAME | LENGTH

BOAT MANUFACTURER | BOAT MODEL | YEAR BUILT | TYPE OF FUEL | DOP ENGINES | HORSEPOWER

ACTIVITY: ☐ RECREATIONAL ☐ COMMERCIAL ☐ OTHER _____

FIRE EXTINGUISHER ON BOARD	FIRE EXTINGUISHER USED	LIFE JACKETS ON BOARD	LIFE JACKETS ACCESSIBLE	LIFE JACKETS WORN
☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO	☐ YES ☐ NO

TYPE OF BOAT:
- ☐ OPEN MOTORBOAT
- ☐ CABIN MOTORBOAT
- ☐ PERSONAL WATERCRAFT
- ☐ HOUSEBOAT
- ☐ SAILBOAT (aux. engine)
- ☐ SAILBOAT (sail only)
- ☐ CANOE / KAYAK
- ☐ RAFT
- ☐ ROWBOAT
- ☐ OTHER (specify) _____

HULL MATERIAL:
- ☐ WOOD
- ☐ ALUMINUM
- ☐ FIBERGLASS
- ☐ PLASTIC
- ☐ RUBBER / VINYL
- ☐ OTHER (specify) _____

PROPULSION:
- ☐ OUTBOARD
- ☐ INBOARD
- ☐ INBOARD / OUTBOARD
- ☐ JET
- ☐ SAIL ONLY
- ☐ PADDLE / OARS
- ☐ OTHER (specify) _____

OPERATION AT TIME OF ACCIDENT:
- ☐ CRUISING
- ☐ CHANGING DIRECTION
- ☐ CHANGING SPEED
- ☐ TOWING WATER SKIER / TUBER
- ☐ TOWING WATER SKIER - BEING DOWN
- ☐ TOWING ANOTHER VESSEL
- ☐ BEING TOWED BY ANOTHER VESSEL
- ☐ DRIFTING
- ☐ AT ANCHOR
- ☐ TIED TO DOCK
- ☐ LAUNCHING
- ☐ DOCKING / LEAVING DOCK
- ☐ SAILING
- ☐ OTHER (specify) _____

SPEED _____ MPH

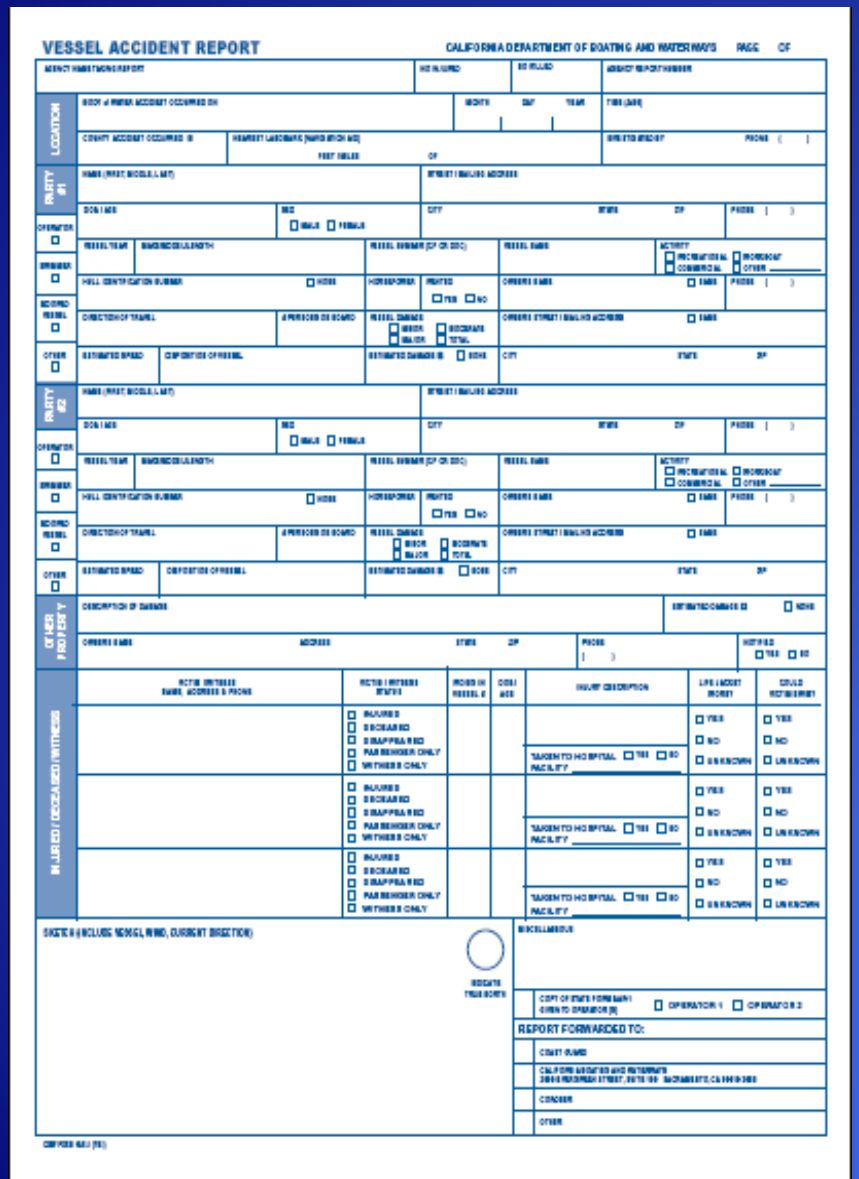
NAME OF PERSON COMPLETING THE REPORT _____

SIGNATURE OF PERSON COMPLETING THE REPORT _____

QUALIFICATION OF PERSON COMPLETING REPORT: ☐ OPERATOR ☐ OWNER ☐ OTHER (specify) _____

THIS CONFIDENTIAL REPORT IS USED IN RESEARCH FOR THE PREVENTION OF ACCIDENTS AND A COPY IS FORWARDED TO THE UNITED STATES COAST GUARD

V.A.R. FORMS



VESSEL ACCIDENT REPORT

CALIFORNIA DEPARTMENT OF BOATING AND WATERWAYS PAGE OF

AGENCY NAME/NUMBER/REPORT NO. | NO INJURED | NO KILLED | AGENCY REPORT NUMBER

LOCATION

DATE OF MARINE ACCIDENT OCCURRED ON | MONTH | DAY | YEAR | TIME (DAY)

COUNTY ACCIDENT OCCURRED IN | NEAREST LANDMARK (NAME WHICH WAY) | FEET MILES OF | DISTANCE FROM SHORE | PHONE

PARTY #1

NAME (FIRST, MIDDLE, LAST) | STREET / MAILING ADDRESS

DOB / AGE | SEX MALE FEMALE | CITY | STATE | ZIP | PHONE

OPERATOR

VESSEL YEAR | MAKE/MODEL/LENGTH | VESSEL NUMBER (CF OR DOC) | VESSEL NAME | ACTIVITY RECREATIONAL COMMERCIAL RENTBOAT OTHER

OWNER

HULL IDENTIFICATION NUMBER NONE | HORSEPOWER | TRAILER YES NO | OWNER'S NAME SAME | PHONE

SECOND VESSEL

DIRECTION OF TRAVEL | # PERSONS ON BOARD | VESSEL DAMAGE NONE MINOR MAJOR MODERATE TOTAL | OWNER'S STREET / MAILING ADDRESS SAME

OTHER

ESTIMATED SPEED | DISPOSITION OF VESSEL | ESTIMATED DAMAGE $ NONE | CITY | STATE | ZIP

PARTY #2

NAME (FIRST, MIDDLE, LAST) | STREET / MAILING ADDRESS

DOB / AGE | SEX MALE FEMALE | CITY | STATE | ZIP | PHONE

OPERATOR

VESSEL YEAR | MAKE/MODEL/LENGTH | VESSEL NUMBER (CF OR DOC) | VESSEL NAME | ACTIVITY RECREATIONAL COMMERCIAL RENTBOAT OTHER

OWNER

HULL IDENTIFICATION NUMBER NONE | HORSEPOWER | TRAILER YES NO | OWNER'S NAME SAME | PHONE

SECOND VESSEL

DIRECTION OF TRAVEL | # PERSONS ON BOARD | VESSEL DAMAGE NONE MINOR MAJOR MODERATE TOTAL | OWNER'S STREET / MAILING ADDRESS SAME

OTHER

ESTIMATED SPEED | DISPOSITION OF VESSEL | ESTIMATED DAMAGE $ NONE | CITY | STATE | ZIP

OTHER PROPERTY

DESCRIPTION OF DAMAGE | ESTIMATED DAMAGE $ NONE

OWNER'S NAME | ADDRESS | STATE | ZIP | PHONE | NOTIFIED YES NO

INJURED / DECEASED / WITNESSES

VICTIM / WITNESS NAME, ADDRESS & PHONE	VICTIM / WITNESS STATUS	VESSEL #	OCCUP. NO.	INJURY DESCRIPTION	LIFE JACKET WORN?	CAUSE DETERMINED?
	INJURED DECEASED DISAPPEARED PAS SENGER ONLY WITNESS ONLY			TAKEN TO HOSPITAL YES NO FACILITY	YES NO UNKNOWN	YES NO UNKNOWN
	INJURED DECEASED DISAPPEARED PAS SENGER ONLY WITNESS ONLY			TAKEN TO HOSPITAL YES NO FACILITY	YES NO UNKNOWN	YES NO UNKNOWN
	INJURED DECEASED DISAPPEARED PAS SENGER ONLY WITNESS ONLY			TAKEN TO HOSPITAL YES NO FACILITY	YES NO UNKNOWN	YES NO UNKNOWN

SKETCH (INCLUDE WIDGET, WIND, CURRENT DIRECTION)

INDICATE TRUE NORTH

MISCELLANEOUS

COPY OF STATE FORM MAILED TO OPERATOR (S) OPERATOR 1 OPERATOR 2

REPORT FORWARDED TO:

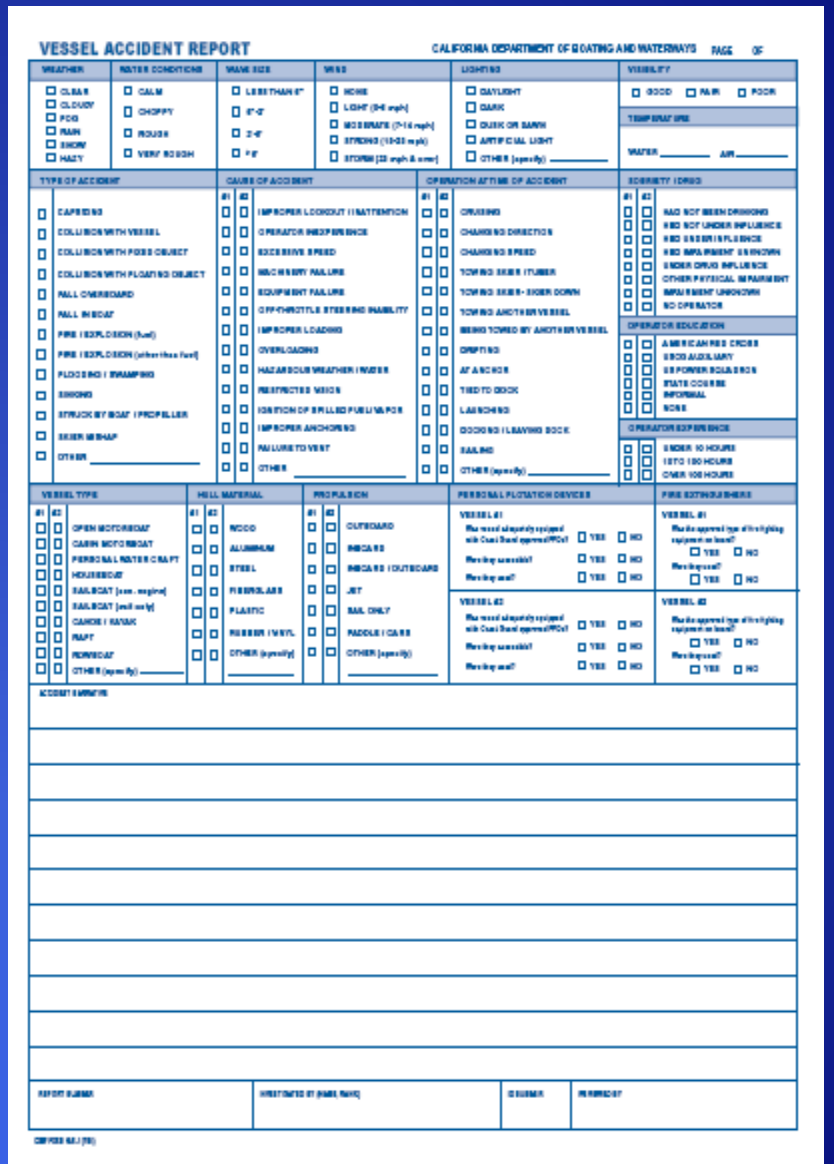
COAST GUARD

CALIFORNIA DEPARTMENT OF BOATS AND WATERWAYS 2000 EVERGREEN STREET, SUITE 100 SACRAMENTO, CA 95815-3888

CORONER

OTHER

CDF 1005 REV. (7/01)



VESSEL ACCIDENT REPORT

CALIFORNIA DEPARTMENT OF BOATING AND WATERWAYS PAGE OF

WEATHER: CLEAR, CLOUDY, FOG, RAIN, SNOW, HAZY

WATER CONDITIONS: CALM, CHOPPY, ROUGH, VERY ROUGH

WAVE SIZE: LESS THAN 6", 6"-2', 2'-6', 6'+

WIND: NONE, LIGHT (0-6 mph), MODERATE (7-16 mph), STRONG (16-33 mph), STORM (33 mph & over)

LIGHTING: DAYLIGHT, DARK, DUSK OR DAWN, ARTIFICIAL LIGHT, OTHER (specify)

VISIBILITY: GOOD, FAIR, POOR

TEMPERATURE: WATER, AIR

TYPE OF ACCIDENT: CAPSIZED, COLLISION WITH VESSEL, COLLISION WITH FIXED OBJECT, COLLISION WITH FLOATING OBJECT, FALL OVERBOARD, FALL IN BOAT, FIRE / EXPLOSION (fuel), FIRE / EXPLOSION (other than fuel), FLOODING / SWAMPING, SINKING, STRUCK BY BOAT / PROPELLER, SKIER WIPEOUT, OTHER

CAUSE OF ACCIDENT (#1 / #2): IMPROPER LOOKOUT / INATTENTION, OPERATOR INEXPERIENCE, EXCESSIVE SPEED, MACHINERY FAILURE, EQUIPMENT FAILURE, OFF-THROTTLE STEERING INABILITY, IMPROPER LOADING, OVERLOADING, HAZARDOUS WEATHER / WATER, RESTRICTED VISION, IGNITION OF SPILLED FUEL / VAPOR, IMPROPER ANCHORING, FAILURE TO VENT, OTHER

OPERATION AT TIME OF ACCIDENT (#1 / #2): CRUISING, CHANGING DIRECTION, CHANGING SPEED, TOWING WATER / TUBER, TOWING WATER - SKIER DOWN, TOWING ANOTHER VESSEL, BEING TOWED BY ANOTHER VESSEL, DRIFTING, AT ANCHOR, TIED TO DOCK, LAUNCHING, DOCKING / LEAVING DOCK, SAILING, OTHER (specify)

SOBRIETY / DRUG (#1 / #2): HAD NOT BEEN DRINKING, HAD NOT BEEN UNDER INFLUENCE, HAD BEEN UNDER INFLUENCE, HAD IMPAIRMENT UNKNOWN, UNDER DRUG INFLUENCE, OTHER PHYSICAL IMPAIRMENT, IMPAIRMENT UNKNOWN, NO OPERATOR

OPERATOR EDUCATION: AMERICAN RED CROSS, USCG AUXILIARY, US POWER SQUADRON, STATE COURSE, INFORMAL, NONE

OPERATOR EXPERIENCE: UNDER 10 HOURS, 10 TO 100 HOURS, OVER 100 HOURS

VESSEL TYPE (#1 / #2): OPEN MOTORBOAT, CABIN MOTORBOAT, PERSONAL WATER CRAFT, HOUSEBOAT, SAILBOAT (over 26 ft. engine), SAILBOAT (small only), CANOE / KAYAK, RAFT, RUNABOUT, OTHER (specify)

HULL MATERIAL (#1 / #2): WOOD, ALUMINUM, STEEL, FIBERGLASS, PLASTIC, RUBBER / VINYL, OTHER (specify)

PROPULSION (#1 / #2): OUTBOARD, INBOARD, INBOARD / OUTBOARD, JET, SAIL ONLY, PADDLE / OARS, OTHER (specify)

PERSONAL FLOTATION DEVICES: VESSEL #1 — Was vessel adequately equipped with Coast Guard approved PFDs? YES NO; Were they accessible? YES NO; Were they used? YES NO. VESSEL #2 — same questions.

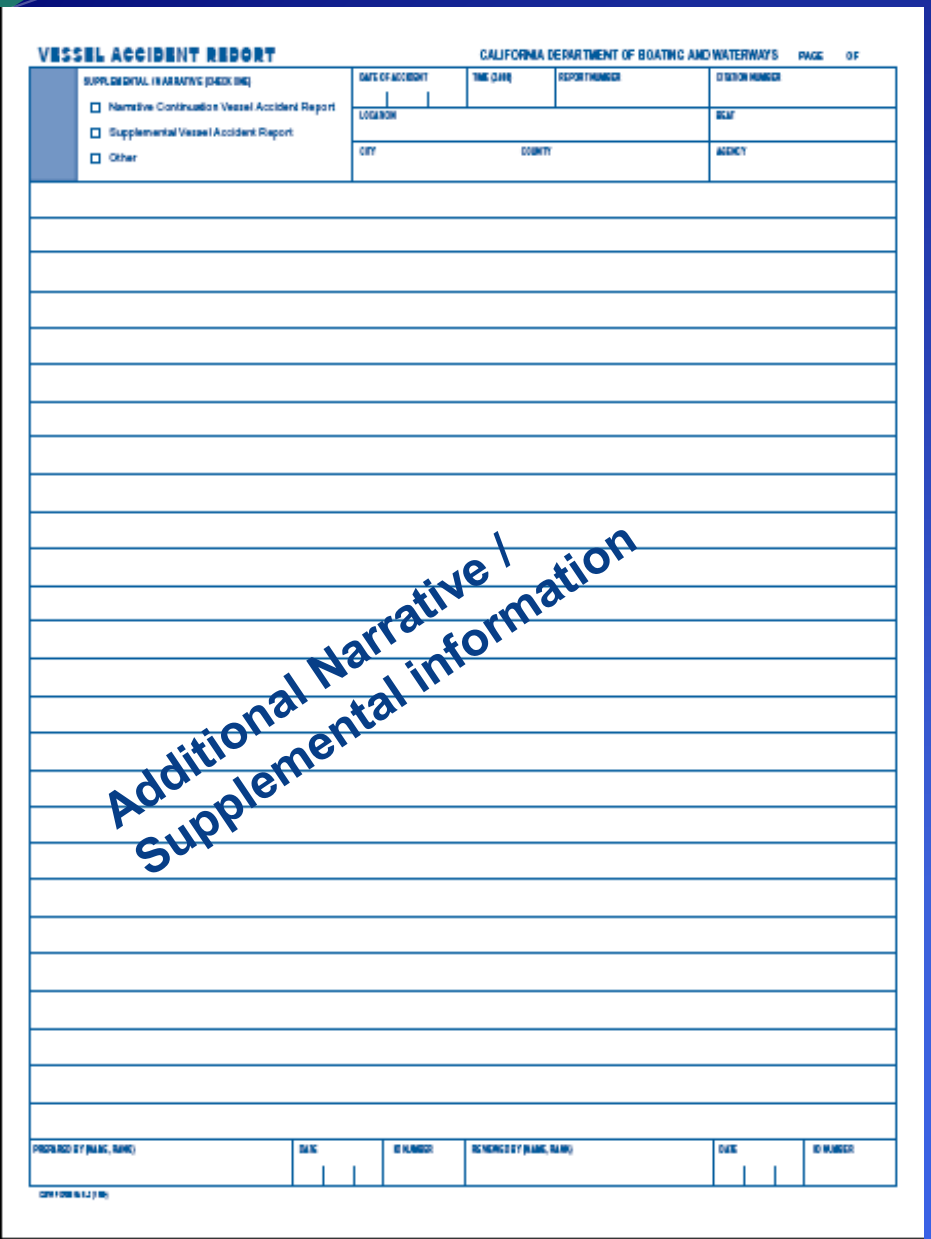
FIRE EXTINGUISHERS: VESSEL #1 — Was the approved type of fire fighting equipment on board? YES NO; Were they accessible? YES NO; Were they used? YES NO. VESSEL #2 — same questions.

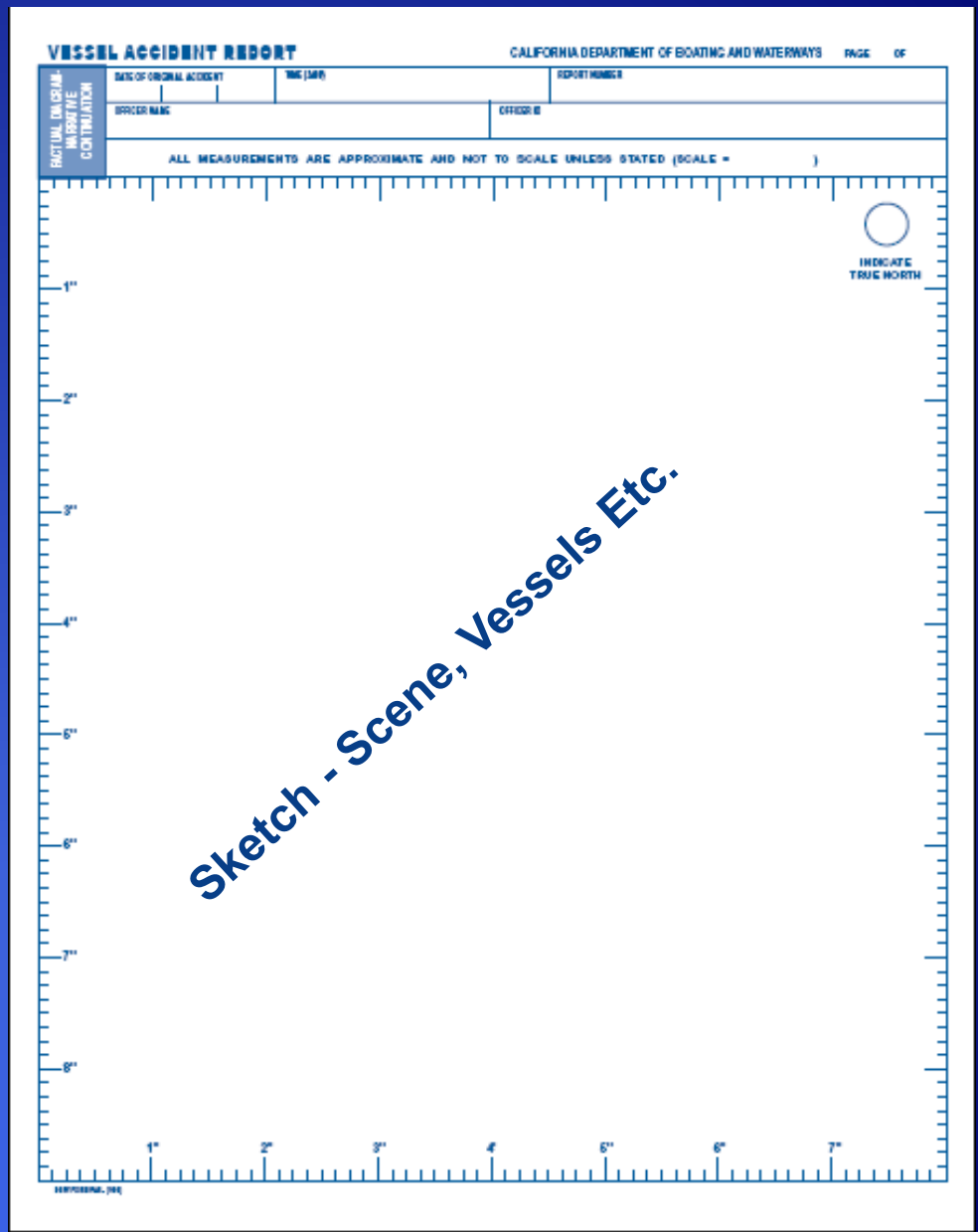
ACCIDENT NARRATIVE

REPORT NUMBER | INVESTIGATED BY (NAME, RANK) | BADGE # | AGENCY

CDF 1005 REV. (7/01)

V.A.R. - 2


VESSEL ACCIDENT REPORT
CALIFORNIA DEPARTMENT OF BOATING AND WATERWAYS
PAGE OF
SUPPLEMENTAL NARRATIVE (CHECK ONE)
Narrative Continuation Vessel Accident Report
Supplemental Vessel Accident Report
Other
DATE OF ACCIDENT
TIME (24H)
REPORT NUMBER
STATION NUMBER
LOCATION
BOAT
CITY
COUNTY
AGENCY
PREPARED BY (NAME, RANK)
DATE
ID NUMBER
REVIEWED BY (NAME, RANK)
DATE
ID NUMBER
Additional Narrative / Supplemental information


VESSEL ACCIDENT REPORT
CALIFORNIA DEPARTMENT OF BOATING AND WATERWAYS
PAGE OF
FACTUAL DIAGRAM NARRATIVE CONTINUATION
DATE OF ORIGINAL ACCIDENT
TIME (24H)
REPORT NUMBER
OFFICER NAME
OFFICER ID
ALL MEASUREMENTS ARE APPROXIMATE AND NOT TO SCALE UNLESS STATED (SCALE =)
INDICATE TRUE NORTH
1"
2"
3"
4"
5"
6"
7"
8"
1"
2"
3"
4"
5"
6"
7"
Sketch - Scene, Vessels Etc.

COMPLETION OF THE V.A.R.

LOCATION

- Agency
- No. Injured / No. Killed
- Agency Report number
- Water Body Accident Occurred On
- Date
- Time
- County Accident Occurred In
- Nearest Landmark (Nav. Aid)
- Investigated by
- Telephone



VESSEL ACCIDENT REPORT

CALIFORNIA DEPARTMENT OF BOATING AND WATERWAYS PAGE OF

AGENCY NAME TAKING REPORT	NO INJURED	NO KILLED	AGENCY REPORT NUMBER

LOCATION	BODY of WATER ACCIDENT OCCURRED ON	MONTH DAY YEAR	TIME (2400)
	COUNTY ACCIDENT OCCURRED IN	NEAREST LANDMARK (NAVIGATION AID) FEET / MILES OF	INVESTIGATED BY PHONE ( )

COMPLETION OF THE V.A.R.

INJURED / DECEASED / WITNESS

Use DBW Form VAR 1-1 if space is needed for additional injured / deceased / witness information

INJURED / DECEASED / WITNESS

VICTIM / WITNESS NAME, ADDRESS & PHONE	VICTIM / WITNESS STATUS	RIDING IN VESSEL #	DOB/ AGE	INJURY DESCRIPTION	LIFE JACKET WORN?	COULD VICTIM SWIM?
	☐ INJURED ☐ DECEASED ☐ DISAPPEARED ☐ PASSENGER ONLY ☐ WITNESS ONLY			TAKEN TO HOSPITAL ☐ YES ☐ NO FACILITY _____	☐ YES ☐ NO ☐ UNKNOWN	☐ YES ☐ NO ☐ UNKNOWN
	☐ INJURED ☐ DECEASED ☐ DISAPPEARED ☐ PASSENGER ONLY ☐ WITNESS ONLY			TAKEN TO HOSPITAL ☐ YES ☐ NO FACILITY _____	☐ YES ☐ NO ☐ UNKNOWN	☐ YES ☐ NO ☐ UNKNOWN
	☐ INJURED ☐ DECEASED ☐ DISAPPEARED ☐ PASSENGER ONLY ☐ WITNESS ONLY			TAKEN TO HOSPITAL ☐ YES ☐ NO FACILITY _____	☐ YES ☐ NO ☐ UNKNOWN	☐ YES ☐ NO ☐ UNKNOWN

COMPLETION OF THE V.A.R.

SKETCHES

A sketch should be made for every report and investigation. A sketch reflects the investigator's opinion of how the accident occurred.



COMPLETION OF THE V.A.R.

MISCELLANEOUS

This space is to be used by local agencies to collect any unique data it feels necessary to their investigation, or any administrative data.



MISCELLANEOUS	
	COPY OF STATE FORM BAR-1 GIVEN TO OPERATOR (S) ☐ OPERATOR 1 ☐ OPERATOR 2
REPORT FORWARDED TO:	
	COAST GUARD
	CALIFORNIA BOATING AND WATERWAYS 2000 EVERGREEN STREET, SUITE 100 SACRAMENTO, CA 95815-3888
	CORONER
	OTHER

Mark an X in the appropriate following boxes that apply if completed.

WEATHER
- ☐ CLEAR
- ☐ CLOUDY
- ☐ FOG
- ☐ RAIN
- ☐ SNOW
- ☐ HAZY

WATER CONDITIONS
- ☐ CALM
- ☐ CHOPPY
- ☐ ROUGH
- ☐ VERY ROUGH

WAVE SIZE
- ☐ LESS THAN 6"
- ☐ 6"-2'
- ☐ 2'-6'
- ☐ >6'

WIND
- ☐ NONE
- ☐ LIGHT (0-6 mph)
- ☐ MODERATE (7-14 mph)
- ☐ STRONG (15-25 mph)
- ☐ STORM (25 mph & over)

LIGHTING
- ☐ DAYLIGHT
- ☐ DARK
- ☐ DUSK OR DAWN
- ☐ ARTIFICIAL LIGHT
- ☐ OTHER (specify) _____

VISIBILITY
☐ GOOD ☐ FAIR ☐ POOR

TEMPERATURE
WATER _____ AIR _____

TYPE OF ACCIDENT
- ☐ CAPSIZING
- ☐ COLLISION WITH VESSEL
- ☐ COLLISION WITH FIXED OBJECT
- ☐ COLLISION WITH FLOATING OBJECT
- ☐ FALL OVERBOARD
- ☐ FALL IN BOAT
- ☐ FIRE / EXPLOSION (fuel)
- ☐ FIRE / EXPLOSION (other than fuel)
- ☐ FLOODING / SWAMPING
- ☐ SINKING
- ☐ STRUCK BY BOAT / PROPELLER
- ☐ SKIER MISHAP
- ☐ OTHER _____

CAUSE OF ACCIDENT
#1	#2	
☐	☐	IMPROPER LOOKOUT / INATTENTION
☐	☐	OPERATOR INEXPERIENCE
☐	☐	EXCESSIVE SPEED
☐	☐	MACHINERY FAILURE
☐	☐	EQUIPMENT FAILURE
☐	☐	OFF-THROTTLE STEERING INABILITY
☐	☐	IMPROPER LOADING
☐	☐	OVERLOADING
☐	☐	HAZARDOUS WEATHER / WATER
☐	☐	RESTRICTED VISION
☐	☐	IGNITION OF SPILLED FUEL/ VAPOR
☐	☐	IMPROPER ANCHORING
☐	☐	FAILURE TO VENT
☐	☐	OTHER _____

OPERATION AT TIME OF ACCIDENT
#1	#2	
☐	☐	CRUISING
☐	☐	CHANGING DIRECTION
☐	☐	CHANGING SPEED
☐	☐	TOWING SKIER / TUBER
☐	☐	TOWING SKIER- SKIER DOWN
☐	☐	TOWING ANOTHER VESSEL
☐	☐	BEING TOWED BY ANOTHER VESSEL
☐	☐	DRIFTING
☐	☐	AT ANCHOR
☐	☐	TIED TO DOCK
☐	☐	LAUNCHING
☐	☐	DOCKING / LEAVING DOCK
☐	☐	SAILING
☐	☐	OTHER (specify) _____

SOBRIETY / DRUG
#1	#2	
☐	☐	HAD NOT BEEN DRINKING
☐	☐	HBD NOT UNDER INFLUENCE
☐	☐	HBD UNDER INFLUENCE
☐	☐	HBD IMPAIRMENT UNKNOWN
☐	☐	UNDER DRUG INFLUENCE
☐	☐	OTHER PHYSICAL IMPAIRMENT
☐	☐	IMPAIRMENT UNKNOWN
☐	☐	NO OPERATOR

OPERATOR EDUCATION
☐	☐	AMERICAN RED CROSS
☐	☐	USCG AUXILIARY
☐	☐	US POWER SQUADRON
☐	☐	STATE COURSE
☐	☐	INFORMAL
☐	☐	NONE

OPERATOR EXPERIENCE
☐	☐	UNDER 10 HOURS
☐	☐	10 TO 100 HOURS
☐	☐	OVER 100 HOURS

VESSEL TYPE
#1	#2	
☐	☐	OPEN MOTORBOAT
☐	☐	CABIN MOTORBOAT
☐	☐	PERSONAL WATER CRAFT
☐	☐	HOUSEBOAT
☐	☐	SAILBOAT (aux. engine)
☐	☐	SAILBOAT (sail only)
☐	☐	CANOE / KAYAK
☐	☐	RAFT
☐	☐	ROWBOAT
☐	☐	OTHER (specify) _____

HULL MATERIAL
#1	#2	
☐	☐	WOOD
☐	☐	ALUMINUM
☐	☐	STEEL
☐	☐	FIBERGLASS
☐	☐	PLASTIC
☐	☐	RUBBER / VINYL
☐	☐	OTHER (specify) _____

PROPULSION
#1	#2	
☐	☐	OUTBOARD
☐	☐	INBOARD
☐	☐	INBOARD / OUTBOARD
☐	☐	JET
☐	☐	SAIL ONLY
☐	☐	PADDLE / OARS
☐	☐	OTHER (specify) _____

PERSONAL FLOTATION DEVICES
VESSEL #1
Was vessel adequately equipped with Coast Guard approved PFDs? ☐ YES ☐ NO

Were they accessible? ☐ YES ☐ NO

Were they used? ☐ YES ☐ NO

VESSEL #2
Was vessel adequately equipped with Coast Guard approved PFDs? ☐ YES ☐ NO

Were they accessible? ☐ YES ☐ NO

Were they used? ☐ YES ☐ NO

FIRE EXTINGUISHERS
VESSEL #1
Was the approved type of fire fighting equipment on board? ☐ YES ☐ NO

Were they used? ☐ YES ☐ NO

VESSEL #2
Was the approved type of fire fighting equipment on board? ☐ YES ☐ NO

Were they used? ☐ YES ☐ NO

Report writing /Evidence Collection

Special Considerations:

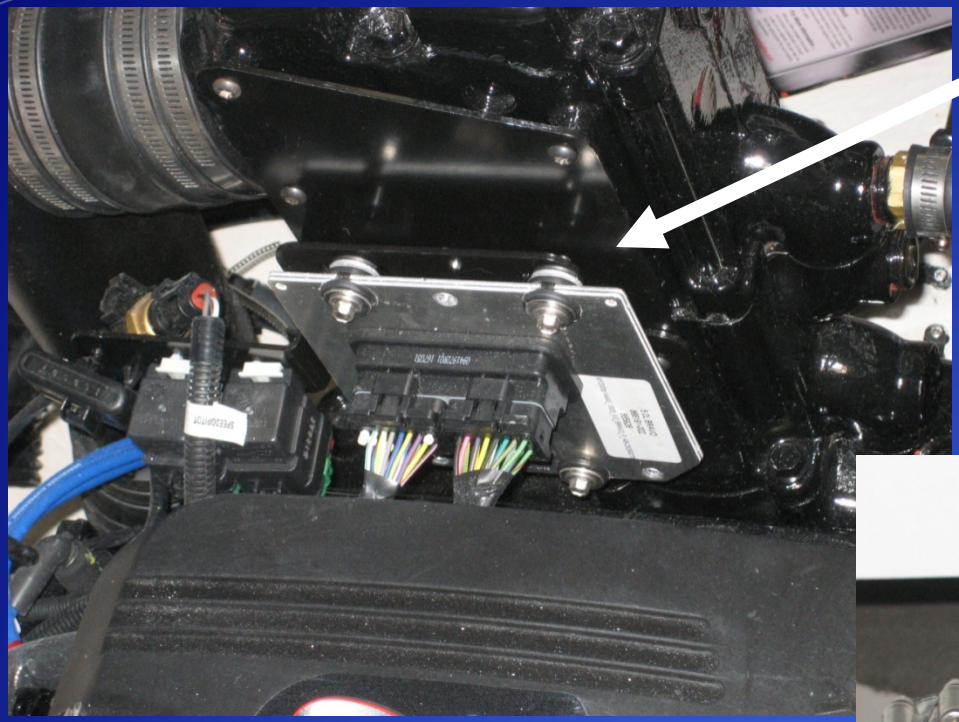
- Besides the standard information you would obtain from somebody for a report, you need to obtain several additional pieces of information.
  - Name, address, phone, and DOB from **EVERYBODY** aboard each vessel involved.
  - For each person aboard…
    - Could they swim?
    - Seating position?
    - Were they wearing a P.F.D.?
    - Operator using electronics?
  - Operator experience / Education ?
  - Proper and required equipment aboard?
  - Was boat overloaded or unbalanced by equipment ?
  - Weather Information – N.W.S. 805-988-6620



NEW TECHNOLOGIES

- Mercury Marine's "Black Box" ECU
  - Similar in principle to early versions of the FAA's black box in commercial aircraft
  - Was originally designed for warranty and repair purposes
  - Will retain the last 2 ignition sequences
    - Gears, RPMs, etc. over elapsed times
  - When in doubt, get a search warrant!.

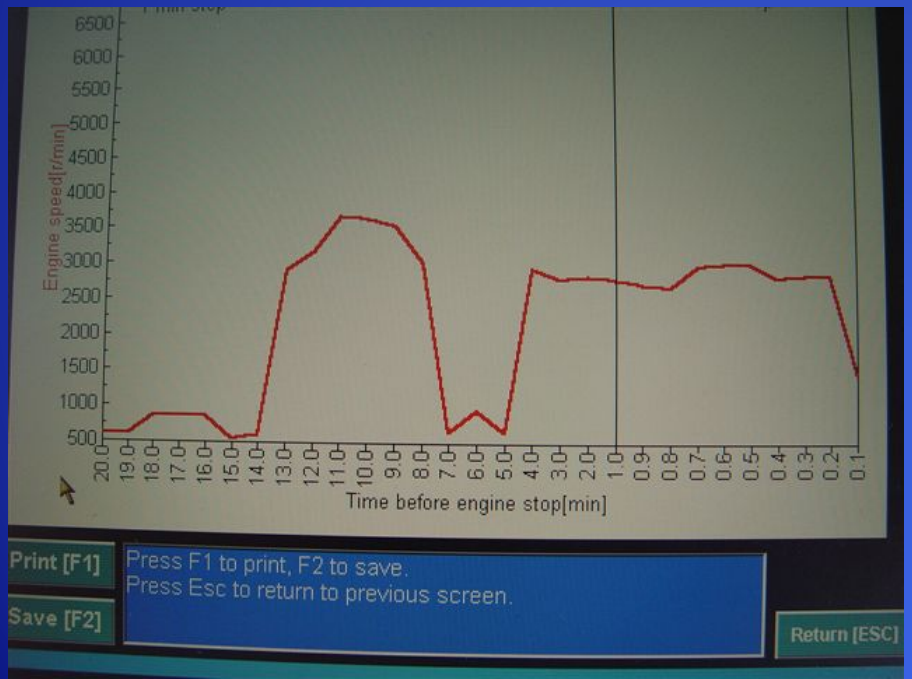
MERCRUISER ECU





SPECIAL CONSIDERATIONS:

Radar / GPS
Engine information (black box, control system)
Position of instruments/switches (Needle Slapping)
Switches position
Keys (leave alone!)







G.P.S. TECHNOLOGY

- Capability to retrieve data varies from one make/model to another
- Retrieval information can include:
  - Speed
  - Track
  - Distance
  - Direction
- When in doubt, get a search warrant!.



Vessel Accident Investigation Reporting Guide

REPORT NARRATIVE

The report narrative should consist of the following two major headings, and these major headings need to be set apart graphically:

(a) Summary. The officer should give his opinion of what took place and explain how the collision happened in his own words

(1) Vessel direction of travel, speed, etc.;

(2) Actions of the operators that contributed to the accident; and

(3) Locate the area of impact and briefly explain the factors that support it.

(b) Cause. The officer should explain why the accident occurred by identifying the operator and the act or violation that caused the accident.

Vessel Accident Investigation Reporting Guide – LONG FORM

2. **Facts.**

Time of call, how received, and time of arrival.

- **Scene.**
  Describe the scene. Include items like type of waterway, width or configuration, water conditions, visibility, depth of water, navigational aids, fixed or floating objects, etc…

- **Vessel No. 1**

(a) Position where vessel located.
(b) Damage
(c) Vessel defects, exclusive of damage, and how detected.
(Repeat the sequence for all vessels involved)

Vessel Accident Investigation Reporting Guide

- **Other property damage.**

  Physical evidence, where located, and disposition.

- **Injuries:**

  Party number – Describe injuries.

  Passengers: Name, age, sex, address, and location in vessel, if not included as a witness.

- **Other facts:**

  Add anything pertinent to the investigation.

Vessel Accident Investigation Reporting Guide

3. <u>Statements.</u>

Operator No._____(Smith). Statements need not be verbatim. Record the substance of the statement eliminating unnecessary detail. Statements from biased witnesses should be recorded. Statements must cover the following items:

(a) Direction of travel
(b) Speed of vessel
(c) Identity of operator
(d) Location from where witness or operator observed the occurrence
(e) Statements must be directed at proving the corpus delicti
(f) Negative statements should be recorded

Vessel Accident Investigation Reporting Guide

Opinions and Conclusions.

(a) All elements of the offence and evidence that will be used to sustain the complaint must be shown.

(b) Opinion of what occurred, how the accident happened.

(c) When writing an opinion, include:

1. **Direction of vessel**
2. **Speed of vessel (s)**
3. **Identity of operators**
4. **A.O.I. and how it was determined**
5. **Violations**
6. **Evidence sustains any allegation(s)**
7. **Intoxication**

COMPLETION OF THE V.A.R.

5. Recommendations.

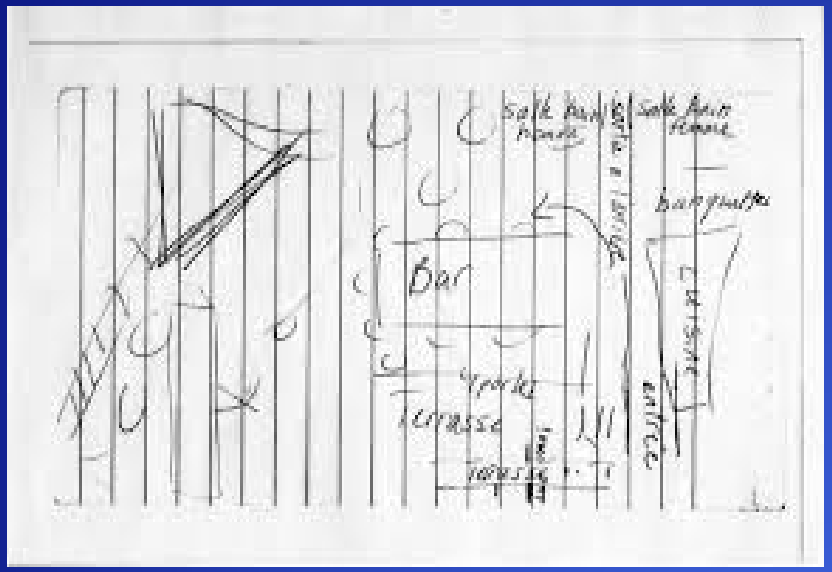
Recommend necessary follow – up action on investigation that the officer will be able or unable to complete.

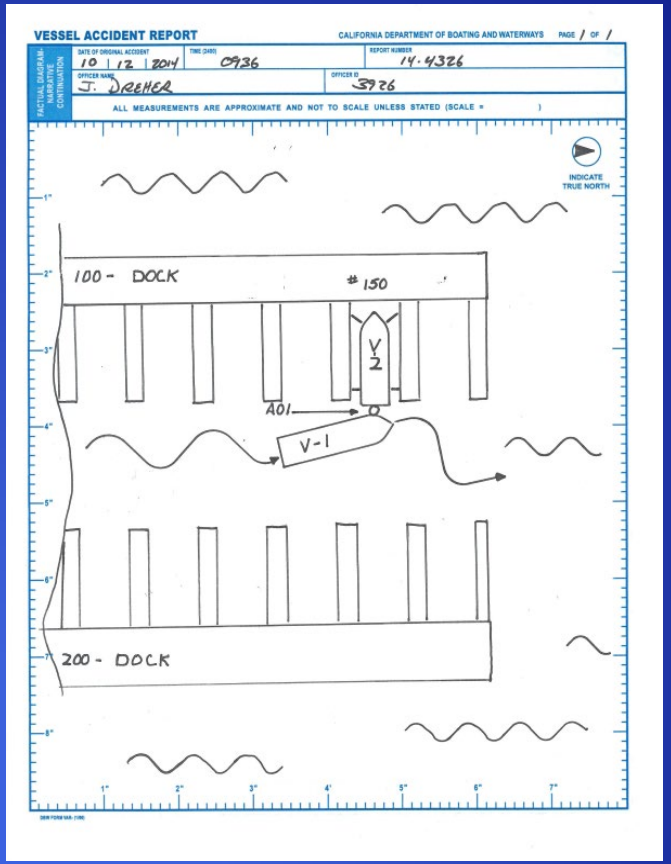
Sketch / Drawings

DIAGRAM VS. SKETCH

Sketch - rough draft drawings done at the accident scene

Diagram - finalized representation of the accident





SKETCHING

General overview of the scene

- Specific location, landmarks, and compass orientation

Involved and witness statements

Physical evidence to corroborate

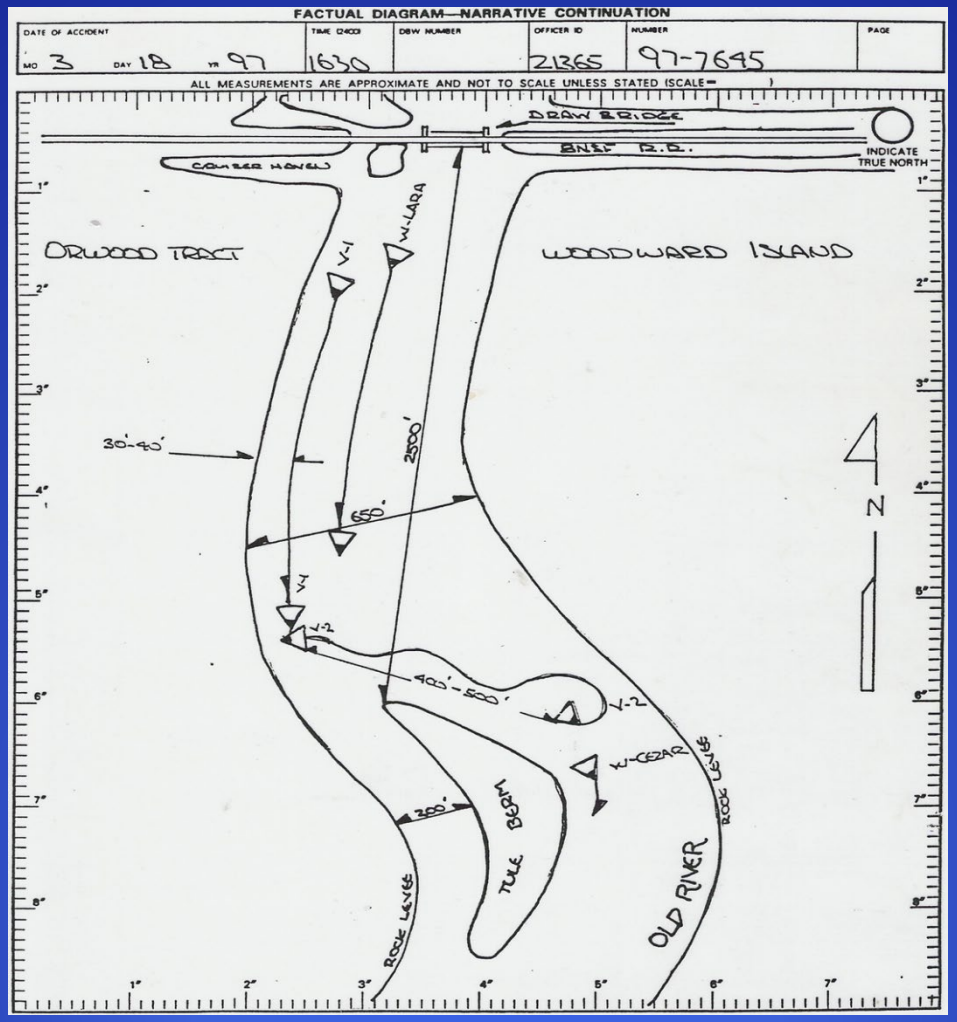
Sketch reconstruction of accident







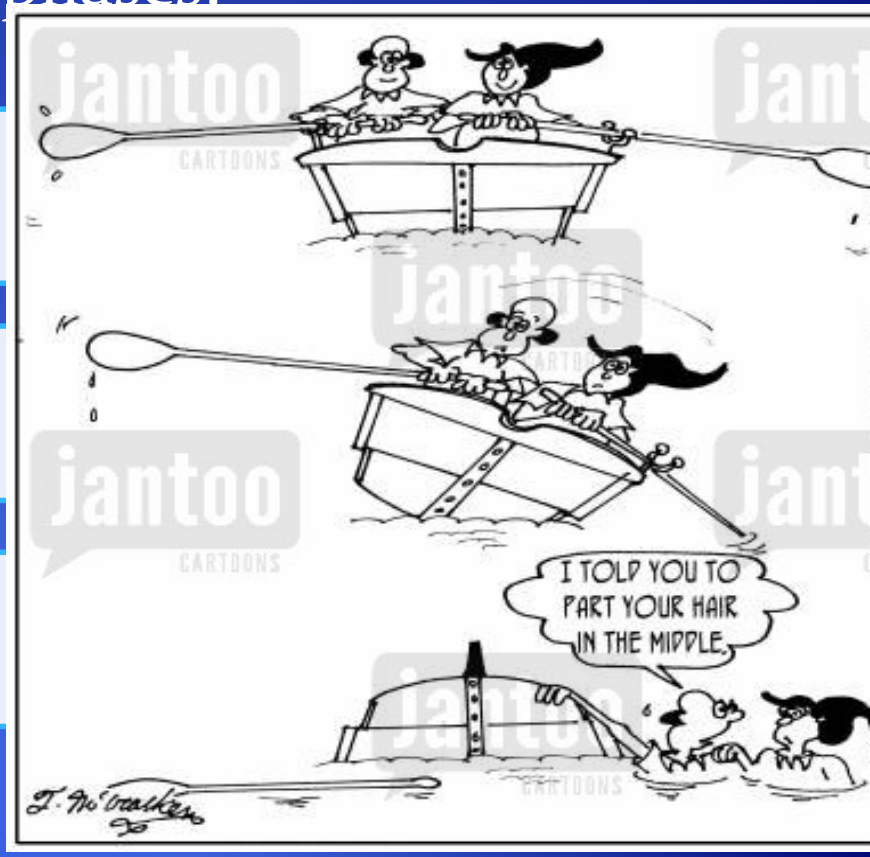
FACTUAL DIAGRAM



Reconstruction Framework

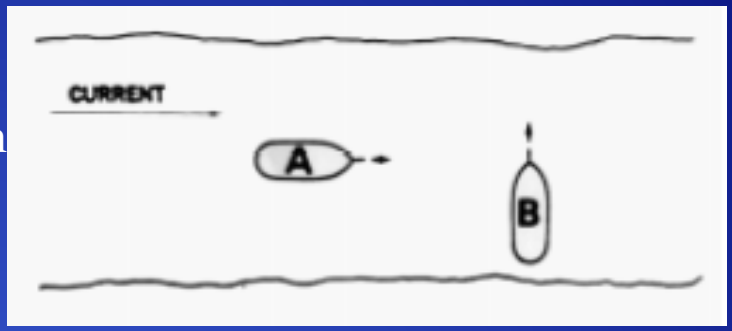
- The process of reconstruction in divided into three basic phases for investigative purposes. They are the "before," "during," and "after" phases:

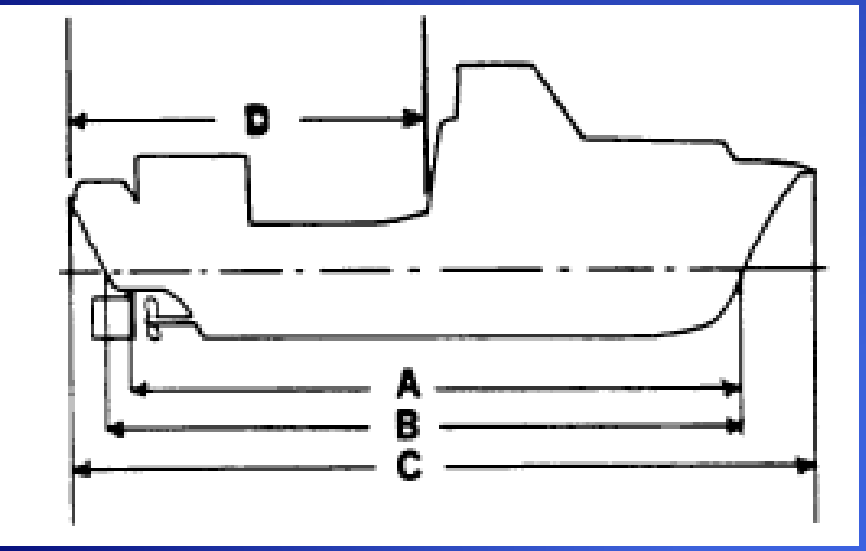
1. **Pre-Accident State**
   (Scene before impact)
2. **Accident Process**
   (What happened on impact)
3. **Post Accident State**
   (Result of impact)



PRE-ACCIDENT STATE:

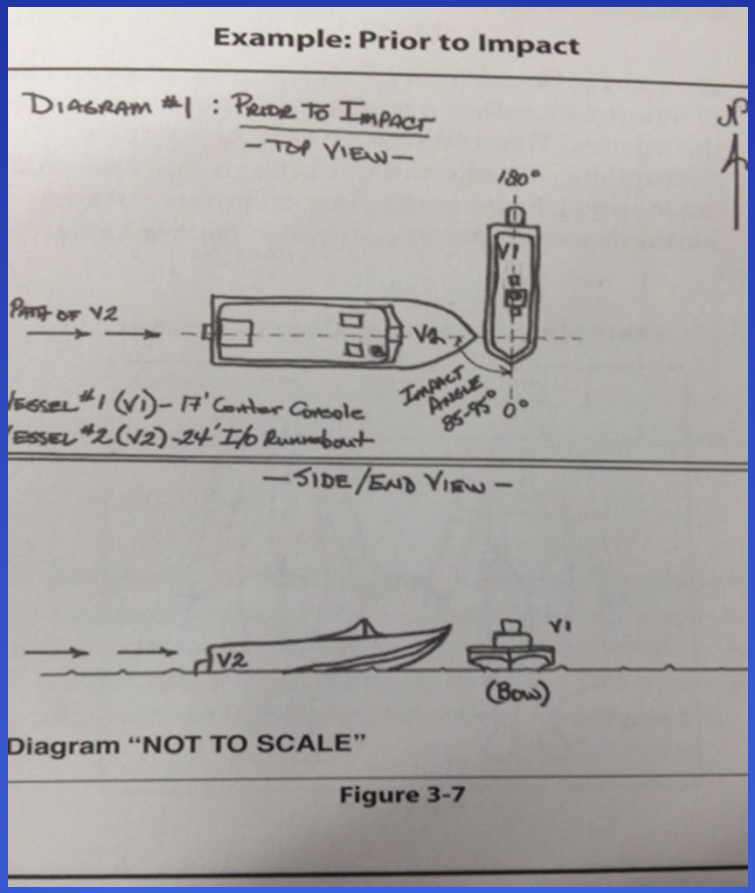
- Condition of boat and associated equipmen
- Condition of occupants







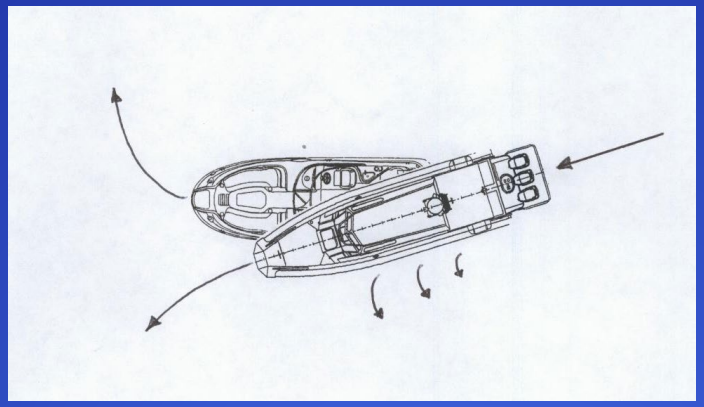
Prior

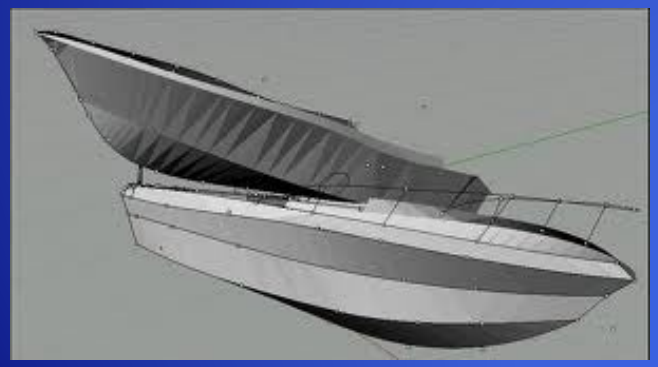

Example: Prior to Impact
DIAGRAM #1 : PRIOR TO IMPACT
– TOP VIEW –
180°
V1
PATH OF V2
V2
IMPACT ANGLE 85-95° 0°
VESSEL #1 (V1) – 17' Center Console
VESSEL #2 (V2) – 24' I/O Runnabout
– SIDE/END VIEW –
V2
V1
(BOW)
Diagram "NOT TO SCALE"
Figure 3-7

ACCIDENT PROCESS:

- Actions, reactions of boat
- Actions, reactions of occupants
- Damage, serviceability

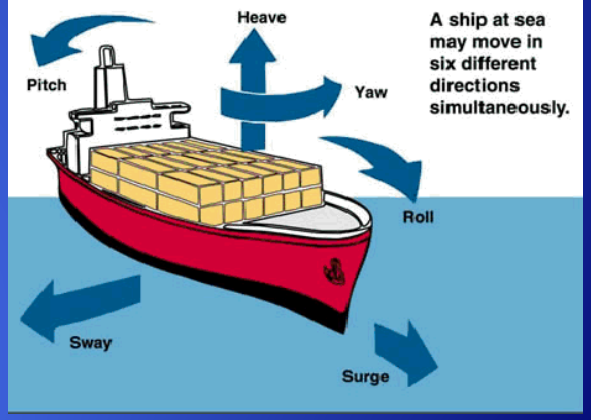




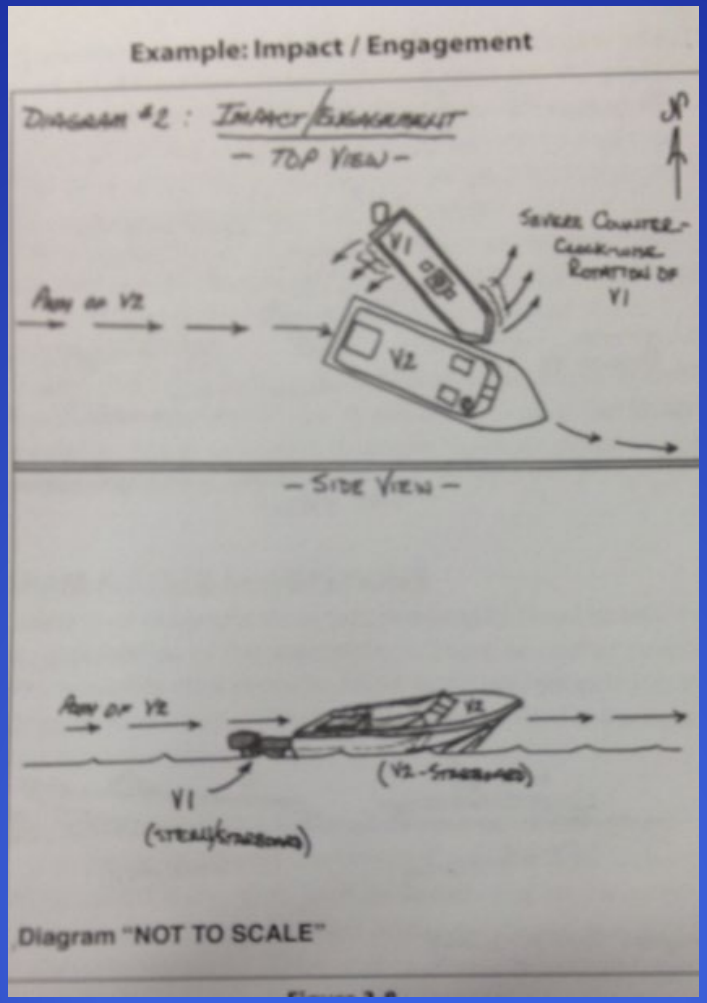




The pictures above and below show what can happen to containers in heavy seas, when a ship rolls.



At Impact


Example: Impact / Engagement
- TOP VIEW -
V1
V2
- SIDE VIEW -
V1
V2
Diagram "NOT TO SCALE"

POST-ACCIDENT STATE:

- Condition of boat and equipment (damage, serviceability, etc.)
- Condition of occupants (autopsy, hospital report, blood alcohol report, etc.)



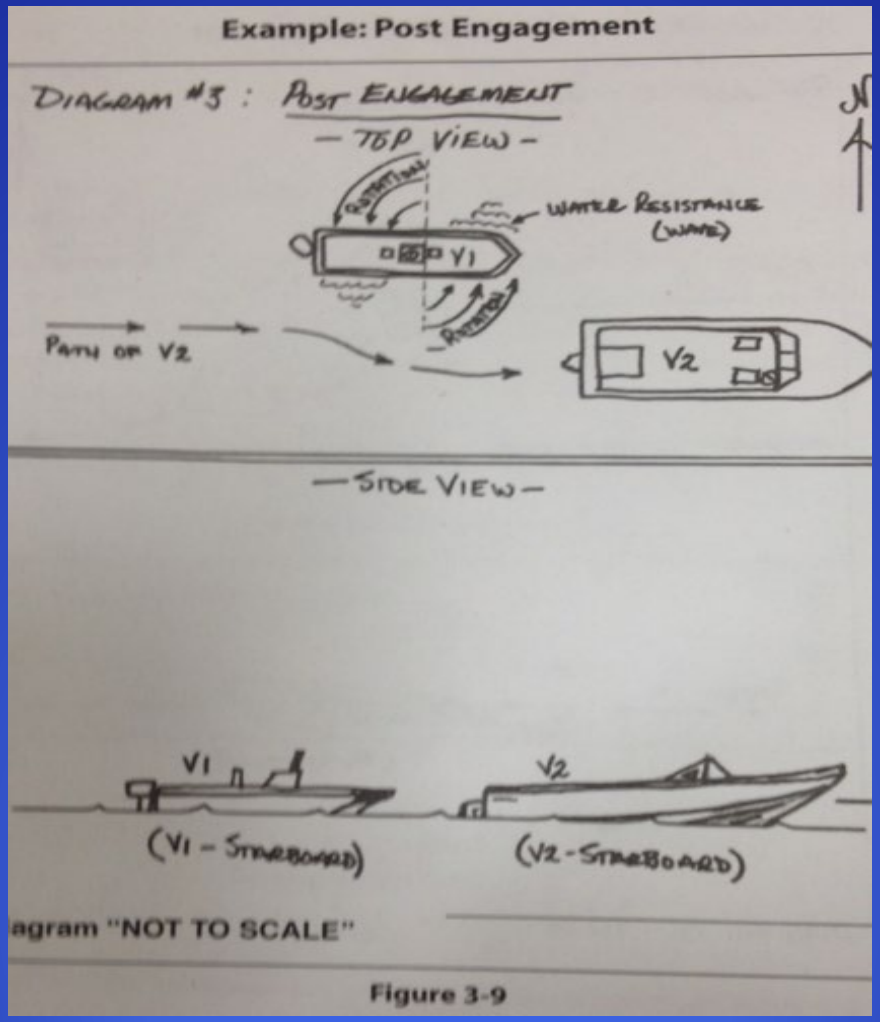








Post


Example: Post Engagement
DIAGRAM #3 : POST ENGAGEMENT
— TOP VIEW —
WATER RESISTANCE (WAKE)
V1
PATH OF V2
V2
— SIDE VIEW —
V1
V2
(V1 - STARBOARD)
(V2 - STARBOARD)
agram "NOT TO SCALE"
Figure 3-9

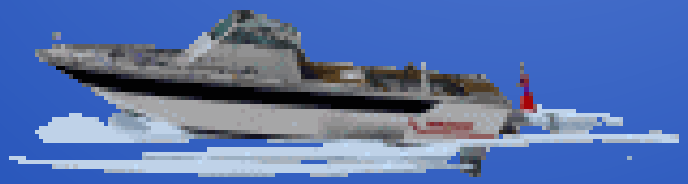
How not to be “That Guy”…

- **<u>Get EVERYBODY’S information</u>**
  - Boating experience, PFD’s worn, swimming ability, & seating position.
- **<u>Take Photos</u>**
  - If there is nothing to photograph, take photographs of nothing
- When done taking photos, take more photos
- Know your Departments SOP’s



SDHPD

Basic Boating



We don't want to be "THAT GUY!"

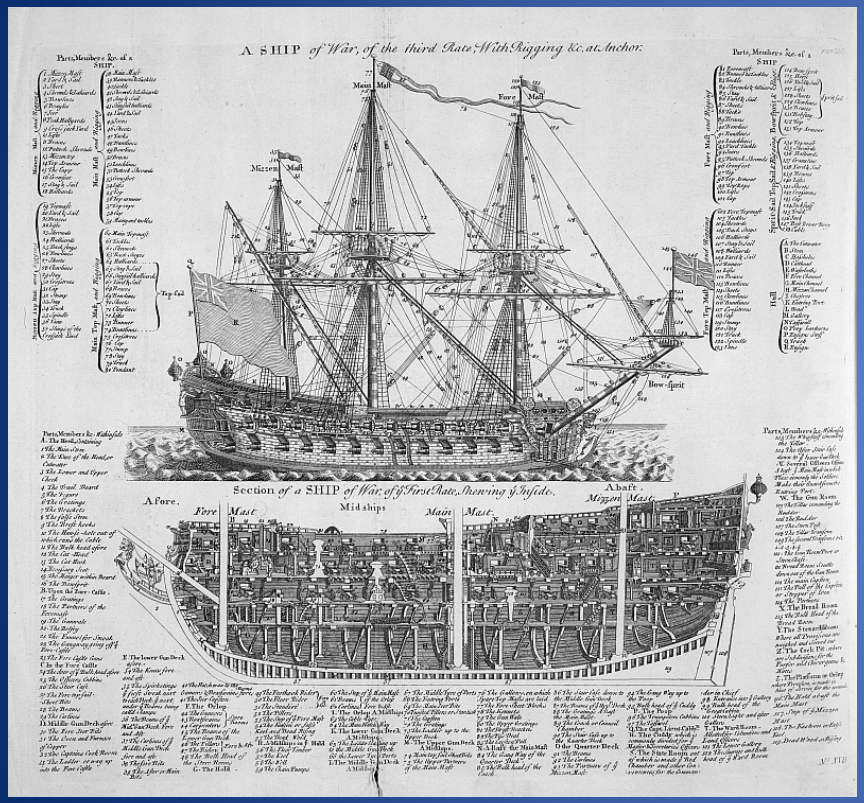


X

Objectives

- Acquaint the student with the appropriate terminology used to identify the various components and equipment found aboard a vessel and those used in a maritime environment.
- Identify the various types of vessels and discuss their characteristics and uses.
- Familiarize the student with vessel registration and documentation requirements.

Why Do We Have Nautical Terms?



- Standardization
- Professionalism
- Precision
- History/Tradition

What is a Vessel?





- A broad generic term for every description of watercraft or conveyance utilized as a means of transportation on the water

What is a Boat?





- Considered smaller than a ship Typically, under 65.7 feet (20 meters)
- Small craft is another term for boat.

What is a Ship?



- Civilian: Greater than 65.7Feet
- Military: Greater than 100 Feet
- Various Types:
  - Cruise Ships
  - Tankers
  - Container
  - Military
  - Specialty

What are different types of Vessels?

Power Boat

A vessel propelled by an internal combustion engine driving a jet pump or a propeller.

Commercial Vessel

Is defined by the USCG as any vessel (boat or ship) engaged in commercial trade or that carries passengers for hire.

Sail Boat

A boat propelled partially or entirely by sails.

Sailboats





- **Sloop**
  - It is the most common type of sailboat and features one mast and two sails, a mainsail and a foresail
- **Schooner**
  - A schooner can have two or more masts, the aftermost mast is taller or equal to the height of the forward mast(s), distinguishing it from a ketch

Ketch



Similar to a sloop, but there is a second shorter mast to the stern of the mainmast, but forward of the rudder post. The second mast is called the mizzen mast and the sail is called the mizzensail.

What defines a Yacht?



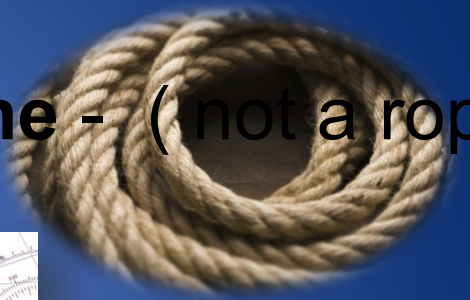


- **Yacht**
  - Is a pleasure vessel, Sail or Power, generally over 40 feet (12.2 meters.)
  - Usually associated with luxury can be described for government vessels utilized by dignitaries/officials (i.e. Presidential Yacht USS Sequoia)

Boating Nomenclature/Terms



Fender – (not a bumper)



Line - (not a rope)

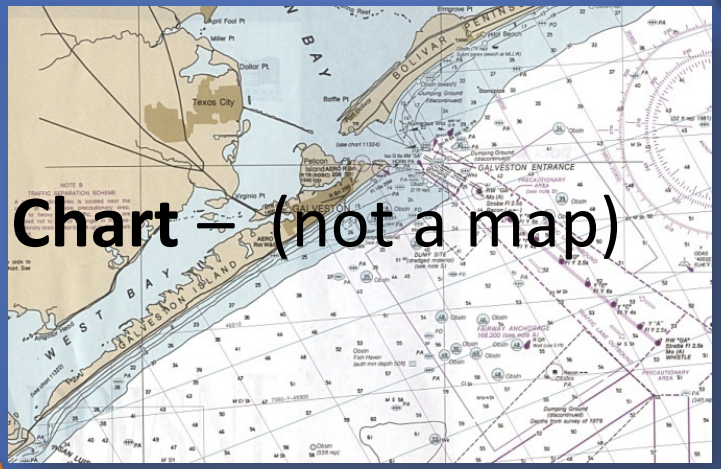


Chart – (not a map)



Overhead – (not a ceiling)



Deck –
(not a floor)

Boating Nomenclature/Terms



Bulkhead – (not a wall)

Bow – (not the front)





Galley – (not kitchen)



Stern – (not the back)



Head – (not toilet)



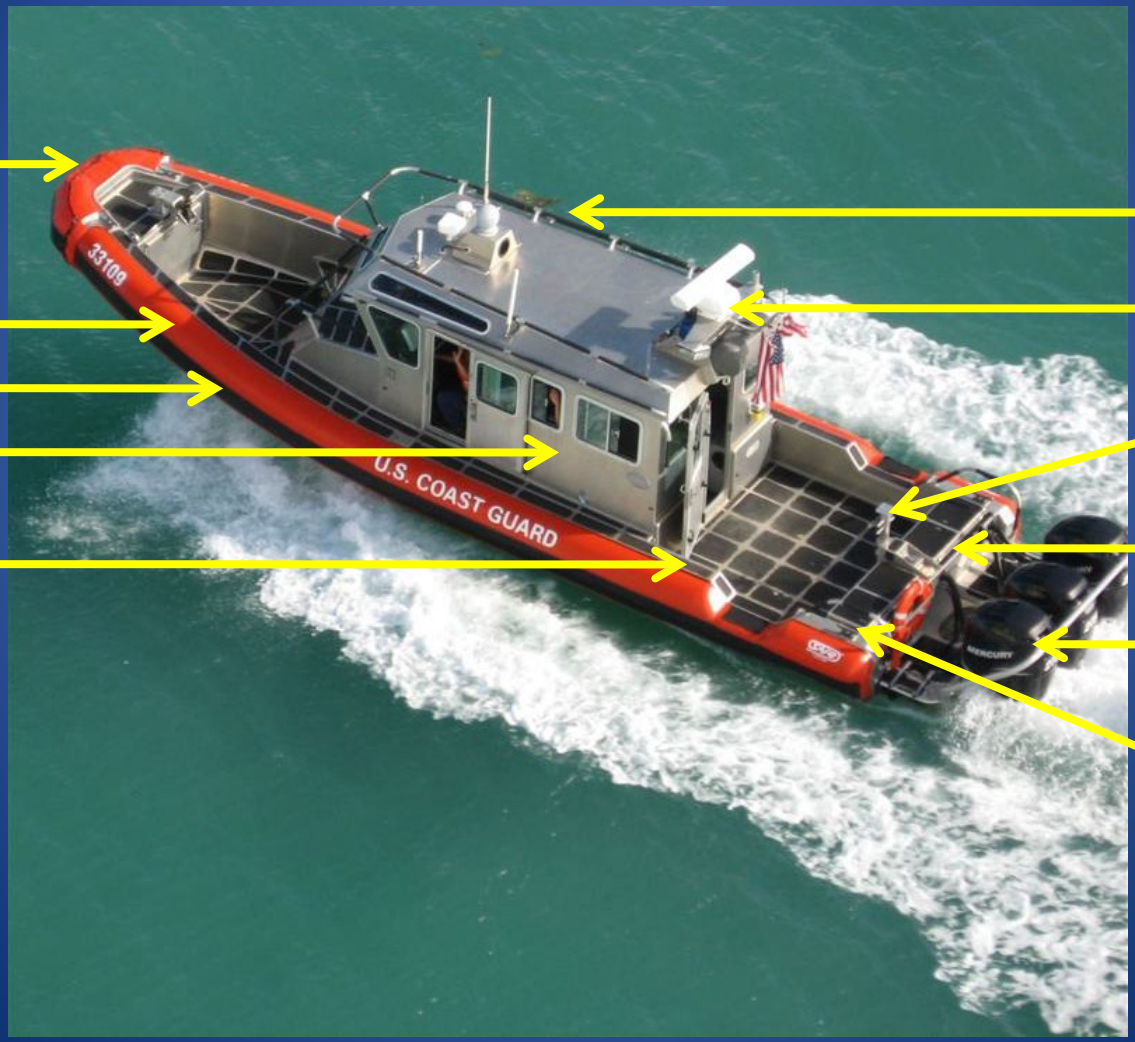
For Official Use Only

Relative Direction Aboard Vessels

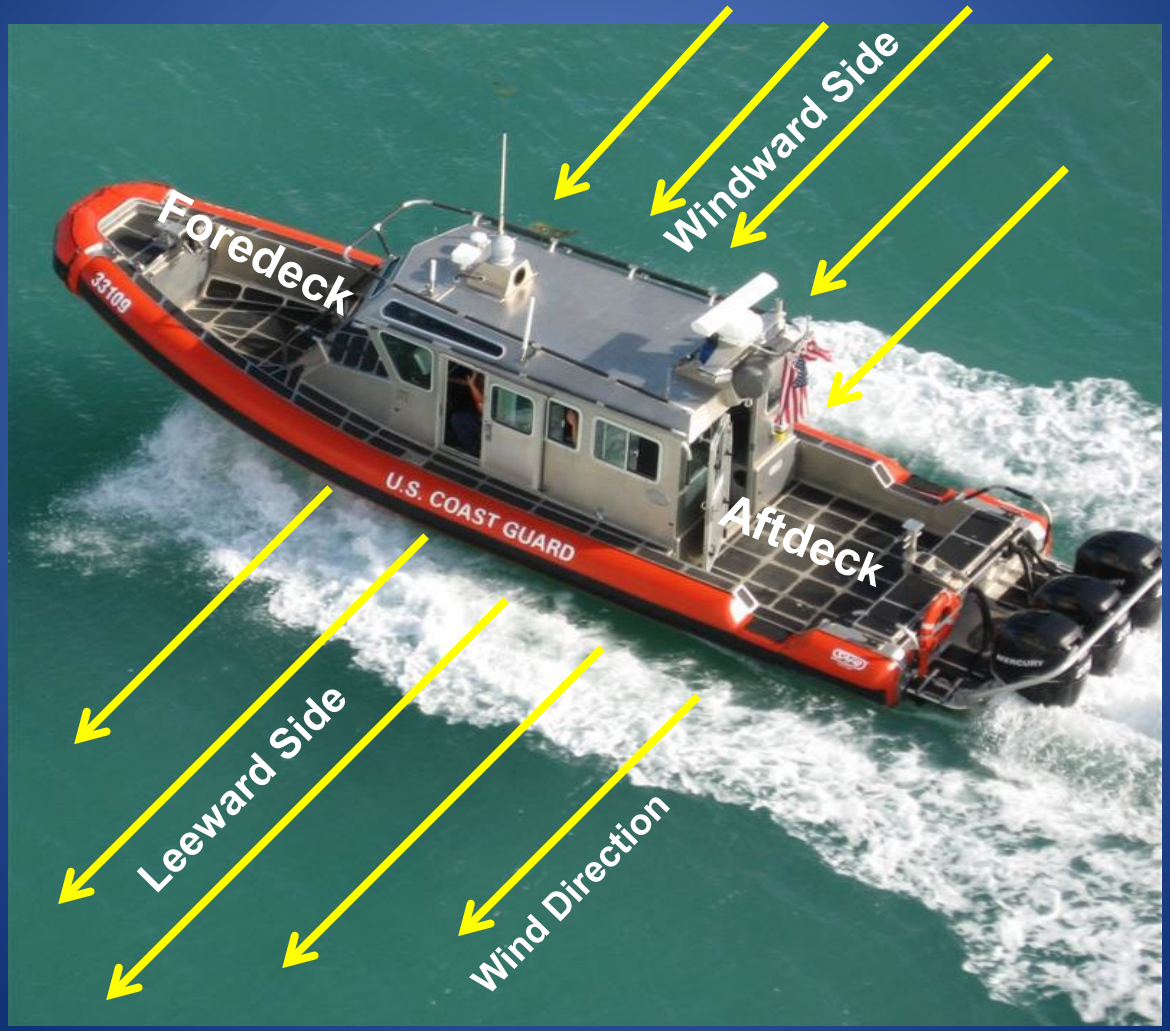
Each of the below directions has a nautical term equivalent

- Front
- **Left**
- Middle
- Up/Down
- Rear
- **Right**
- Inside/Outside

Boating Nomenclature/Terms



Boating Nomenclature/Terms



Relative Direction Aboard Vessels

- **Forward or Fore- The direction toward the bow**
- **Ahead- Something which is in front of the bow**
- **Aft- The direction toward the stern**
- **Astern- When something is behind the stern**
- **Abaft- When something is aft of something else**

MIDDLE





- **Amidship-** Midway between the bow and stern or midway between a vessel's sides.

- **Athwartship-** Something that runs side to side or at right angles to the centerline.

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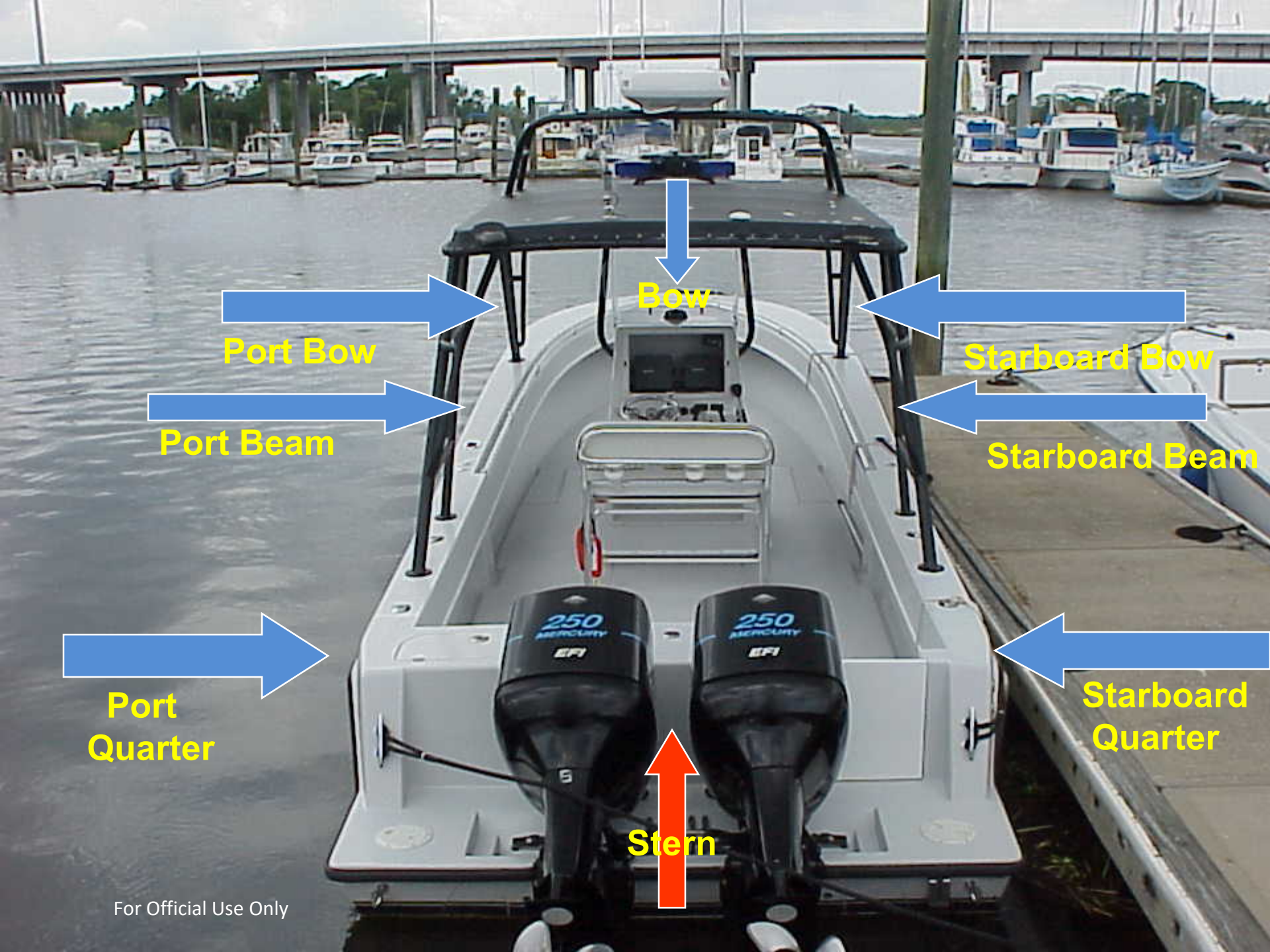

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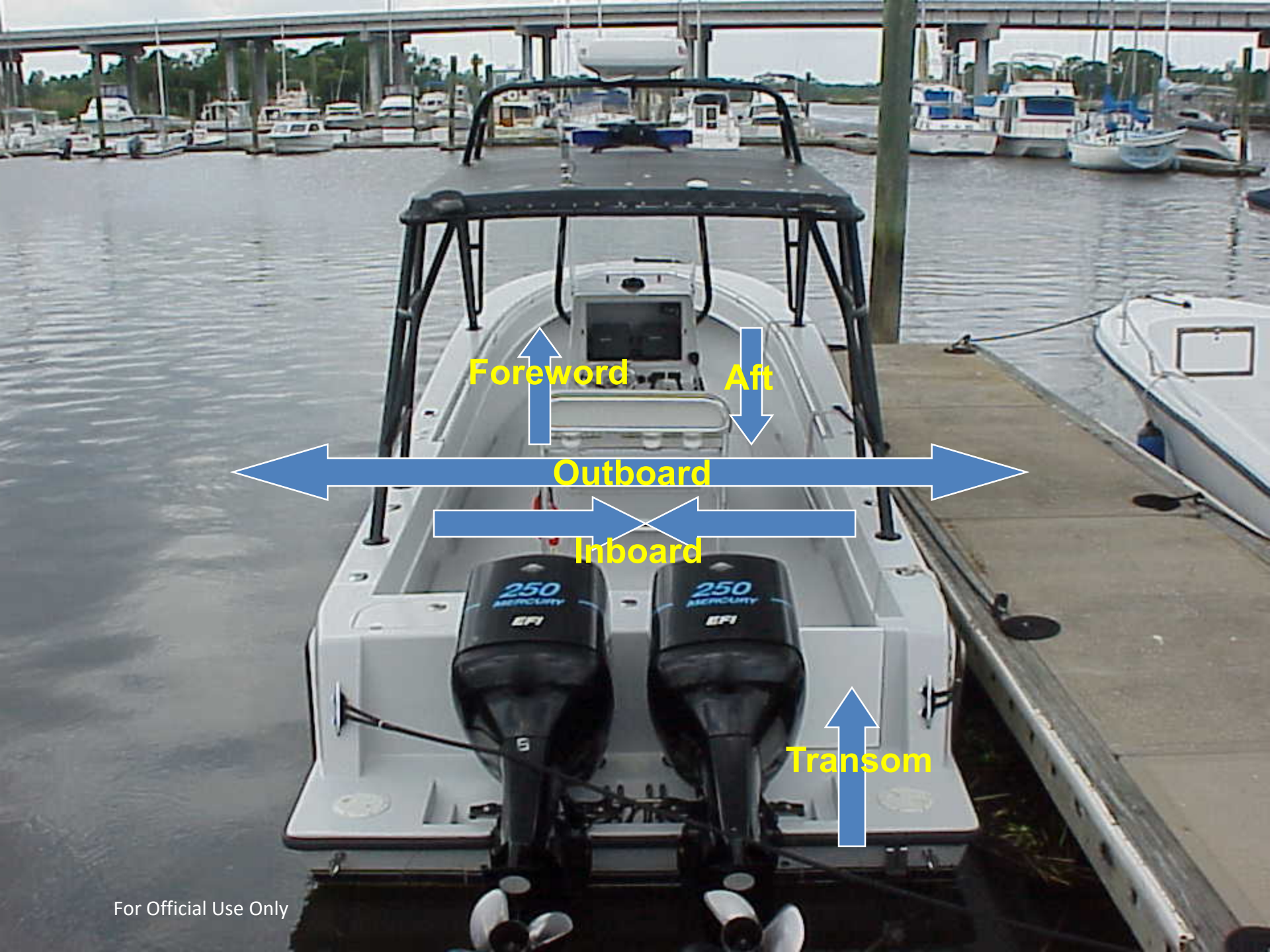

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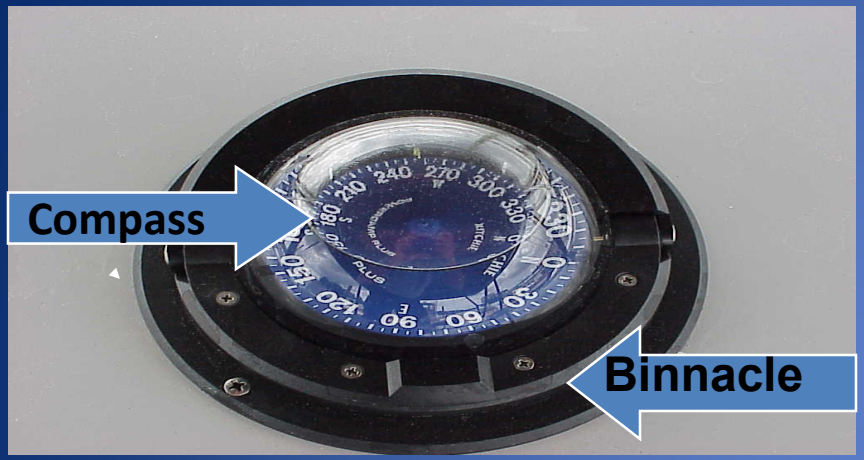
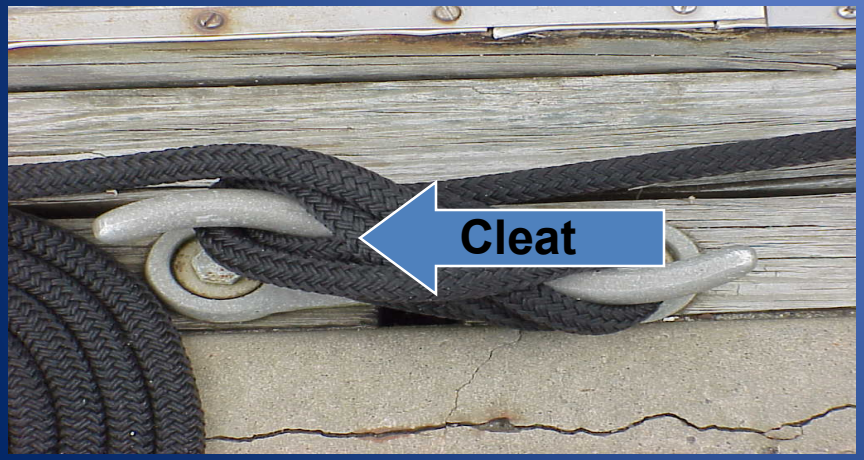
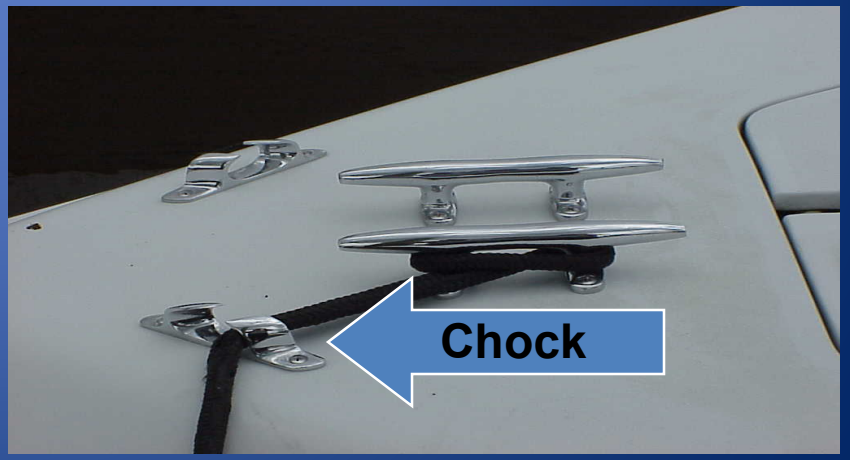
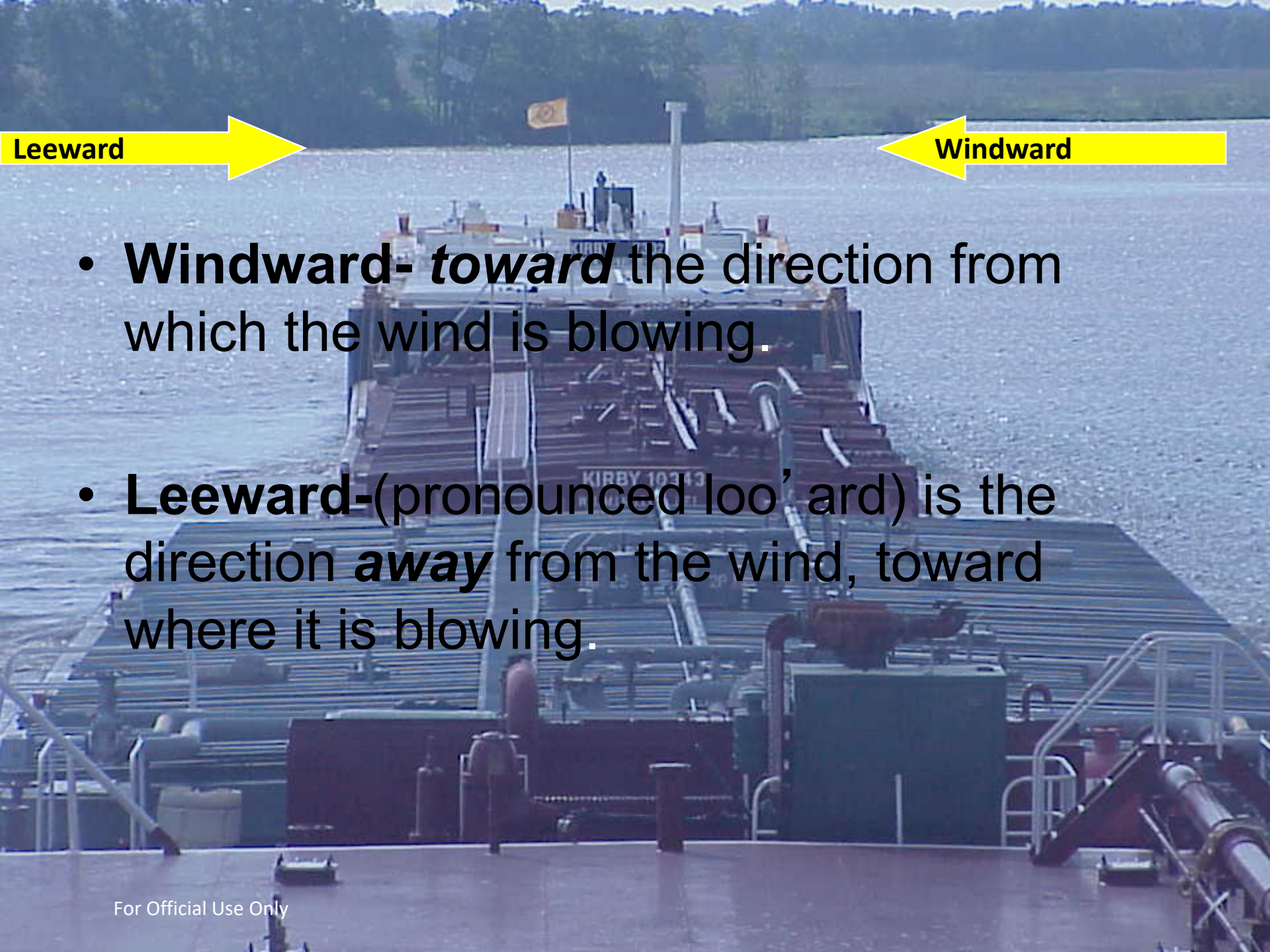
Nautical Accessories











- **Windward-** ***toward*** the direction from which the wind is blowing.

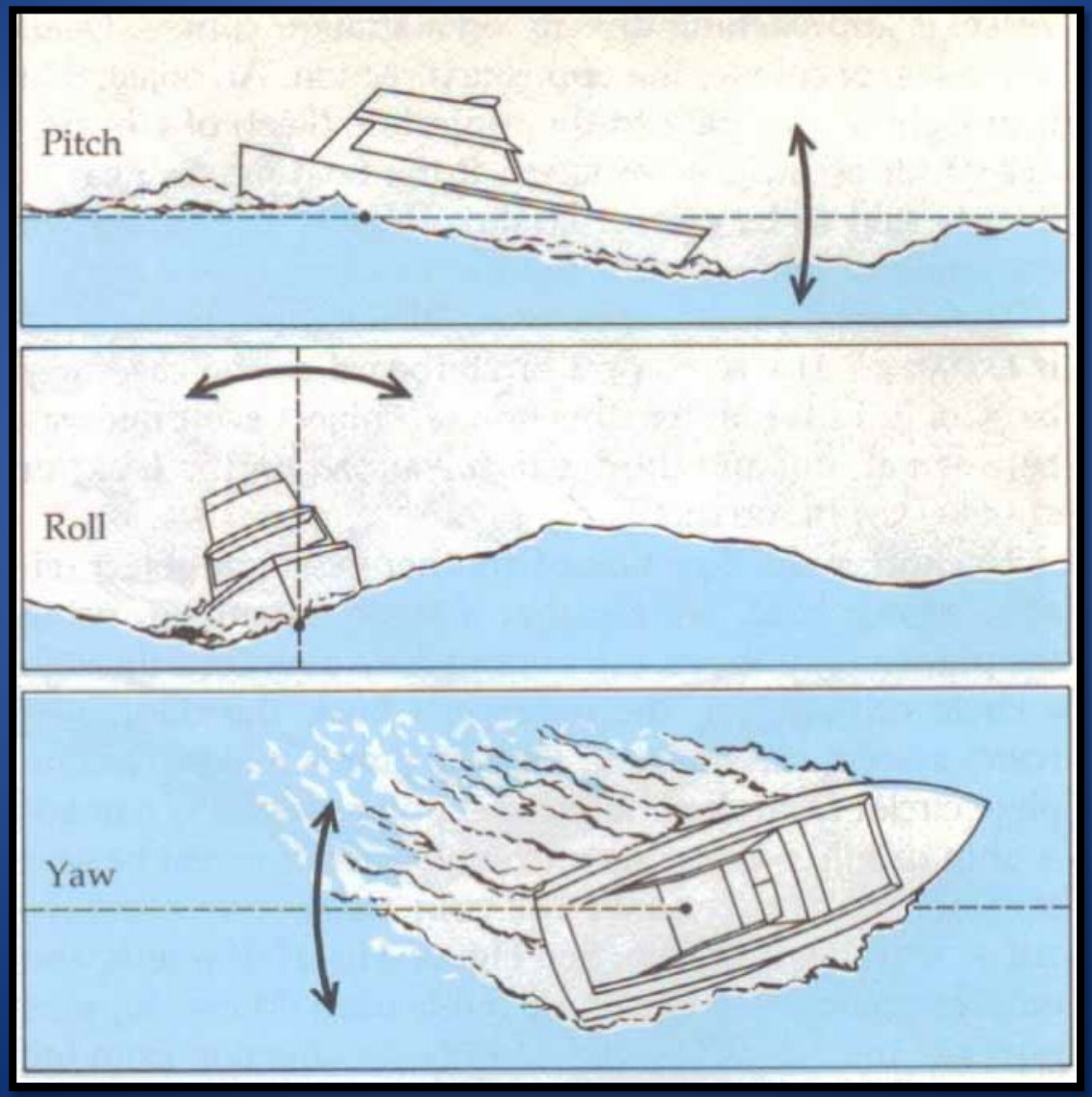
- **Leeward-**(pronounced loo’ ard) is the direction ***away*** from the wind, toward where it is blowing.

For Official Use Only

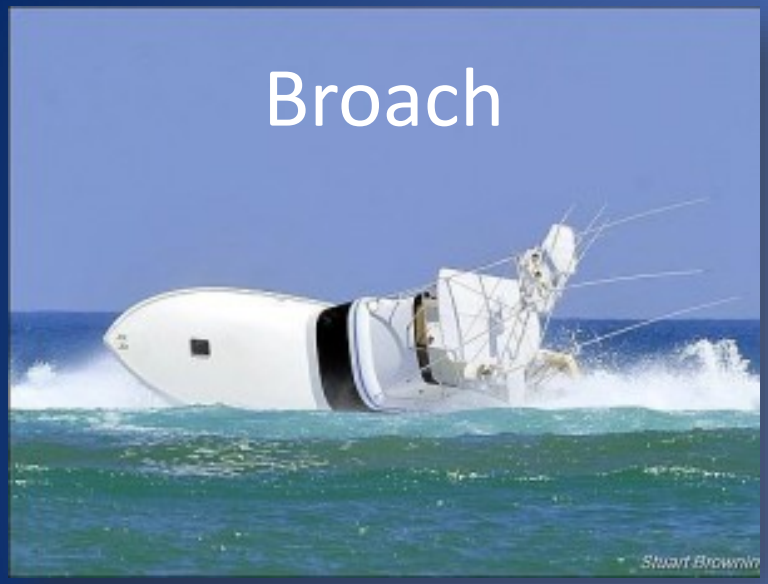
Motions of Vessels

- **Underway-** Moving (not moored, anchored, or aground).
- **Headway-** Moving forward.
- **Adrift** - Floating free with the currents and tide; said of a free floating object or boat which can not move by its own power; floating at random. A vessel adrift is UNDERWAY.
- **Steerageway-** Enough speed through the water for the rudder to act.

Motions of Vessels



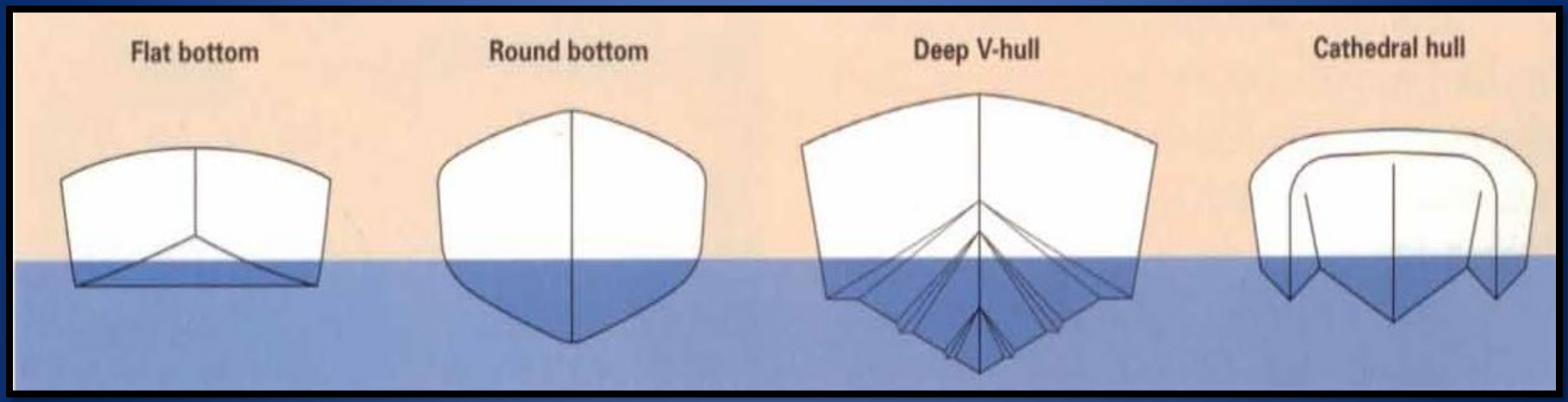
Actions of Vessels







Hull Shapes and Types











Lifting Strakes

- Small linear protrusions that run longitudinally on both sides of the keel to give a planing hull lift and lateral stability.

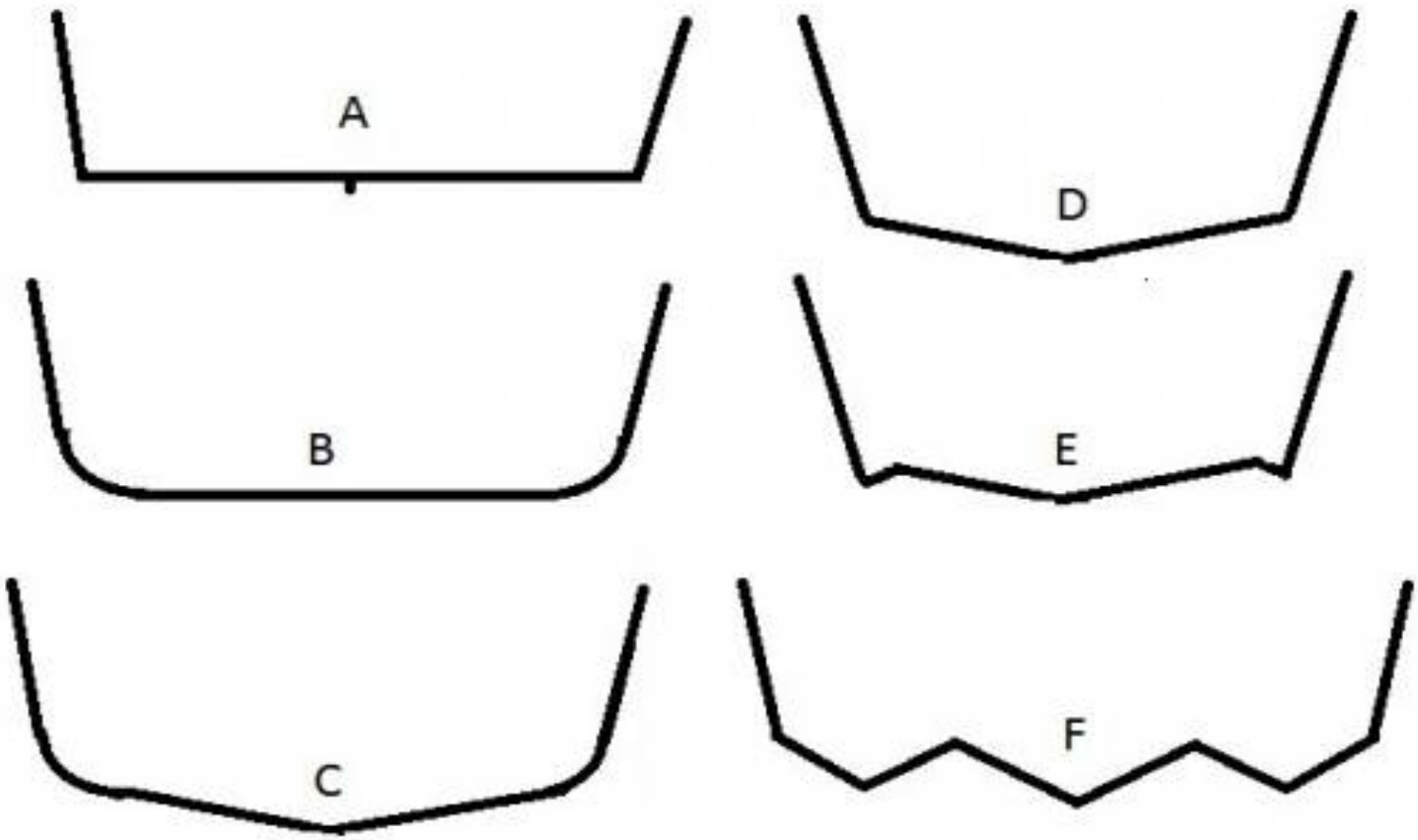


Chine

- A chine is the junction of a boat's topsides (the more or less vertical sides of the hull) Gunnel and her bottom (Hull).

- Chines have several functions, including helping a hull to rise onto a plane and stay there, but the function most noticeable to the average boater is deflecting water away from the hull.

Chine Designs



CHINE DESIGNS

BoatingABC.com

Displacement Hulls



- Displace or move an amount of water equal to the weight of the boat.
- Very efficient-- most long range cruising boats such as trawlers and sailboats use this type of hull.
- Restricted in their speed to the square root of their waterline length times 1.34. Therefore, a 64 foot boat can realistically only expect a top end speed of a little over 10 knots.

Planing Hull



- Designed to ride on top of the water

V-bottoms offer better handling in rough water

Configured to develop positive dynamic pressure to lift much of the hull out of the water so that its draft decreases with increasing speed.

- The dynamic lift is produced via chines and lifting strakes

Deep V





- Designed and intended to ride on top or across the surface of the water but yet cut through it for smooth ride

Mono Hull



Catamaran









FLAT BOTTOM







CATHEDRAL



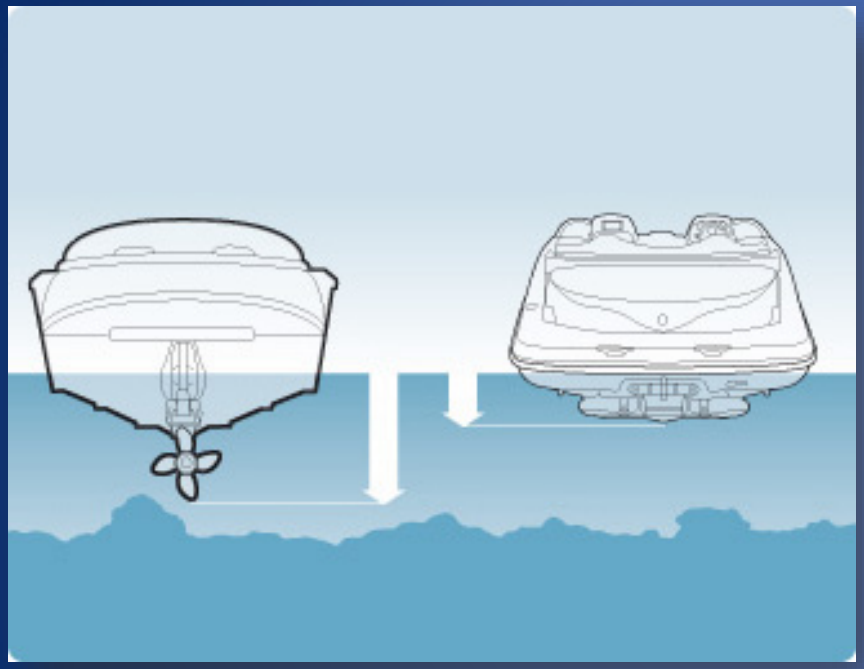


Round Bottom



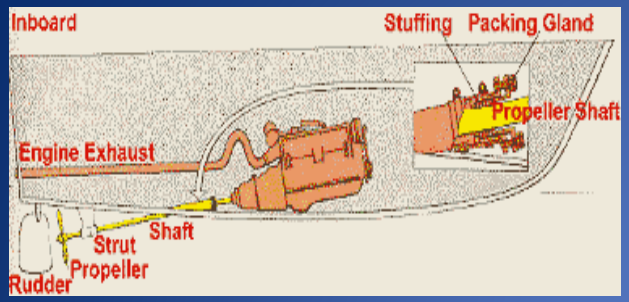


Draft



- The depth of the boat below the waterline; the amount of vertical distance from a boats water line to the bottom of it's keel
- The depth of water necessary to float a vessel

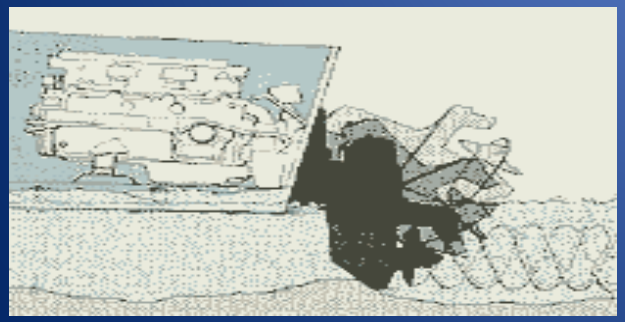
Types of Propulsion



- Inboard

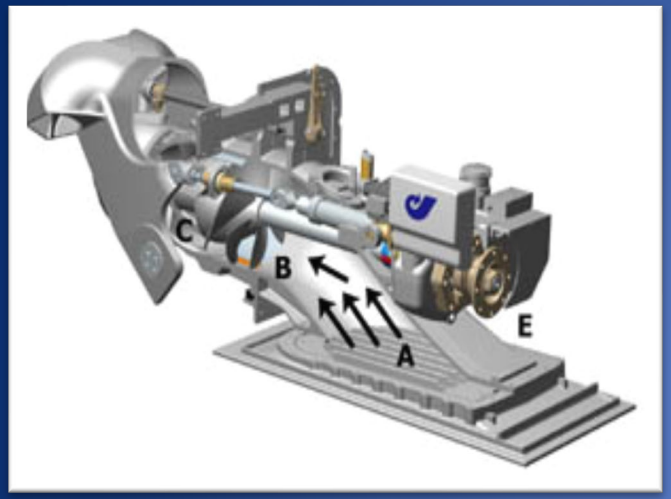


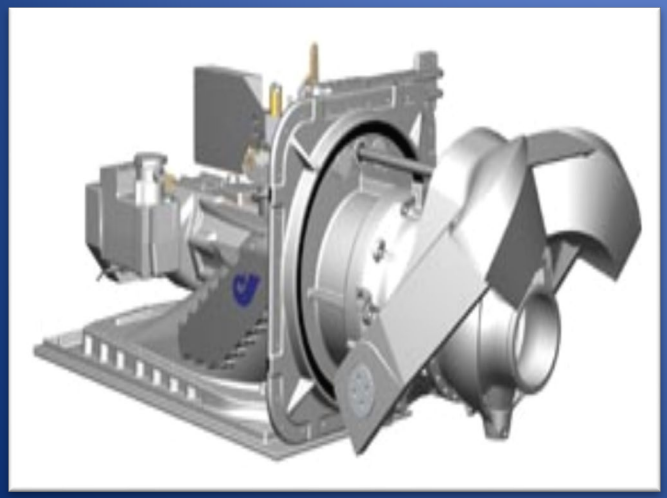
- Outboard



- Inboard/Outboard

Water Jet Drives





- Are similar to I/O
- The motor is mounted inside the hull
- It draws water into the pump thru the bottom intake. Then ejects water thru a nozzle at the transom.
- Nozzle can be directed, side to side, for steering
- Most jet boats DO NOT maneuver well at low speed or in reverse
- Little or NO “Off Throttle” steering ability

Outboard

Powerhead

- Engine

Midsection

- Exhaust housing

Lower Unit

- Gearbox



Cowling

Mounting bracket

Anti-ventilation plate

Water intake

Propeller

Skeg

Steering

•Inboards use a rudder or rudder in combination with a thrust from the propeller(s)



icula
dde



•Outboards use directed water thrust, usually without a rudder.





Good Judgment

•Based upon an understanding of your boat and the forces acting upon it.

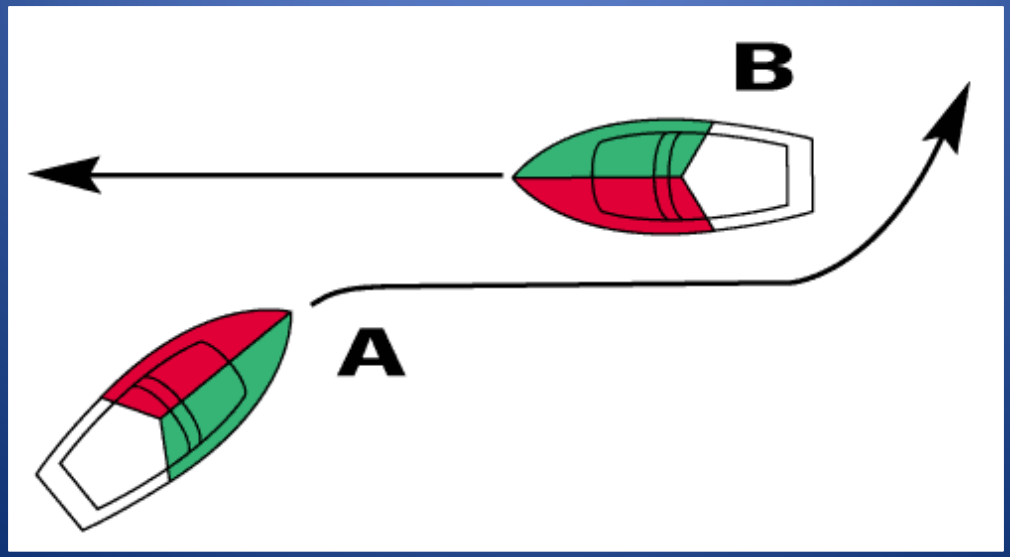
•The combinations of conditions are endless, so you must be able to appraise the situation and act promptly.

•The seasoned helmsman tries to foresee possibilities and have solutions in mind before problems arise.

•Always remember, **"SLOW IS PRO"** when it comes to close quarter handling and docking maneuvers.

Give–way vs. Stand-on

- **Give-way Vessel**
  - Vessel that does not have the right of way, and must give way
- **Stand-on Vessel**
  - Vessel that has the right-of-way and should maintain her course and speed



Aids to Navigation (AToN)

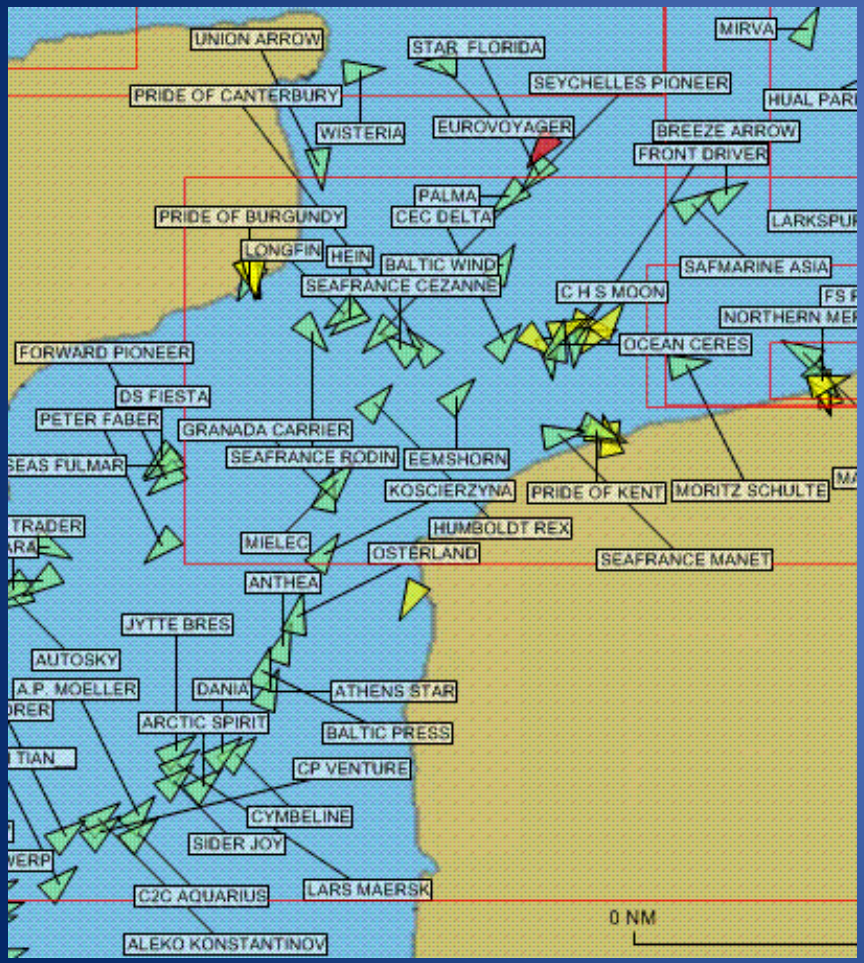






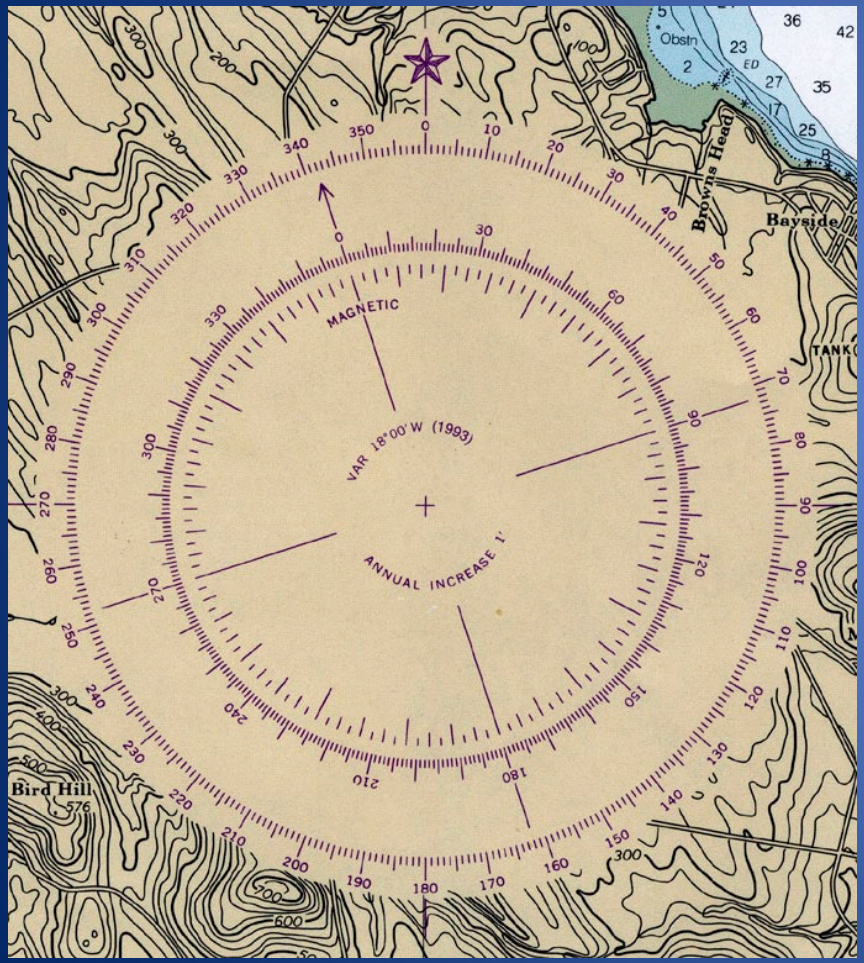
- ATON- Any fixed object that a navigator may use to find his position, such as permanent land or sea markers, buoys, radio beacons, and lighthouses, and to indicate safe and unsafe waters.

AIS



- The Automatic Identification System (AIS) is an automatic tracking system used on ships by vessel traffic services (VTS) for identifying and locating vessels by electronically exchanging data with other nearby ships, AIS base stations and satellites

Compass Rose



- The compass rose has appeared on charts and maps since the 1300's. Originally, this device was used to indicate the directions of the winds, but today indicates the points of our compass. Usually found on charts or maps, North is indicated by a star on the outer ring, while magnetic north is shown on an inner ring by an arrow (with the correction for variation indicated inside the rose)

Global Positioning System (GPS) -

A navigation system using satellite signals to fix a position with great accuracy





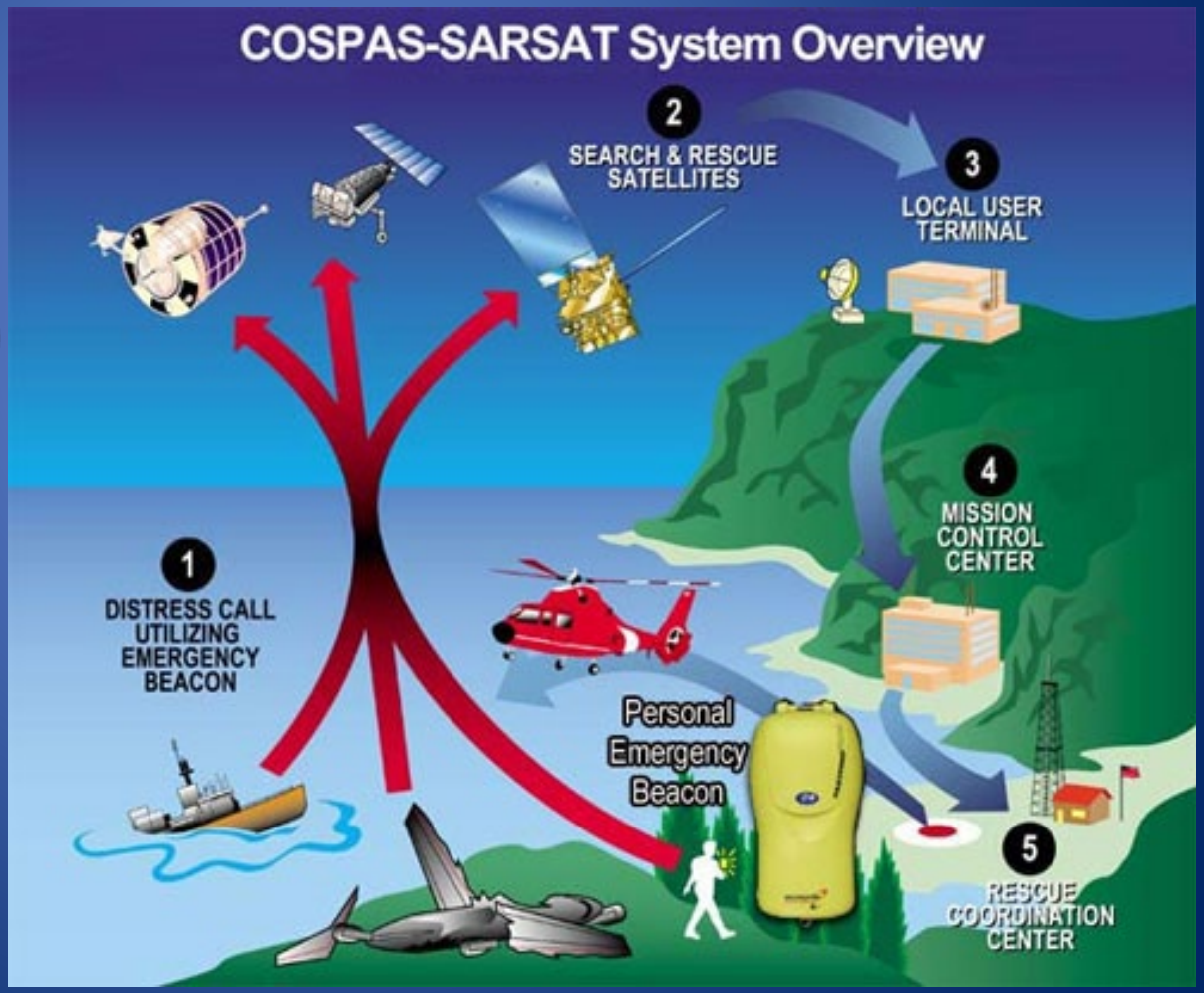


Boating Nomenclature/Terms



EPIRB

Emergency Position Indicating Radio Beacon



Boating Nomenclature/Terms

Line -

Rope and cordage used aboard a vessel. On boats there are no ropes; they are all called lines

A particular line generally derives its name from the object it affects ie: bow, stern, tow, spring

Anchor Line?

Rode (anchor-chain & line)

List



- The leaning of a boat to the side because of excess weight on that side

Marine VHF Radio





- A marine VHF set is a combined transmitter and receiver and only operates on standard, international frequencies known as channels.
- Channel 16 is the international calling and distress channel.
- Transmission power ranges between 1 and 25 watts.
- Maximum range:
  - Up to 60nm between aerials mounted on tall ships.
  - Around 5nm between aerials mounted on small boats at sea level.

Moor



- To attach a boat to a mooring, dock, post, anchor, etc.



Boating Nomenclature/Terms

Notices to Mariners -

http://www.navcen.uscg.gov/lnm/d11/default.htm

"Mayday" Emergency

"Pan Pan" (x3) urgency on board a boat, ship or aircraft

"Sécurité" (x3) *information about people or vessels in distress and* objects or events that can be an immediate danger

Personal Flotation Device (PFD)





- Official terminology for life jackets.
- When properly used a PFD will support a person in the water.
- Also called a life jacket, life preserver, life vest, life buoy, life ring, etc

Personal Watercraft





- Is a recreational watercraft that the rider sits or stands on, rather inside, as in a boat.
- The PWC industry reached an agreement with the Coast Guard in 1999 whereby a PWC cannot exceed 65 mph pursuant to a specified test protocol.
- Can only operate sunrise to sunset.

RDF & Relative Bearing





- **Radio Direction Finder (RDF)** - A navigational instrument which provides a bearing to a radio beacon
- **Relative Bearing** - Direction or bearing of an object relative to a boat's heading

Wake



Is the region of recirculating flow immediately behind a moving or stationary solid body, caused by the flow of surrounding fluid around the body.

DOCUMENTED
VS.
UN-DOCUMENTED

Documented





- Some larger recreational vessels (over 5 tons) may be documented.
- Certificate of documentation MUST be on board at all times.
- Does not exempt from:
  - Applicable state or federal taxes
  - Compliance with federal or state equipment carriage requirements.

DHS; USCG, CG-1270 (REV. 06-03) OMB APPROVED 2115-0110

UNITED STATES OF AMERICA

DEPARTMENT OF HOMELAND SECURITY
UNITED STATES COAST GUARD

NATIONAL VESSEL DOCUMENTATION CENTER

CERTIFICATE OF DOCUMENTATION

VESSEL NAME	OFFICIAL NUMBER	IMO OR OTHER NUMBER	YEAR COMPLETED
ANDREW J. BARBERI	629314		1981

HAILING PORT	HULL MATERIAL	MECHANICAL PROPULSION
NEW YORK, NY	STEEL	YES

GROSS TONNAGE	NET TONNAGE	LENGTH	BREADTH	DEPTH
3,335 GRT	2,268 NRT	310.0	70.0	20.7

PLACE BUILT
NEW ORLEANS, LA.

OWNERS
THE CITY OF NEW YORK, DEPARTMENT OF TRANSPORTATION, BUREAU OF FERRY AND GENERAL AVIATION

OPERATIONAL ENDORSEMENTS
COASTWISE

MANAGING OWNER
N.Y.C. DEPT. OF TRANSPORTATION
FERRY MAINTENANCE FACILITY
1 BAY STREET
STATEN ISLAND, NY 10301

RESTRICTIONS
NONE

ENTITLEMENTS
NONE

REMARKS
NONE

ISSUE DATE
SEPTEMBER 11, 2003

THIS CERTIFICATE EXPIRES
SEPTEMBER 30, 2004

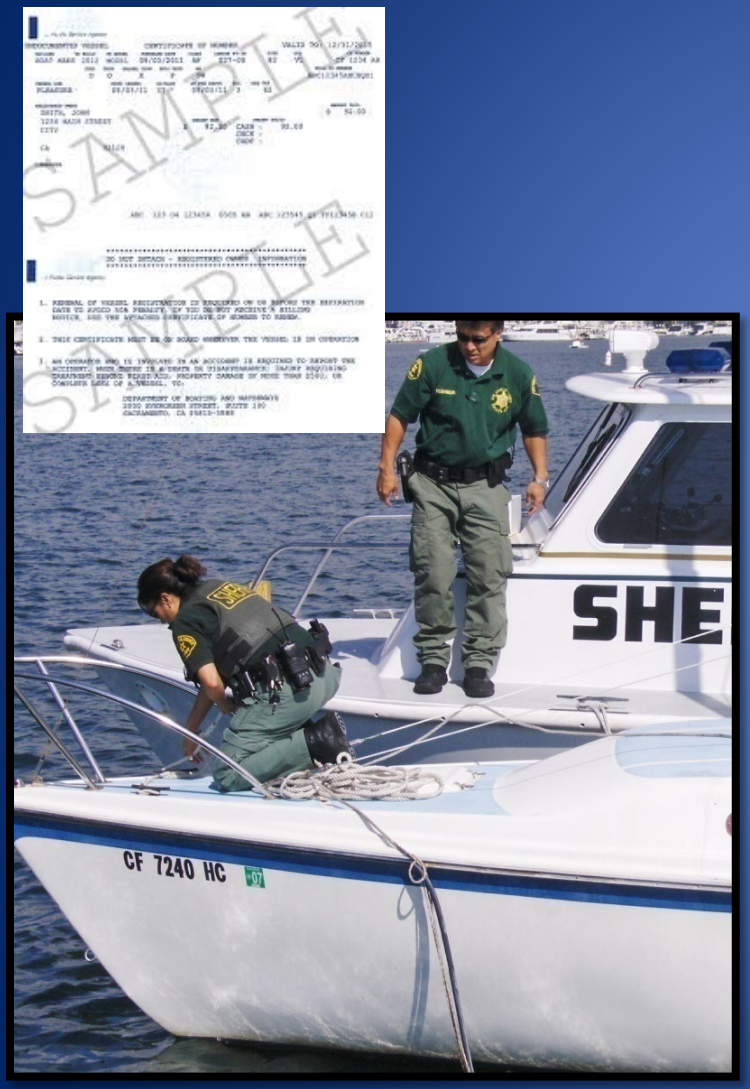
VDS
1241674

Thomas Wills

DIRECTOR, NATIONAL VESSEL DOCUMENTATION CENTER

PREVIOUS EDITION OBSOLETE. THIS CERTIFICATE MAY NOT BE ALTERED

Undocumented Vessels



- Vessels equipped with propulsion machinery must be registered.
- A certificate number will be issued upon registering the vessel.
- Numbers must be displayed on the vessel.
- Owner/operator must carry certificate when the vessel is in use.
- Certificate is valid for 60 days when you move to a new state.
- Dinghies? Electric Motors?

Six Primary Types of Anchors

Fisherman





Fluke/Danforth

Bruce/Claw





Grapnel

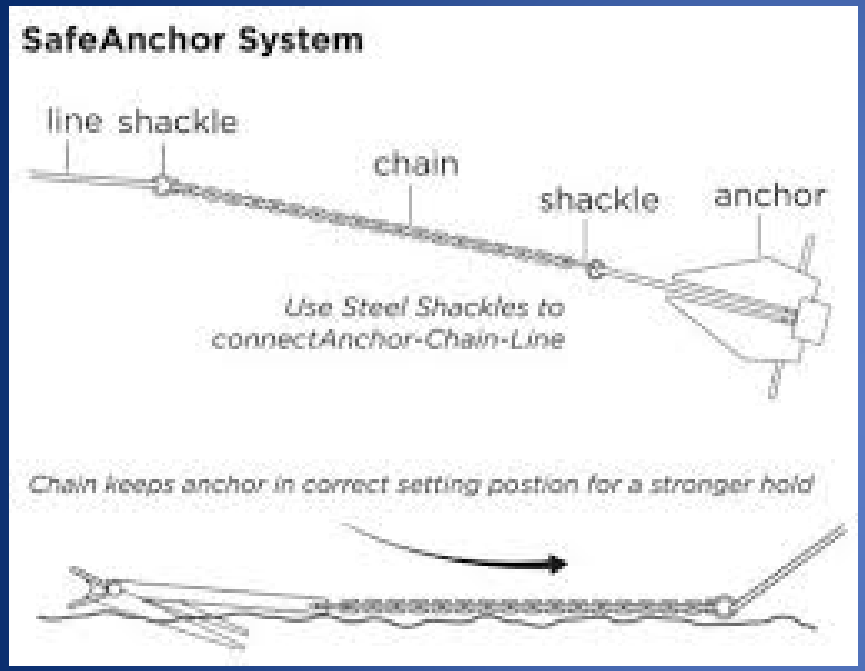
CQR/Plow





Mushroom

Rode



- The anchor line, cable or chain that connect the anchor to the boat

Anchoring Process

- Snub the line promptly and the anchor should get a quick bite into the bottom
- Once it has a good bite, make the line fast and shut off the motor
- Monitor the anchor to ensure it holds **"Anchor Watch"**



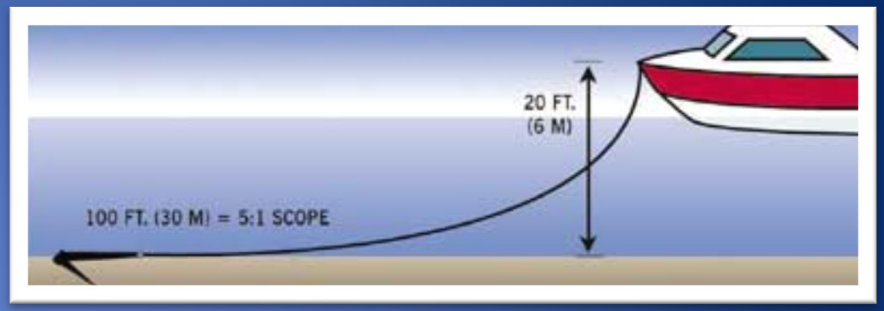




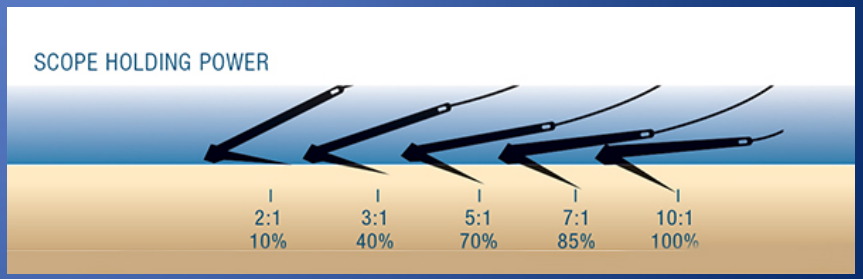


Scope

- The ratio of the length of the anchor rode to the height of the bow above the bottom



- Ranges from 5:1 – 10:1, depending upon the sea and weather conditions



Retrieving the Anchor







Emergency Repair Kits











What are your Questions?

Boating Under the Influence











Boating Accidents

- USCG Commandant Publication Boating Statistics:
  - Alcohol Use is the #6 contributing factor in Boating accidents:

    Alcohol was involved in approximately 1/3 of all boating fatalities.

    (300 accidents average per year with 100 fatalities)

Dangers of BUI

- **USCGBoating.org**:
- Alcohol affects judgment, vision, balance, and coordination. These impairments increase the accidents afloat – for both passengers and boat operators. USCG data shows that deaths involving alcohol use, over half the victims capsized their boats and/or fell overboard.

- Alcohol is even more hazardous on the water than on land. The marine environment – motion, engine noise, sun, wind and spray – accelerates a drinker's impairment.

Harbors and Navigation Code

- 655(b) H&N – BUI – No person shall operate any vessel or manipulate water skis, an aquaplane, or a similar device while under the influence of an alcoholic beverage, any drug, or the combined influence of an alcoholic beverage and any drug.

- 655(g) H&N – Notwithstanding any other provision of law, information, verbal or otherwise, which is obtained from a commissioned, warrant, or petty officer of the USCG who directly observed the offense may be used as the sole basis for establishing the necessary reasonable cause for a peace officer of this state to make an arrest pursuant to the United States Constitution, the California Constitution, and Section 836 of the Penal Code for violations of subdivisions (b), (c), (d), and (e) of this section.

Harbors and Navigation Code

- 655.1 H&N – Chemical Test Admonishment (Form DS 367)
- 655.5 H&N – Enhanced Penalties for Chemical Test Refusal
- 663 H&N – Authority to Stop and Board Vessels – where the peace officer has PC to believe a violation of state law or regulations or local ordinance exists.

Harbors and Navigation Code

- 663.1 H&N – Arrest without Warrant – Notwithstanding any other provision of law, a peace officer may, without a warrant, arrest a person who is involved in an accident in the waters of this state involving a vessel when the officer has reasonable cause to believe that the person had been operating the vessel while under the influence of an alcoholic beverage or any drug, or under the combined influence of an alcoholic beverage or any drug.

- 663.6 H&N – Vessel Shall Stop on Lawful Order

Prevention

- BUI / DUI is wrong
- No one has the right to endanger others
- BUI / DUI cannot be tolerated or condoned
- Is it legal to operate a vessel and drink?




14

Vessel Operator Capabilities

- Information processing
- Short term memory
- Judgment/Decision making
- Balance
- Steady, sure reactions
- Clear vision
- Small muscle control
- Coordination of limbs



Successful BUI Detection



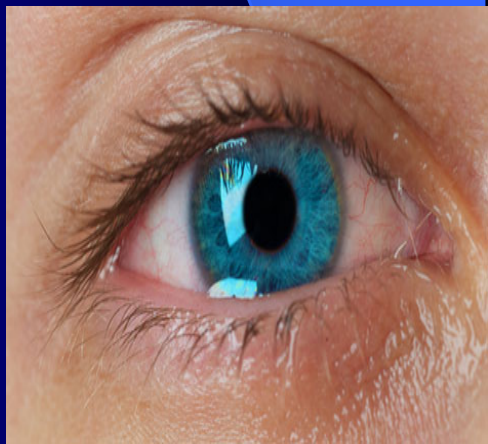
- Know what to look and listen for
- Ask the right kinds of questions
- Choose and use the right kinds of tests
- Make, interpret, and document all observations thoroughly
- Be motivated and apply your knowledge and skill whenever you encounter someone who may be under the influence

Face to Face Observation and Interview of Suspect

- Requires the ability to:
- Recognize the sensory evidence of alcohol and/or other drug influence
- Describe that evidence clearly and convincingly







Subject to Field Sobriety Tests

- Nystagmus (called alcohol gaze nystagmus in final report)
- Finger to Nose
- Finger Count
- Hand Pat
- Writing out the alphabet
- ONCE ON LAND
- Walk and Turn
- One Leg Stand
- Rhomberg

Horizontal Gaze Nystagmus (HGN)



- Most reliable field sobriety test
- Involuntary jerking occurring as eyes gaze toward the sides
- Noticeable when a person is under the influence
- As BAC increases eyes begin to jerk sooner as they move to the side (on set)
- CNS depressants, inhalants, and dissociative anesthetics also cause HGN
- Medical Issues??

Finger count



- Tells subject not to begin test until instructed to do so and asks if subject understands.
- When told to do so, instruct the subject to extend one hand directly in front of him/her. Open the hand with the palm facing upward.
- The thumb is then touched with the index finger and the subject shall count out loud, “ONE.” The thumb is then touched with the middle finger and the subject shall count out loud, “TWO.” The thumb is then touched with the ring finger and the subject shall count out loud, “THREE.” The thumb is then touched with the little finger and the subject shall count out loud, “FOUR.”
- The process is then reversed.
- 1,2,3,4 – 4,3,2,1 is one complete set

Hand Pat / Palm Pat



- When told to do so, instruct the subject to put one hand out in front of him/her with the open palm facing upward. The opposite hand is then placed on top of the first hand with the open palm facing downward.

- The hand with the palm facing upward is held in a stationary position. The hand on top with the palm facing downward will be the only hand moving.

- When told to begin, the subject will rotate the top hand 180 degrees and pat the back of the top hand to the palm of the bottom hand simultaneously counting out loud, “ONE.” The top hand then rotates 180 degrees so the palm of the top hand pats the palm of the bottom hand simultaneously counting out loud, “TWO.”

- The process then repeats. The subject should start at a slow speed then, gradually increase the speed until a relatively rapid pace is reached.

- The subject should perform this FST for a minimum of 10 seconds but no more than 15 seconds.

FTN instructions stage

- Tell subject to stand / sit with your feet together and place your arms at your sides
- You will be asked to touch the tip of your index finger to the tip of your nose. (Demonstrate without touching your nose)
- When told to do so, tilt your head back and close your eyes until told to open them. (Demonstrate)
- Do you understand the instructions?
- Tilt your head back and THEN close your eyes. Instructions: Left, Right, Left, Right, Right, Left.



Alphabet



- Tells subject not to begin test until instructed to do so and asks if subject understands.
- Ask the subject if he/she know the English alphabet.
- Ask the subject his/her highest level of education.
- If performing verbally, ask the subject to recite the alphabet without singing.
- If performing written, provide the subject with paper, pen/pencil, and firm writing surface. Ask the subject to write the alphabet then sign and date the paper.

Modified Romberg Balance

- Tell subject to sit straight with your feet together and arms down at your sides. Maintain that position and do not start until told to do so. Do you understand the instructions?

- When told to begin, tilt your head back and close your eyes. (Demonstrate but do not close your eyes.)

- When I say start, keep your head tilted back with your eyes closed until you think thirty seconds has gone by. Once you think 30 seconds have gone by, bring your head forward, open your eyes and say “Stop”.

- Do you understand the instructions? Once they indicate they understand, direct them to begin.

- Once the subject opens their eyes, Ask “How much time was that ?”

- Ensure they are not resting their backs against seating

OFF BOAT and ON LAND

- 20 minutes monitoring subject
- Allows subject to regain balance coordination from being on water
- Keep in mind, docks can still move around
- Detention plus movement equals - arrest

Two Divided Attention Tests

- Walk and Turn



- One Leg Stand



Walk and Turn

- Divided Attention
- Mental Task and Physical Task

- Instructions stage
- Walking stage





Walk and Turn Administrative Procedures

- **Verbal instructions:**
  - Assume heel toe stance
  - Arms down at sides
  - Don't start until told
- **9 heel to toe steps turn, 9 heel to toe steps**

- **Turn procedures:**
  - Turn around on line
  - Several small steps

- **While walking**:
  - Keep watching feet
  - Arms down at sides
  - Count steps out loud
  - Don't stop during walk

OLS Balancing & Counting Stage

- **Divides subject's attention:**
  - Balancing task
  - Small muscle control
  - 30 second timing is important!





OLS Administrative Procedures

- Balance and counting stage:
  - Raise either leg
  - Keep raised foot approximately six inches off ground, foot parallel to the ground
  - Keep both legs straight and arms at your side
  - Keep eyes on raised foot
  - Count out loud in the following manner: “One thousand one, one thousand two, one thousand three and so on”, until told to stop (30 seconds)

Rhomberg



- The DUI Rhomberg balance test is a non-standardized field sobriety test (FST). During the administration of the Rhomberg balance test, the DUI suspect is to:

- Stand with his/her feet together
- Have his/her head tilted slightly back
- Have his/her eyes closed
- Estimate the passage of 30 seconds
- When the DUI suspect believes that 30 seconds has passed, he/she should tilt his/her head forward, open his/her eyes, and say "stop."


OVER
THE LIMIT
0:00
Over the Limit
0:30
0:11
II

Note Taking and Testimony

- Graphically describe your observations
- Convey evidence clearly
- Field notes are only as good as the information they contain

License and Registration

- They forget to produce both documents
- They produce wrong documents
- They fail to see the license, registration, or both while searching for them
- They fumble or drops wallet, purse, license, or registration
- Unable to retrieve documents using fingertips

Use Clear Language

Vague	Clear
Operator was within 200 feet of a beach	The vessel was traveling on plain within 200 feet of a beach. The beach and water was occupied by swimmers.
PWC jumped boat wake	The PWC disappeared behind a ski boat and only re-appeared when it jumped the port side wake of the ski boat, approx. 25 feet off stern.
Operator appeared drunk	operators eyes bloodshot; gaze fixed; Strong odor of alcoholic beverage on operators breath

BUI Defense

- Parts to defend:
  - Criminal Charges
  - DMV
  - Report Accuracy
  - Elements of Crime
  - Procedures



BUI Defense

- "BUI boating defenses and drunk boating strategies include attacking the chemical test, poor BUI investigation, failure to properly administer a number of field sobriety tests, lack of proficiency in BUI enforcement or testifying, failure to prove actual operation while impaired, etc."
- The prosecutor often has difficulty proving the defendant was the operator of a vessel with more than one person aboard since it is possible to move away from the controls of a vessel for any period of time with ease.

BUI Defense

- Every place the police report is silent is a fertile area to demonstrate the innocence of the accused. Everything the accused didn't do can be the best evidence of their sobriety, and the basis for a 'not guilty' verdict.

- For example, the police report does not say the accused fumbled with their driver's license. A skilled defense attorney can make points by illustrating that an intoxicated person might, but that this accused did not."

BUI Defense

- There are 4 distinct aspects to the case that a prosecutor will use:

- Driving Pattern, Physical Appearance, FST performance, and Chemical Test results.

- The case is like a table with 4 legs; if one of those legs is broken, the table cannot stand. Likewise if there is reasonable doubt regarding any aspect of the case, an accused should be acquitted.

Report Consistency

- It is essential that all reports be consistent.
- Upon receipt of a subpoena or other notification of a trial date, review all records and reports to refresh your memory
- List all evidence and properly document it

Report conclusions

DUI

- Based on my evaluation of (suspect), I believe that he/she is under the influence of (alcohol / drugs). Based on the (suspect) SFST's, I believe that he/she is unable to operate a vehicle safely. Based on the totality of my investigation, I arrested (suspect) for DUI.

BUI

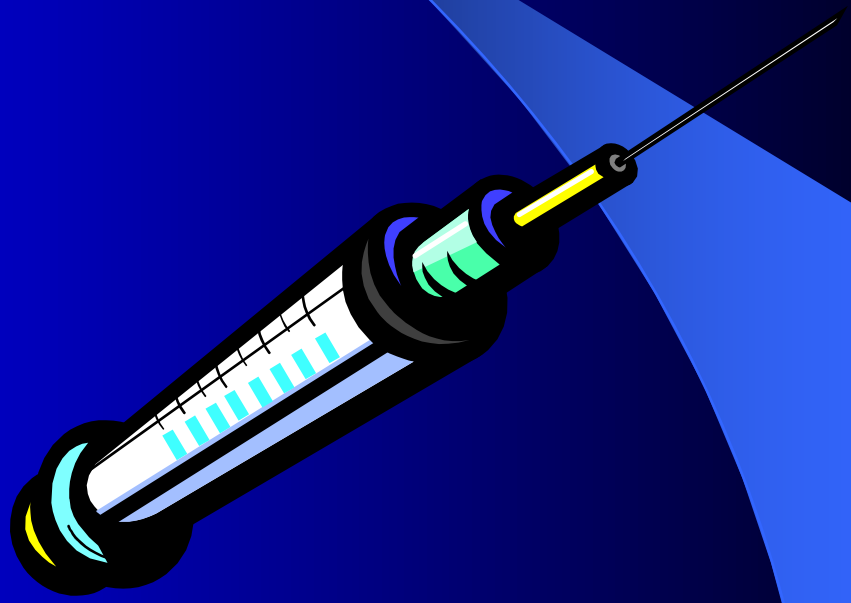
- Based on my evaluation of (suspect), I believe that he/she is under the influence of (alcohol / drugs). Based on the (suspect) FST's, I believe that he/she is unable to operate a vessel safely. Based on the totality of my investigation, I arrested (suspect) for BUI.

Chemical Testing

- Remember to admonish that no sample of breath is saved, and they can have a blood sample retained for their defense.

Chemical Testing

- Blood or Breath (no Urine, unless drugs are suspected.)
- HPD HQ for Breath
- University Medical Center for blood draws.



Forced Blood Draw

- So what if your arrestee refuses to give a sample
- A forced draw may be taken to collect evidence as long as it does not shock the conscience of the court and is done in a medically approved manner. (No implied consent as in DUI)
- All forced blood draws will be done at SDPD Room 138.



The BUI Arrest: A Review

- Observation / PC
- Stop.
- Objective Symptoms
- Preliminary FCT on your vessel at scene
- 20 Minute wait on shore
- Shore-side FCT's
- Chemical Tests
- 10-16

Questions?







Nautical Charts

and

Bay Familiarity



ATLANTIC
OCEAN
Sea
English Channel
Bay of Biscay
FRA
LUX
CZE
SVK
UKR
AUT
CHE
HUN
MDA
ROU
SVN
HRV
BIH
SRB
BGR
Black
Ligurian Sea
ITA
Adriatic Sea
PRT
ESP
AND
Balearic Sea
Tyrrhenian Sea
MKD
ALB
Thracian Sea
Sea of Marmara
GRC
Aegean
Mediterranean
Strait of Gibraltar
Alboran Sea
Ionian Sea
Myrtoan Sea
Sea
Sea of Crete
MLT
MAR
TUN
Libyan Sea
Sea
DZA
LBY
EGY
TARTARIA
OLIA
ARABIA FELIX


TARTARIA
GRECIA
NATOLIA
IVDEA
ARABIA FELIX
AFRIÇA
PRESTE IOÃO
PRIVISTE IRA


Cala del Lazzeretto
Porto S.
Isola di Gianni
Giglio Porto
V. S. Giorgio
le Scole
P. di Castellari
P. della Smeralda
obiarello
105
63
32
3
104
83
25
60
103
4
9
69
227
105
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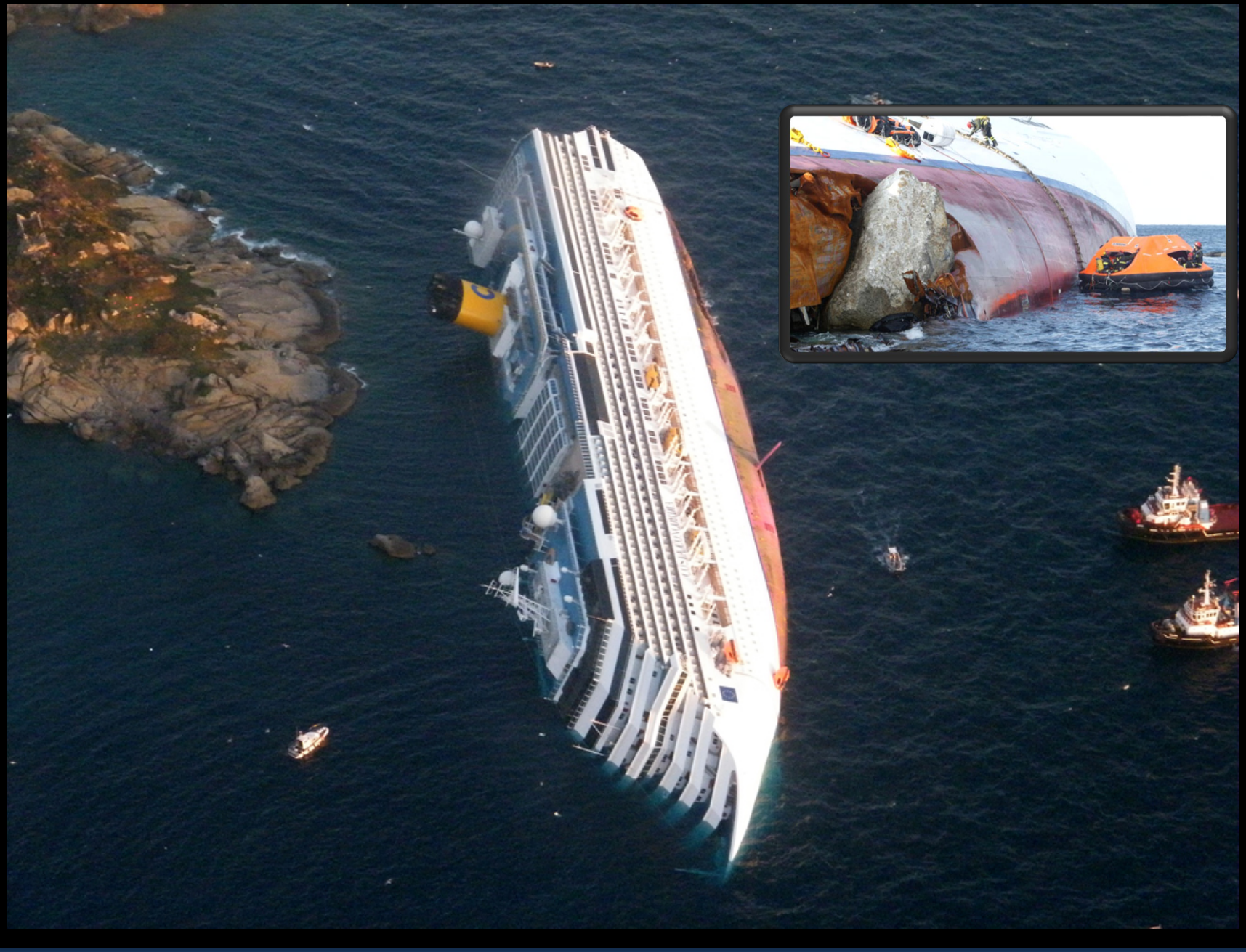




Piloting



- Skill used in "*dangerous*" PILOT WATERS.
- Close-quarter navigation.
- Using all tools and senses simultaneously.
- Must have adequate training and knowledge.

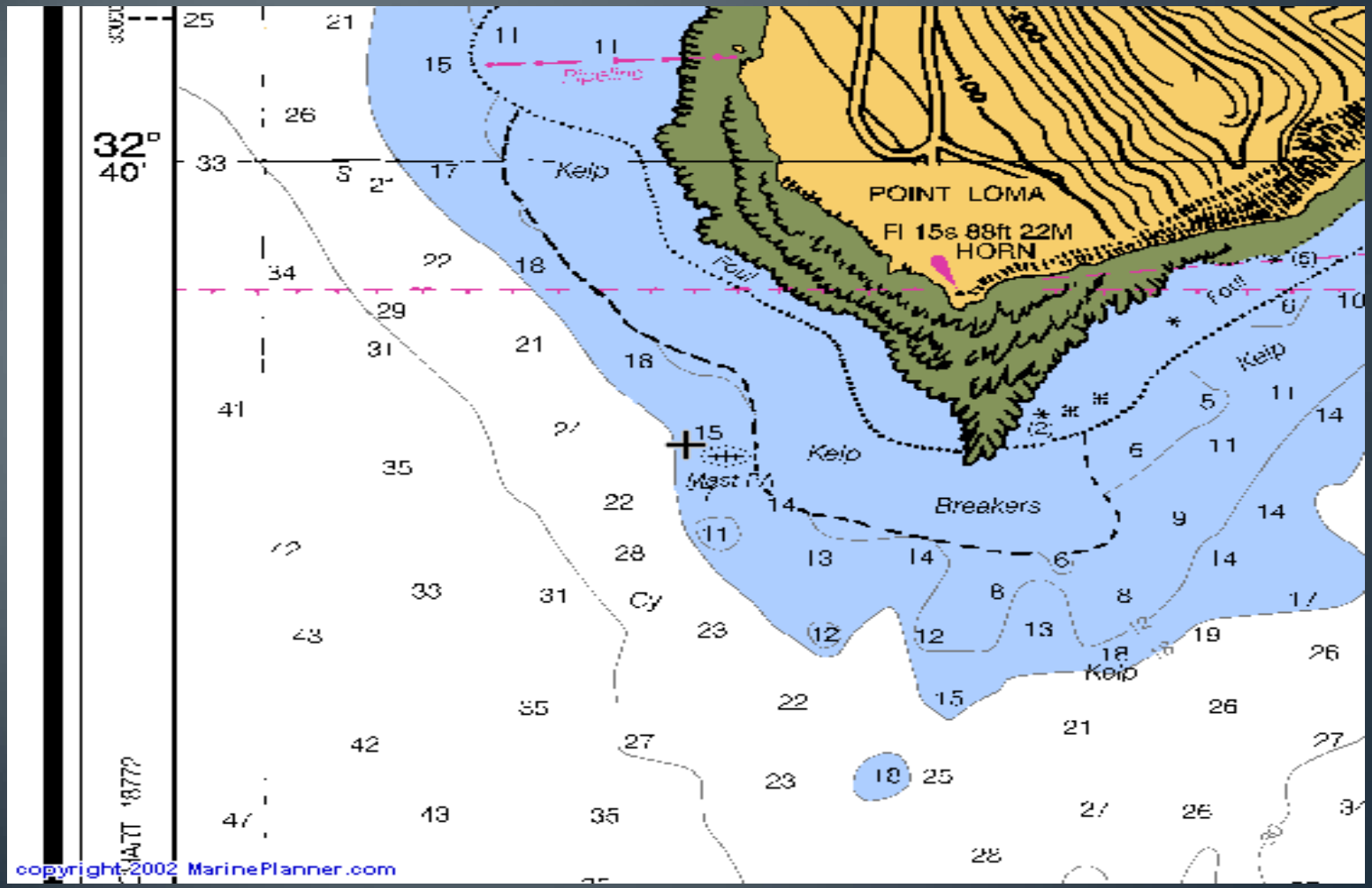
Aids to Navigation

In the dark past, it was realized that:

The seas and oceans of the world are dangerous places;

Efforts must be made to improve the safety of those who go to sea.

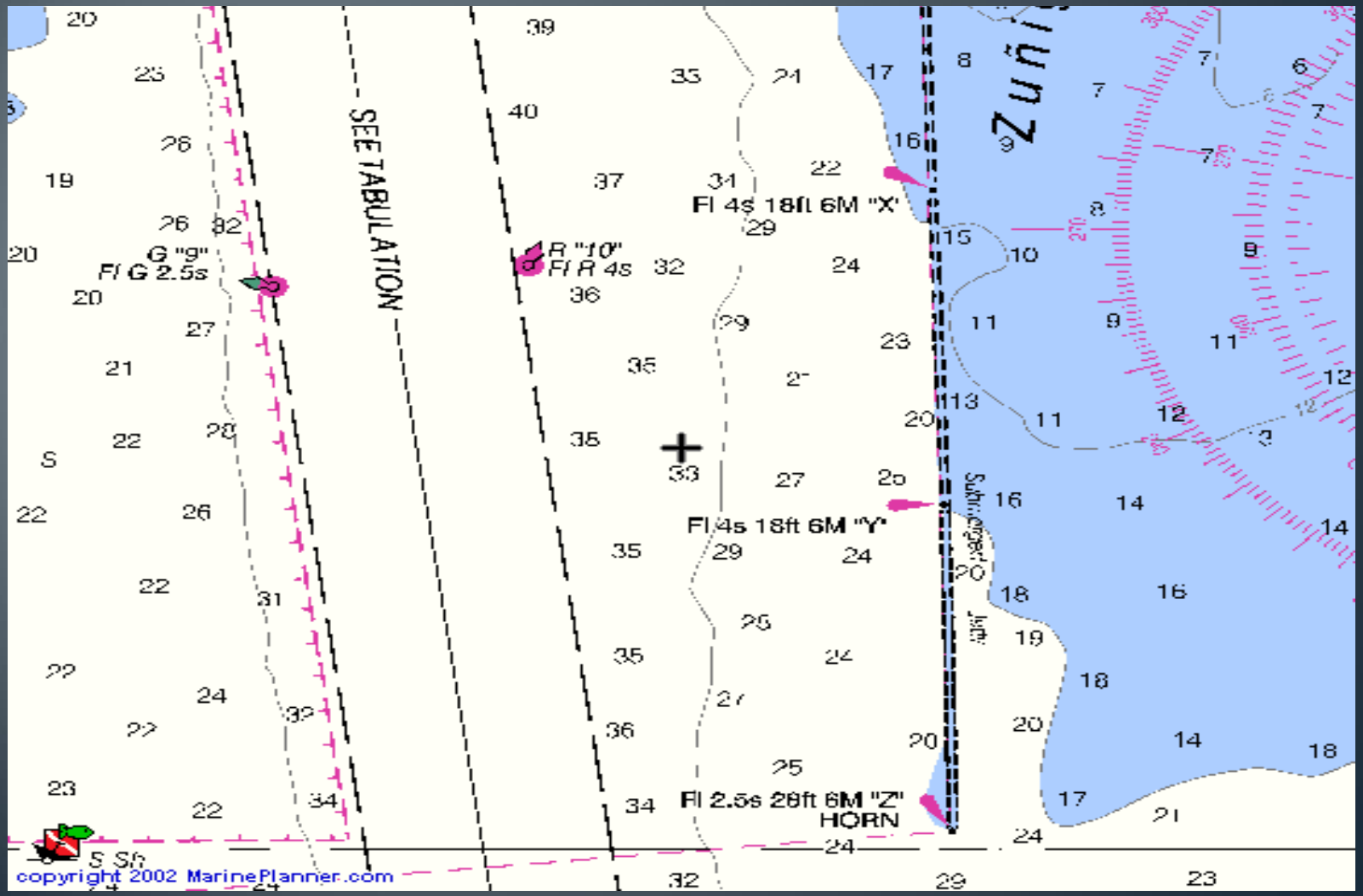
Point Loma Lighthouse



Point Loma Lighthouse

- Light emission is 88’ above sea level
- Range is 22 miles
- White flashing light every 15 seconds

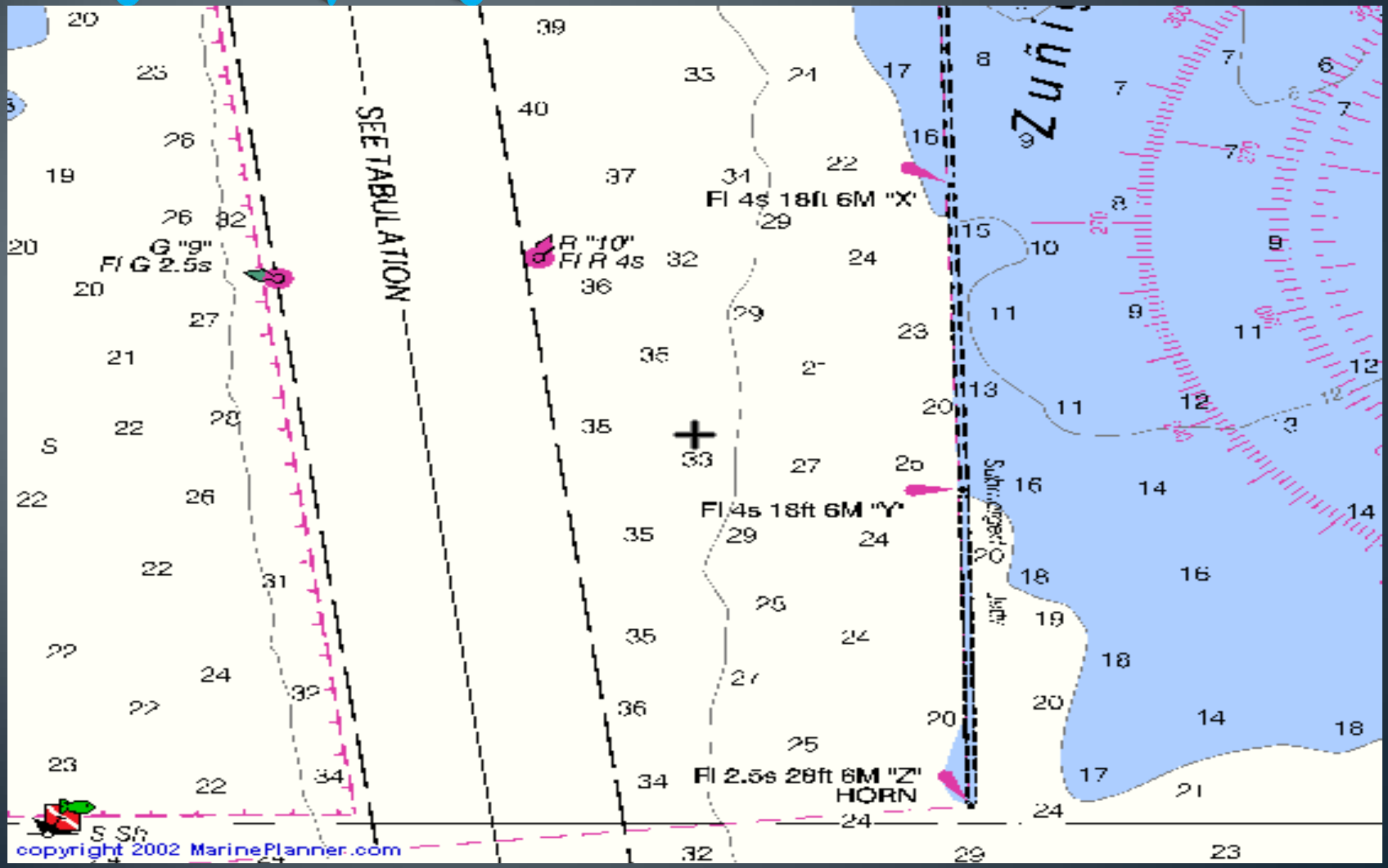
Point Zuniga Jetty Light "Z"



Point Zuniga Jetty Light "Z"

- Light emission is 28’ above sea level
- Range is 6 miles
- White flashing light every 2.5 seconds
- Horn

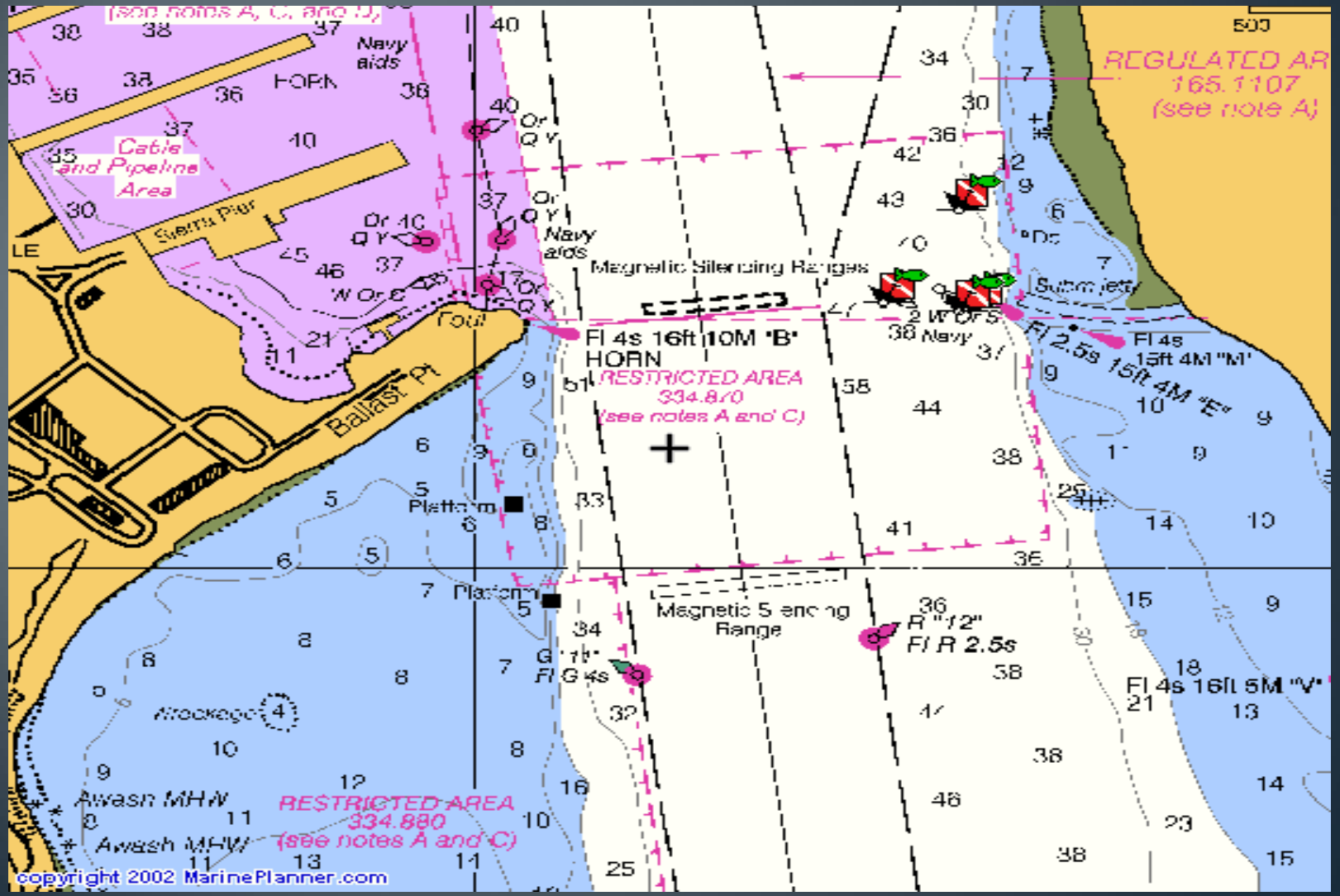
Zuniga Jetty Lights "V", "W", "X" and "Y"



Zuniga Jetty Lights "V", "W", "X" and "Y"

- Light emission is 18’ above sea level
- Range is 6 miles
- White flashing light every 4 seconds

Ballast Point Light



Ballast Point Light

- Light emission is 16’ above sea level
- Range is 10 miles
- White flashing light every 4 seconds

Channel Range Markers

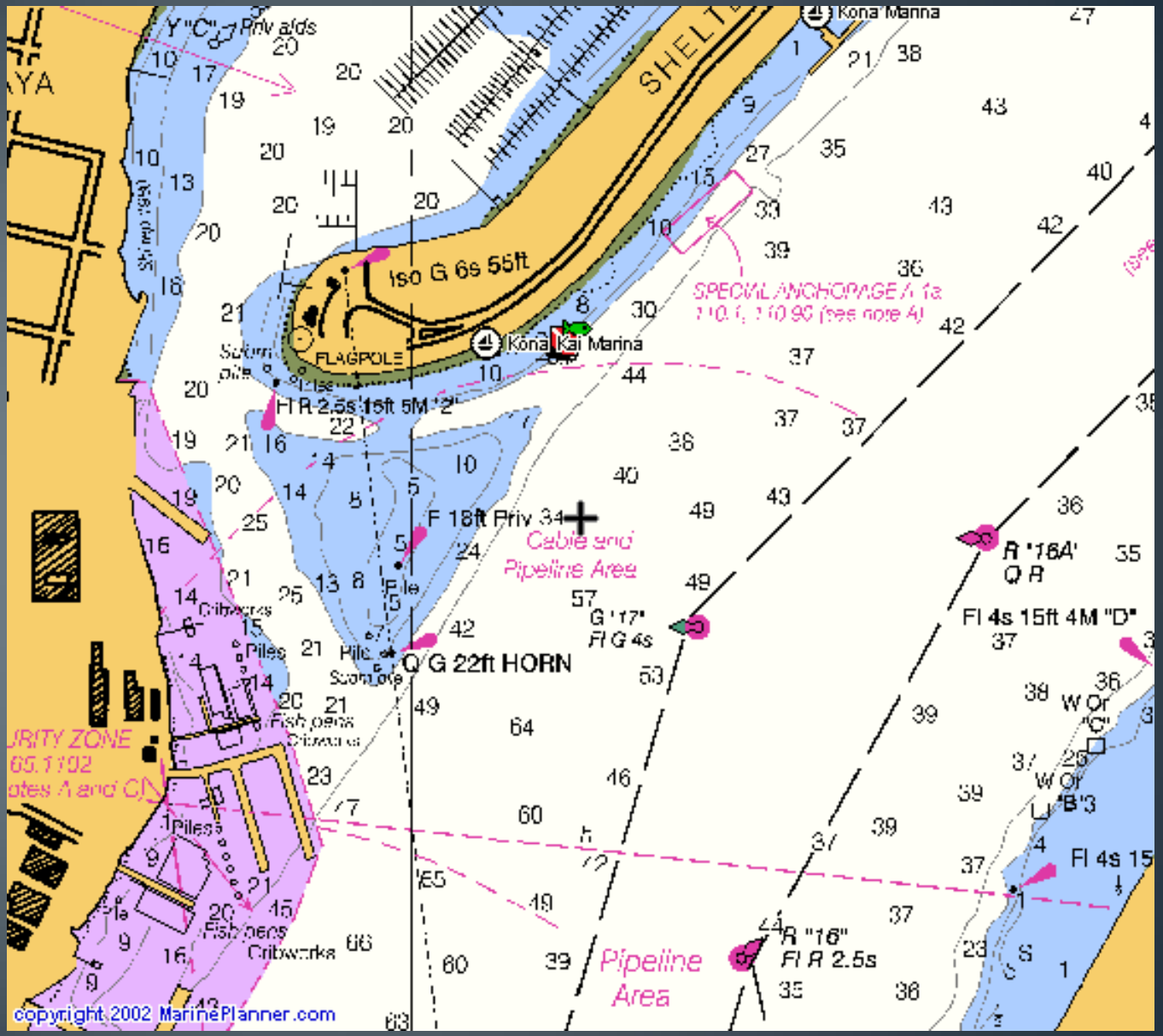
Channel Range Markers

Ranges are imaginary lines defined by pairs of aids to navigation.

When the two lit and/or un-lit markers appear to be in line with each other, the mariner is maintaining a safe course within the channel.




SHELTER ISLAND
YACHT HARBOR
5
MPH
ANCHORING, MOORING,
BERTHING BY
PERMIT ONLY


Kona Marina
Iso G 6s 55ft
FLAGPOLE
Kona Kai Marina
SPECIAL ANCHORAGE A
Fl R 2.5s 15ft 5M "2"
F 18ft Priv 34
Cable and Pipeline Area
R "16A"
Q R
Fl 4s 15ft 4M "D"
G "17"
Fl G 4s
Q G 22ft HORN
Pipeline Area
R "16"
Fl R 2.5s
Fl 4s 15
Piles
Fish pens
Cribworks
copyright 2002 MarinePlanner.com

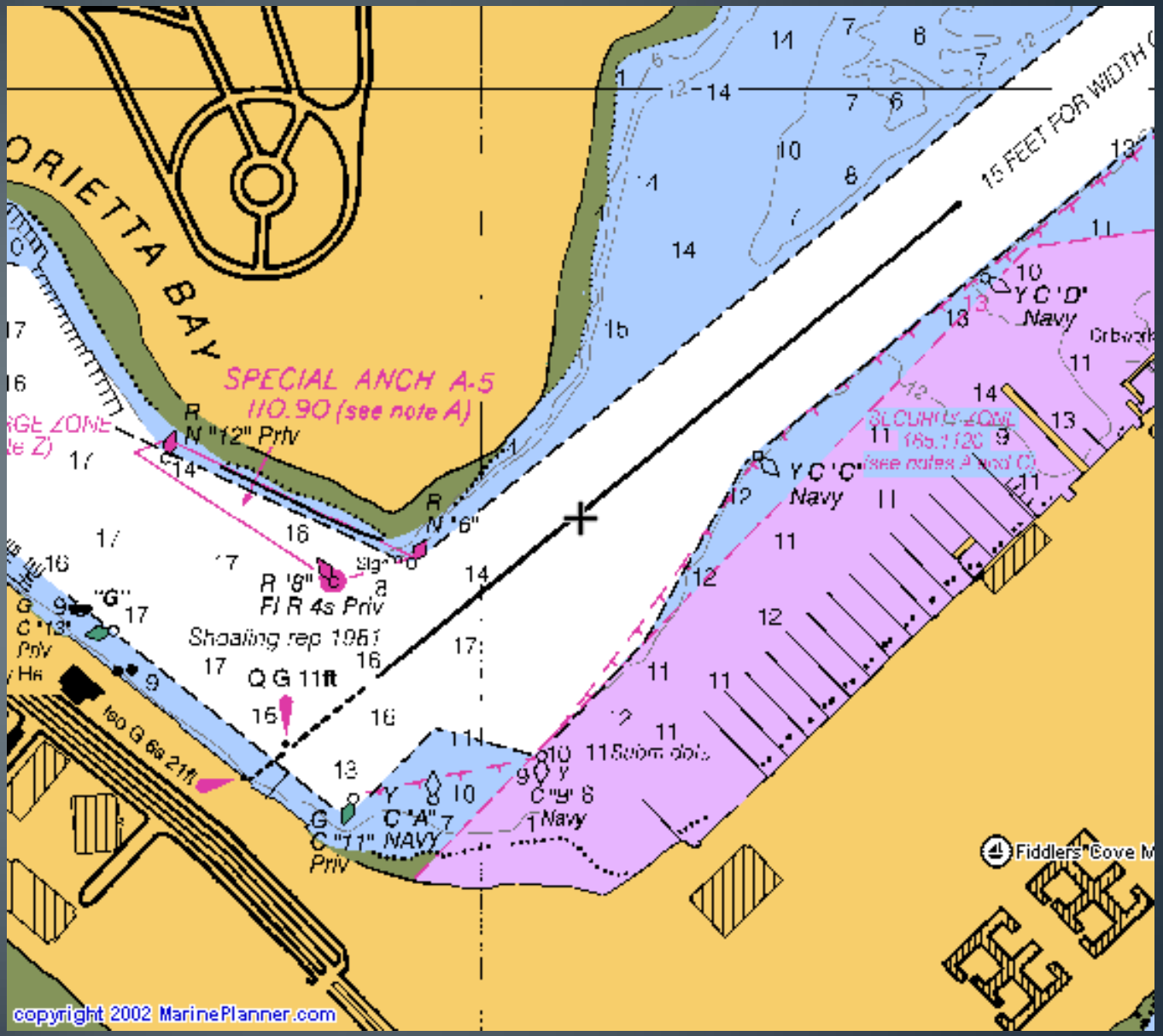
Glorietta Bay Channel

Coronado








ORIETTA BAY
SPECIAL ANCH A-5
110.90 (see note A)
15 FEET FOR WIDTH
R
N "12" Priv
R
N "6"
R "8"
Fl R 4s Priv
Shoaling rep 1951
Q G 11ft
"G"
C "13"
Priv
Iso G 6s 21ft
G
C "11" NAVY
Priv
C "A" 7
Y
C "B" 8
Navy
Y C "C"
Navy
Y C "D"
Navy
Fiddlers Cove M
copyright 2002 MarinePlanner.com

BIOSYSTEMS



A floating aid to navigation anchored to the bottom that conveys information to navigators by their shape or color, by their visible or audible signals, or both.

Green Channel Buoys

- Odd Number
- Green Light
- Keep On Left When Entering Bay
- Keep On Right When Exiting Bay

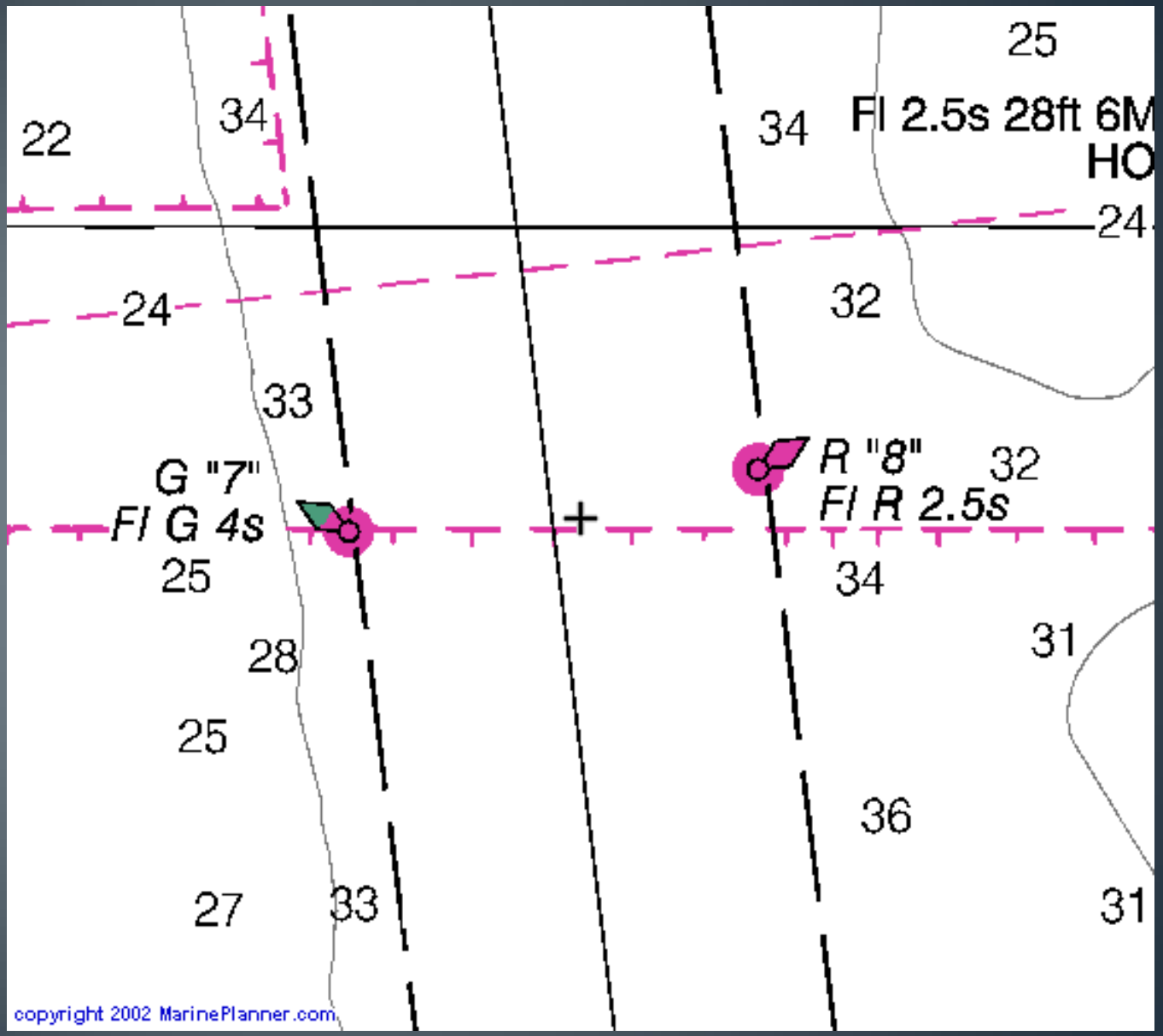

17

Red Channel Buoys

- Even Number
- Red Light
- Keep On Right When Entering Bay
- Keep On Left When Exiting Bay

RED RIGHT RETURNING


16A


25
Fl 2.5s 28ft 6M
HO
22
34
34
24
24
32
33
G "7"
Fl G 4s
R "8"
Fl R 2.5s
32
25
34
31
28
25
36
27
33
31
copyright 2002 MarinePlanner.com

DayMarkers

- The daytime identifier of an aid to navigation.
- An unlighted fixed structure which is equipped with a highly visible dayboard for daytime identification.
- The daytime identifier of an aid to navigation presenting one of several standard shapes (square, triangle, rectangle).

Day Markers

- Not Anchored
- Stationary
- Red or Green in Color
- Red are even numbers and triangular
- Green are odd numbers and square
- Some are lit and some are not
- Mark channels other than the main shipping channel


3


4


2
PILOT
POLICE

DayMarkers

- Located in San Diego Bay
  - Commercial Basin/America's Cup Harbor
  - -Chula Vista Channel
  - -Coronado Cays

Weather Warning System

For over 100 years, display stations were established at yacht clubs, marinas, and Coast Guard stations to hoist flags, pennants and colored lights to warn mariners of storms at sea.

Types of Warnings:

SMALL CRAFT ADVISORY: Sustained winds of 21 to 33 knots. A Small Craft Advisory for Hazardous Seas is issued for seas 10 feet or greater.

GALE WARNING: To indicate winds within the range 34 to 47 knots are forecast for the area.

STORM WARNING: To indicate winds 48 knots and above, no matter how high the speed, are forecast for the area.

HURRICANE WARNING: Issued only in connection with a tropical cyclone (hurricane) to indicate that winds 64 knots and above are forecast for the area.

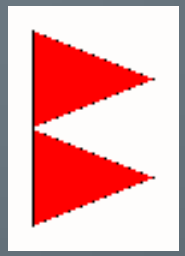
Warning Displays

DAYTIME SIGNALS -FLAGS

SMALL CRAFT ADVISORY



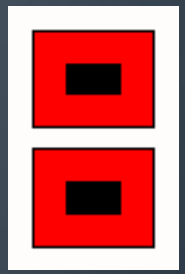
GALE WARNING



STORM WARNING



HURRICANE WARNING



Warning Displays

NIGHT (LIGHT) SIGNALS

SMALL CRAFT ADVISORY



GALE WARNING



STORM WARNING



HURRICANE WARNING

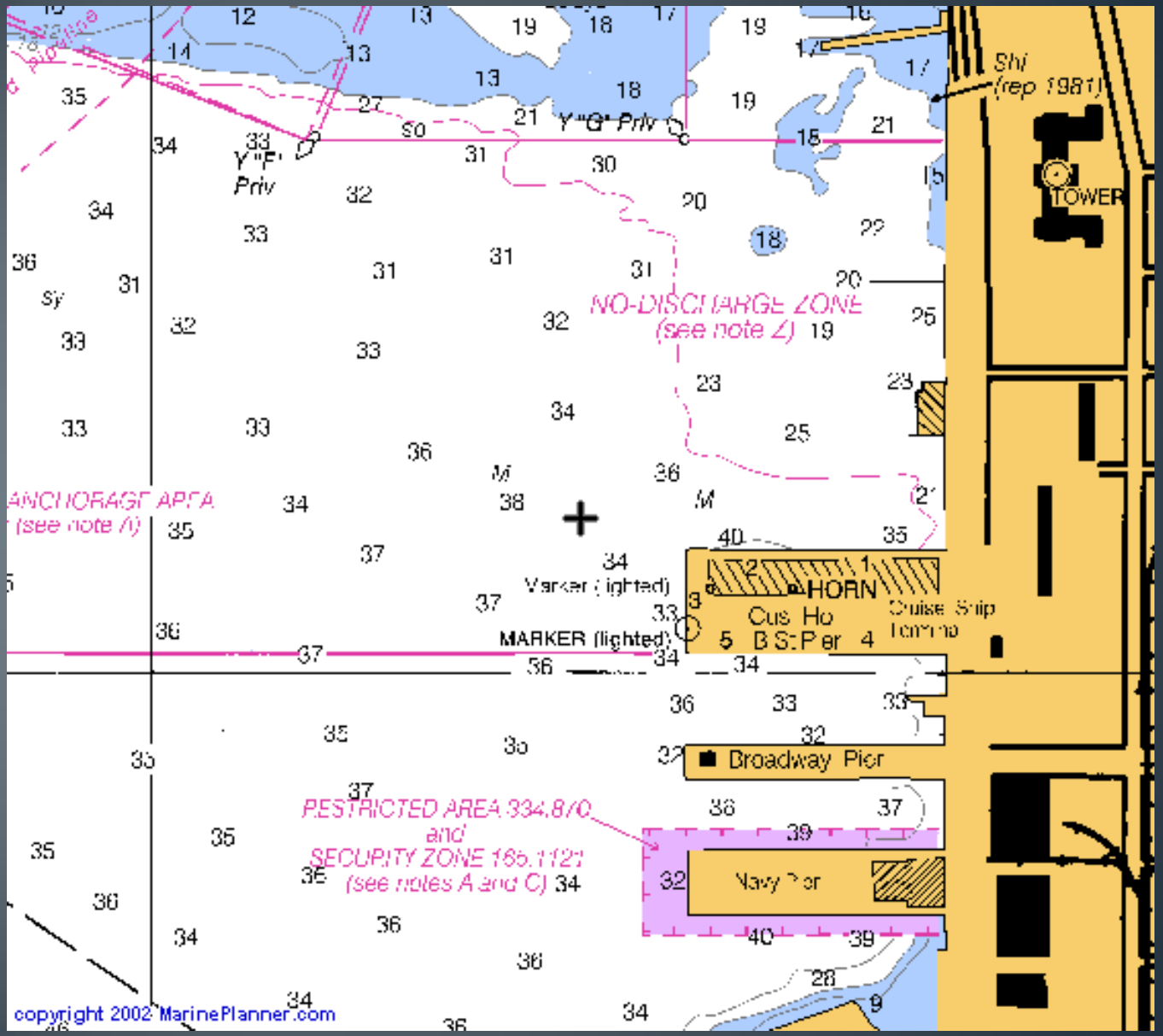


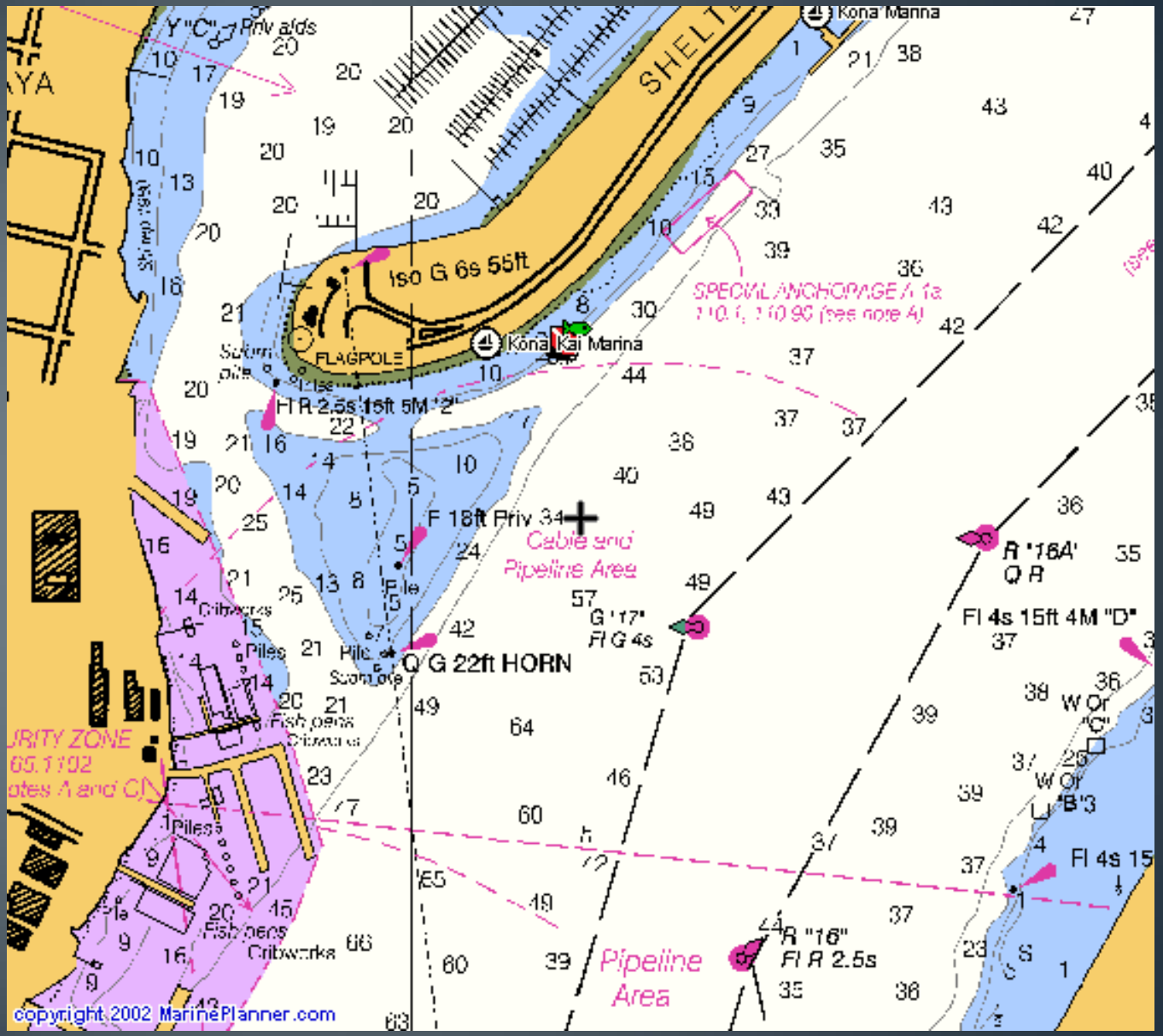
Location of Warning Systems in San Diego Bay

- South end of Shelter Island
- “B” Street Pier / Cruise Ship Terminal
- Coronado Yacht Club


SAN DIEGO
CREW CENTER
NO
BERTHING
ALLOWED
CONTACT U.S. CUSTOMS
AT (619) 557-5132



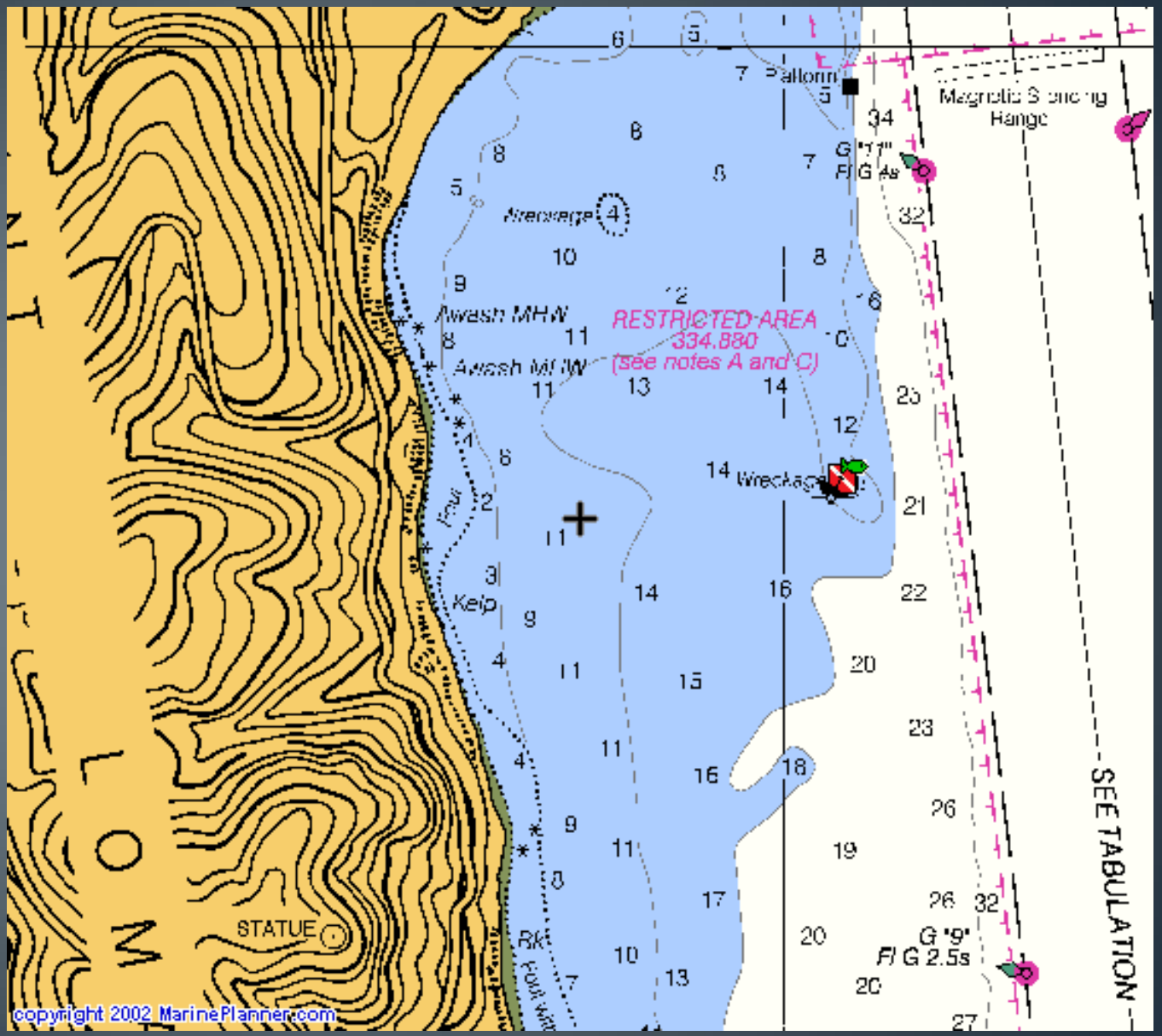

Shi
(rep 1981)
TOWER
Y "F" Priv
Y "G" Priv
NO-DISCHARGE ZONE
(see note Z)
ANCHORAGE AREA
(see note A)
Marker (lighted)
HORN
Cus Ho
Cruise Ship
Termina
MARKER (lighted)
Broadway Pier
RESTRICTED AREA 334.870
and
SECURITY ZONE 165.1121
(see notes A and C)
Navy Pier
copyright 2002 MarinePlanner.com


Kona Marina
Iso G 6s 55ft
FLAGPOLE
Kona Kai Marina
SPECIAL ANCHORAGE A
Fl R 2.5s 15ft 5M "2"
F 18ft Priv 34
Cable and Pipeline Area
R "16A"
Q R
Fl 4s 15ft 4M "D"
G "17"
Fl G 4s
Q G 22ft HORN
Pipeline Area
R "16"
Fl R 2.5s
Fl 4s 15
Piles
Fish pens
Cribworks
copyright 2002 MarinePlanner.com

Restricted Areas

Navy Restricted Areas.

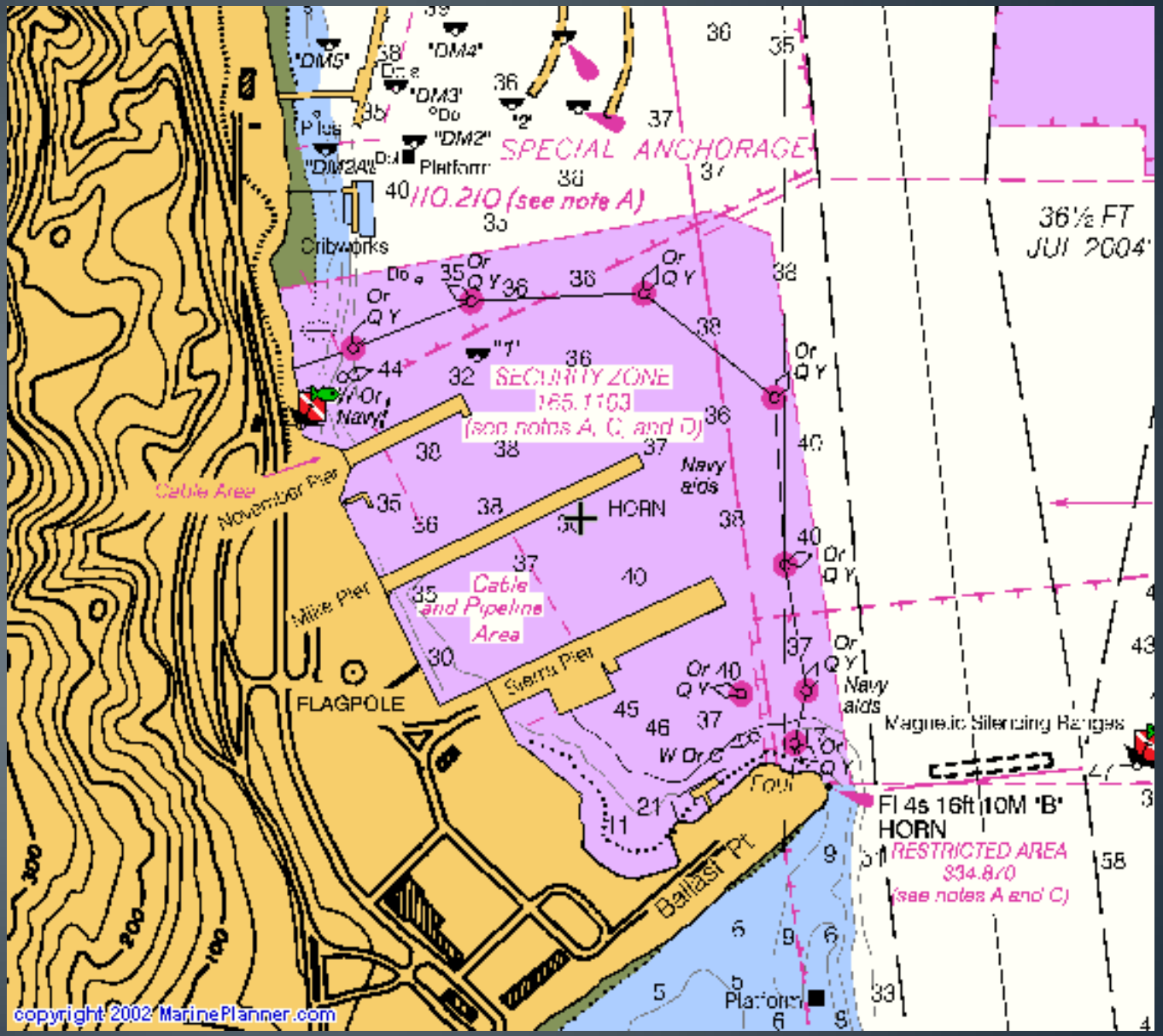
- South of Ballast Point to Point Loma



Platform
Magnetic Sounding Range
G "11"
Fl G 4s
Wreckage
Awash MHW
Awash MLW
RESTRICTED AREA
334.880
(see notes A and C)
Wreckage
Kelp
STATUE
Rk
G "9"
Fl G 2.5s
SEE TABULATION
copyright 2002 MarinePlanner.com

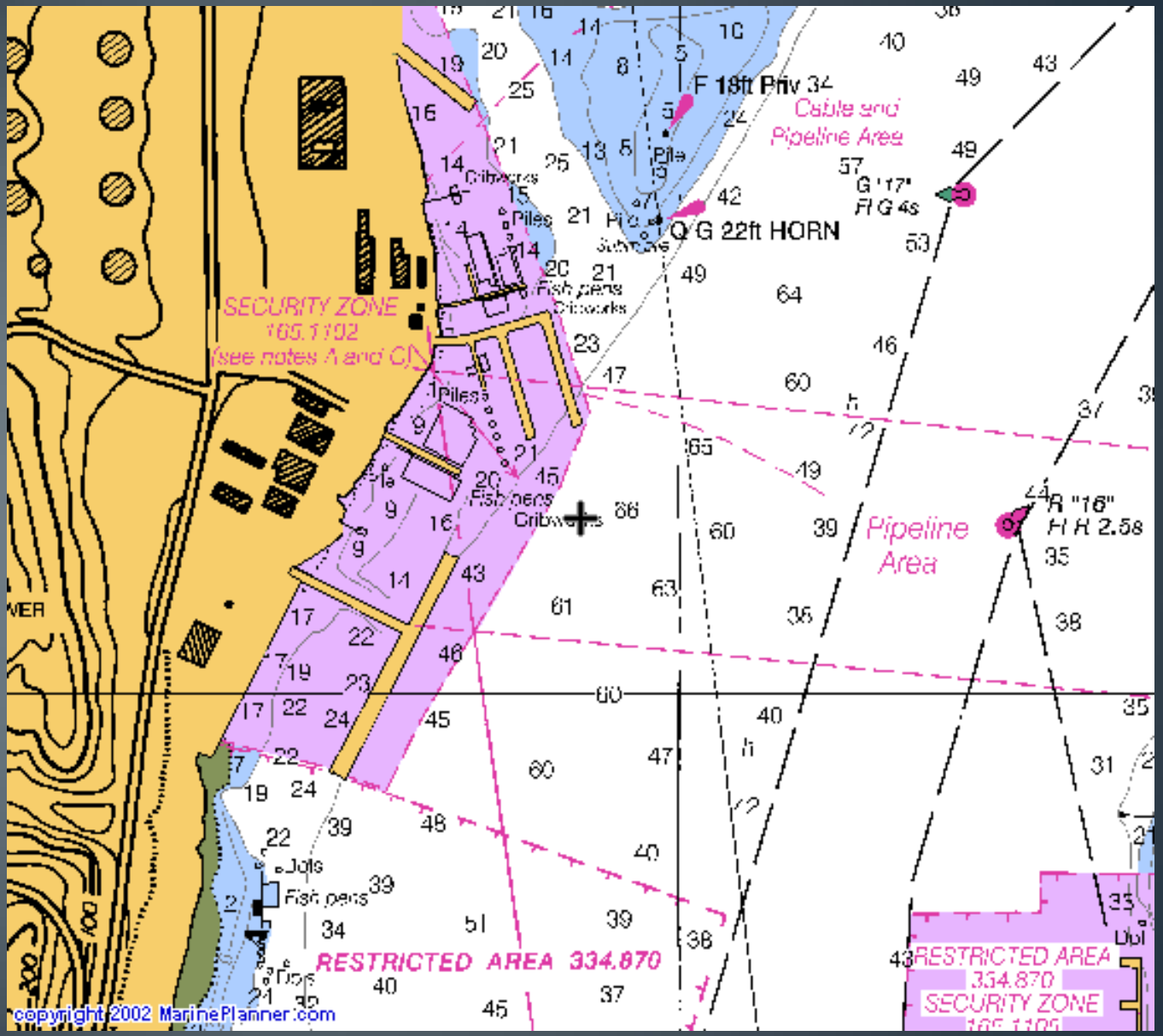
Navy Restricted Areas.

- South of Ballast Point to Point Loma
- **Submarine Base**


SPECIAL ANCHORAGE
110.210 (see note A)
36½ FT
JUL 2004
SECURITY ZONE
165.1103
(see notes A, C, and D)
Navy aids
HORN
Cable Area
November Pier
Mike Pier
Sierra Pier
Cable and Pipeline Area
FLAGPOLE
Ballast Pt
Cribworks
Platform
Fl 4s 16ft 10M "B"
HORN
RESTRICTED AREA
334.870
(see notes A and C)
Magnetic Silencing Ranges
copyright 2002 MarinePlanner.com

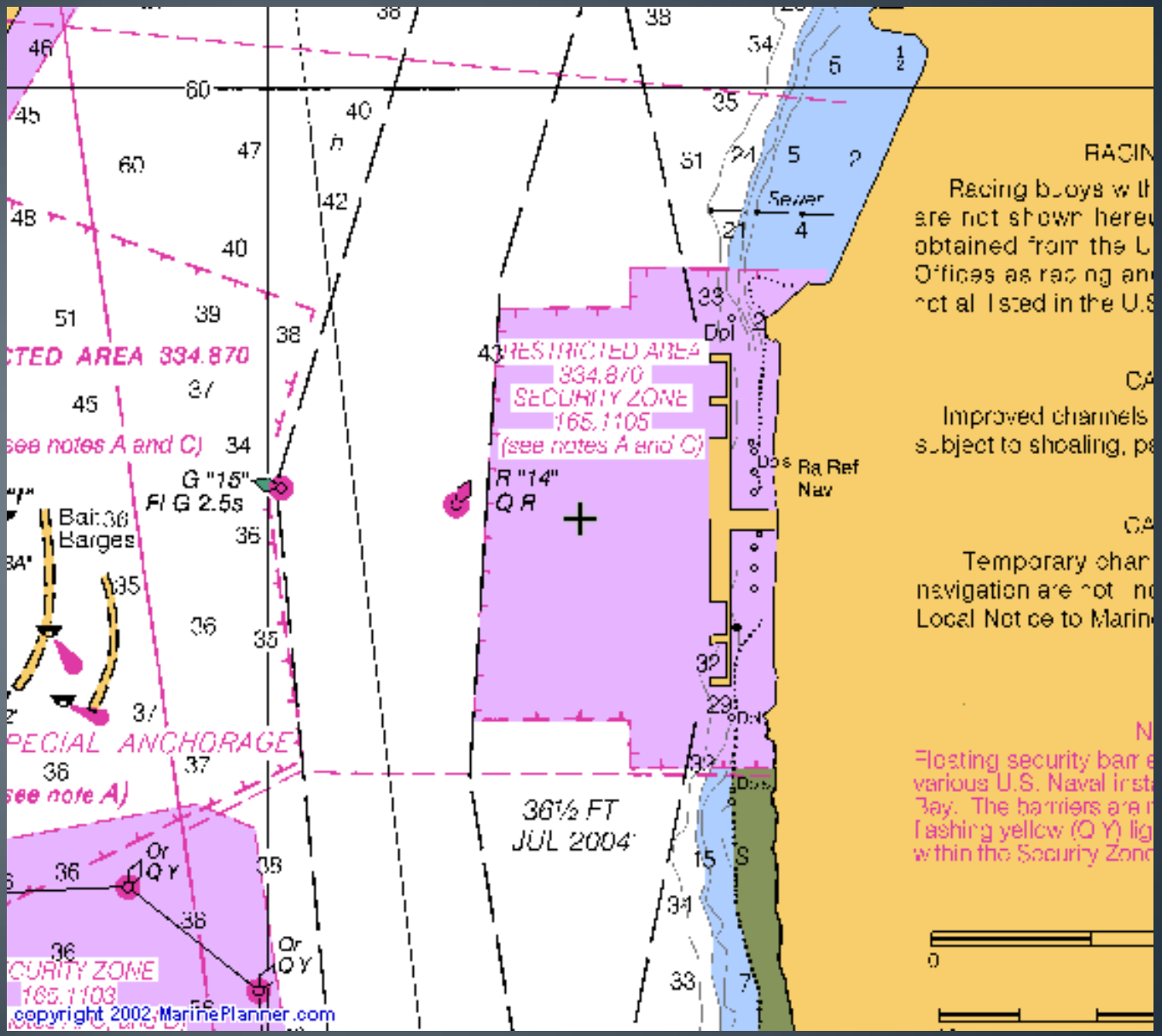
Navy Restricted Areas.

- South of Ballast Point to Point Loma
- Submarine Base
- **Navy Fuel Pier**


F 18ft Priv 34
Cable and Pipeline Area
Q G 22ft HORN
G "17" Fl G 4s
SECURITY ZONE
165.1102
(see notes A and C)
Piles
Fish pens
Cribcribs
Pipeline Area
R "16" Fl R 2.5s
RESTRICTED AREA 334.870
RESTRICTED AREA
334.870
SECURITY ZONE
Jetty
Pipe
copyright 2002 MarinePlanner.com

Navy Restricted Areas.

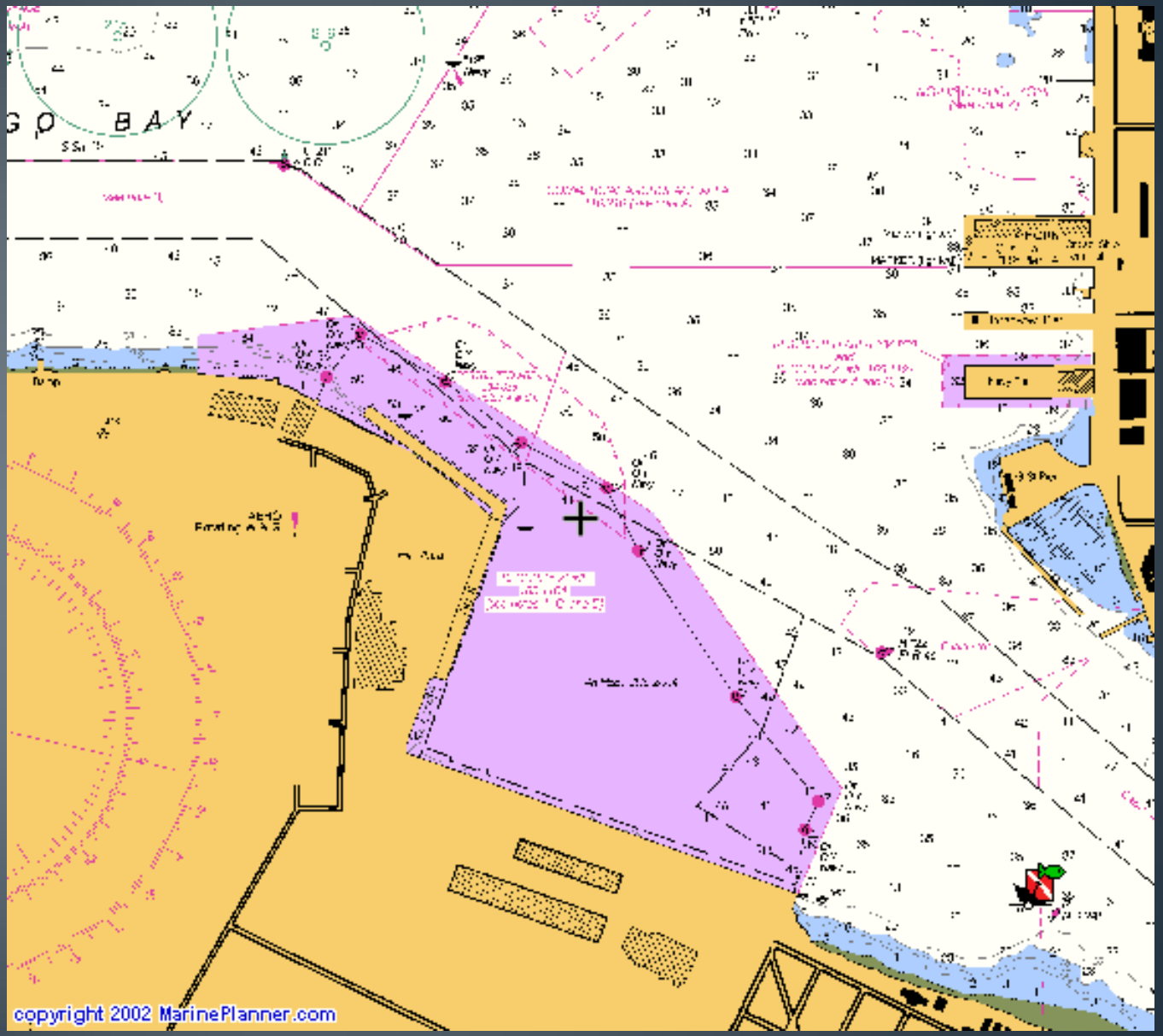
- South of Ballast Point to Point Loma
- Submarine Base
- Navy Fuel Pier
- **Navy Ammo Pier**



RESTRICTED AREA
334.870
SECURITY ZONE
165.1105
(see notes A and C)
G "15"
Fl G 2.5s
R "14"
Q R
Bait
Barges
Sewer
Dpl
Ra Ref
Nav
36½ FT
JUL 2004
Or
Q Y
copyright 2002 MarinePlanner.com

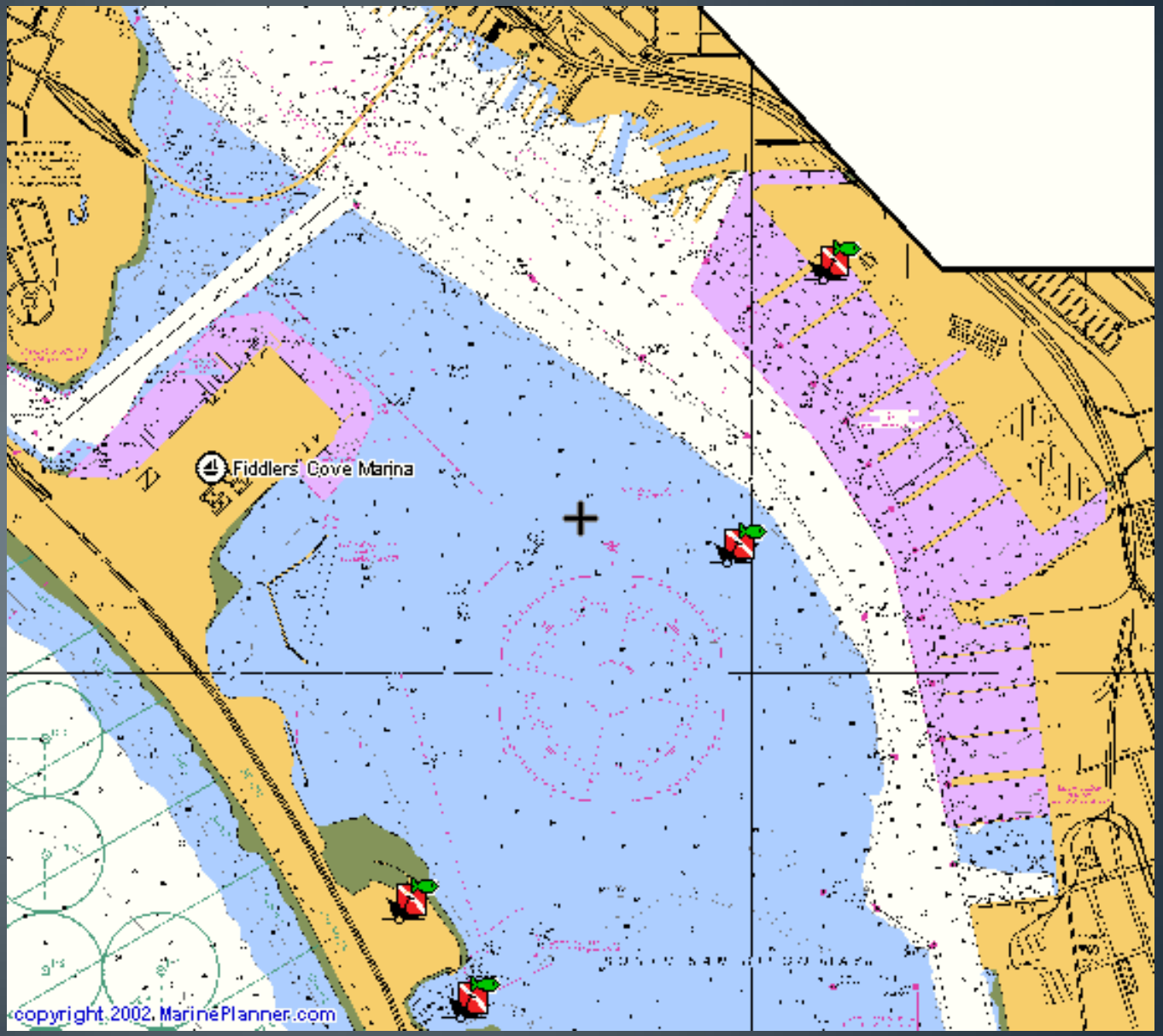
Navy Restricted Areas.

- South of Ballast Point to Point Loma
- Submarine Base
- Navy Fuel Pier
- Navy Ammo Pier
- **Carrier Basin**


BAY
copyright 2002 MarinePlanner.com

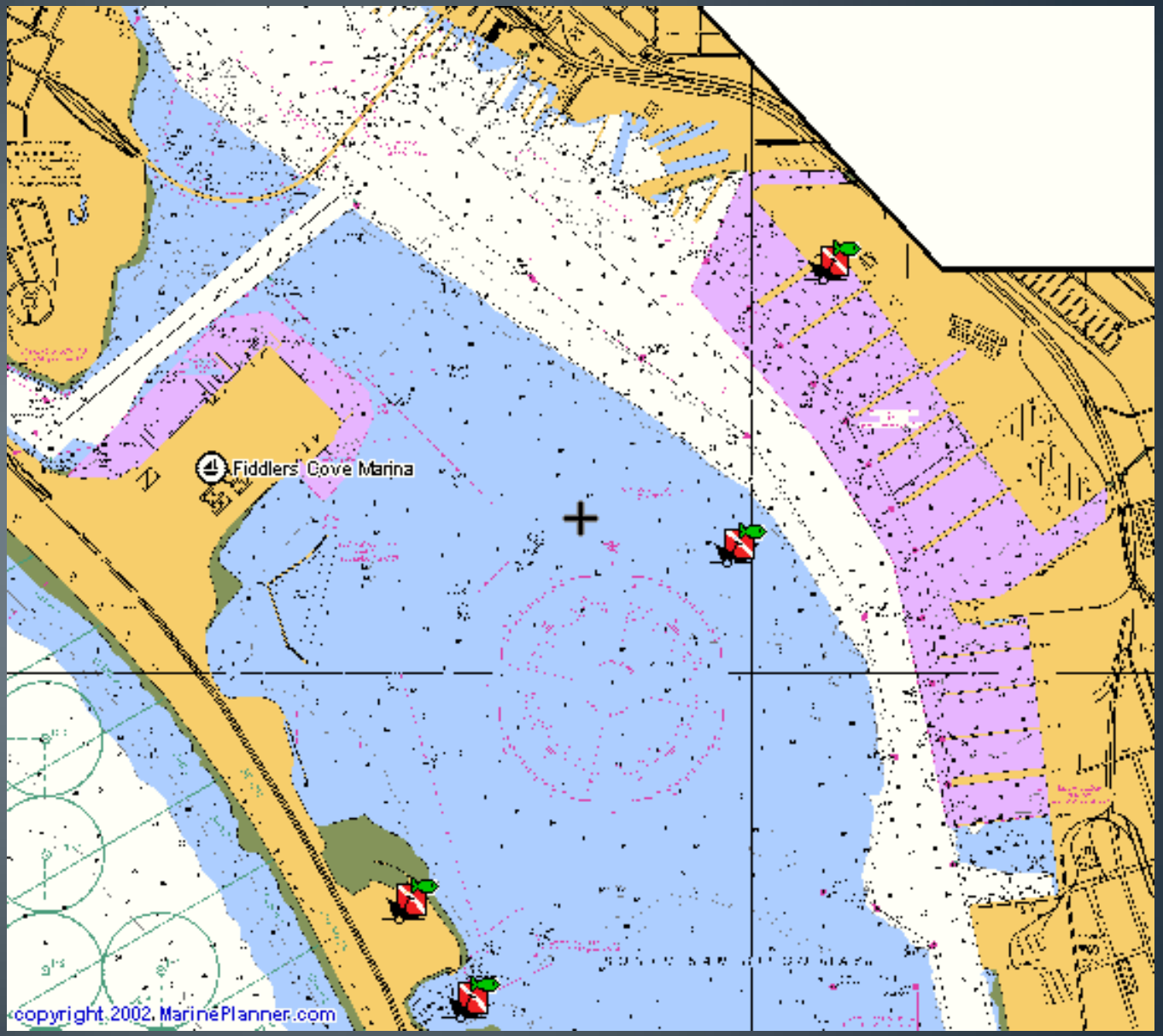
Navy Restricted Areas.

- South of Ballast Point to Point Loma
- Submarine Base
- Navy Fuel Pier
- Navy Ammo Pier
- Carrier Basin
- **32nd Street Naval Station**


Fiddlers' Cove Marina
copyright 2002, MarinePlanner.com

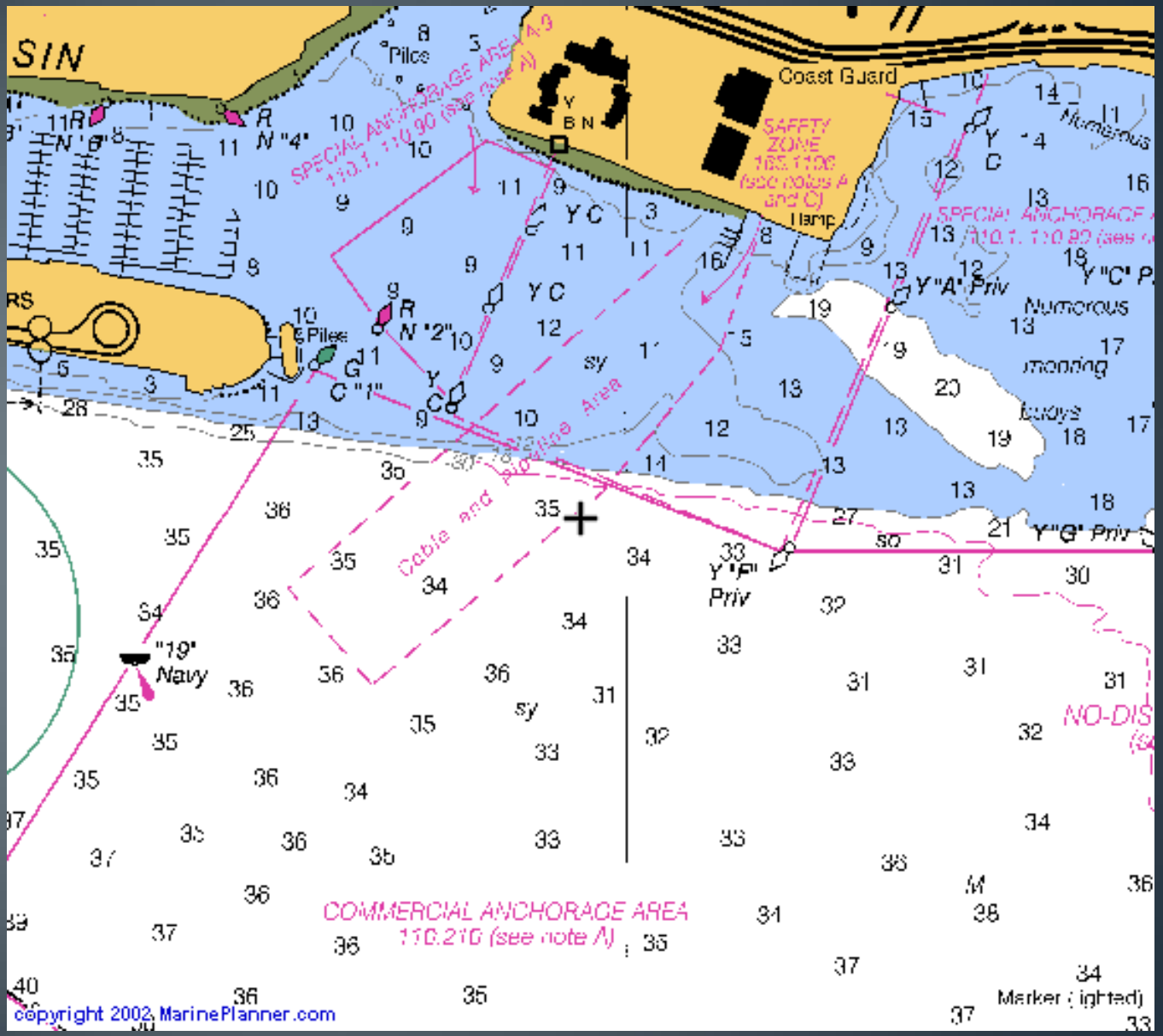
Navy Restricted Areas.

- South of Ballast Point to Point Loma
- Submarine Base
- Navy Fuel Pier
- Navy Ammo Pier
- Carrier Basin
- 32nd Street Naval Station
- **Naval Amphibious Base Coronado**


Fiddlers' Cove Marina
copyright 2002, MarinePlanner.com

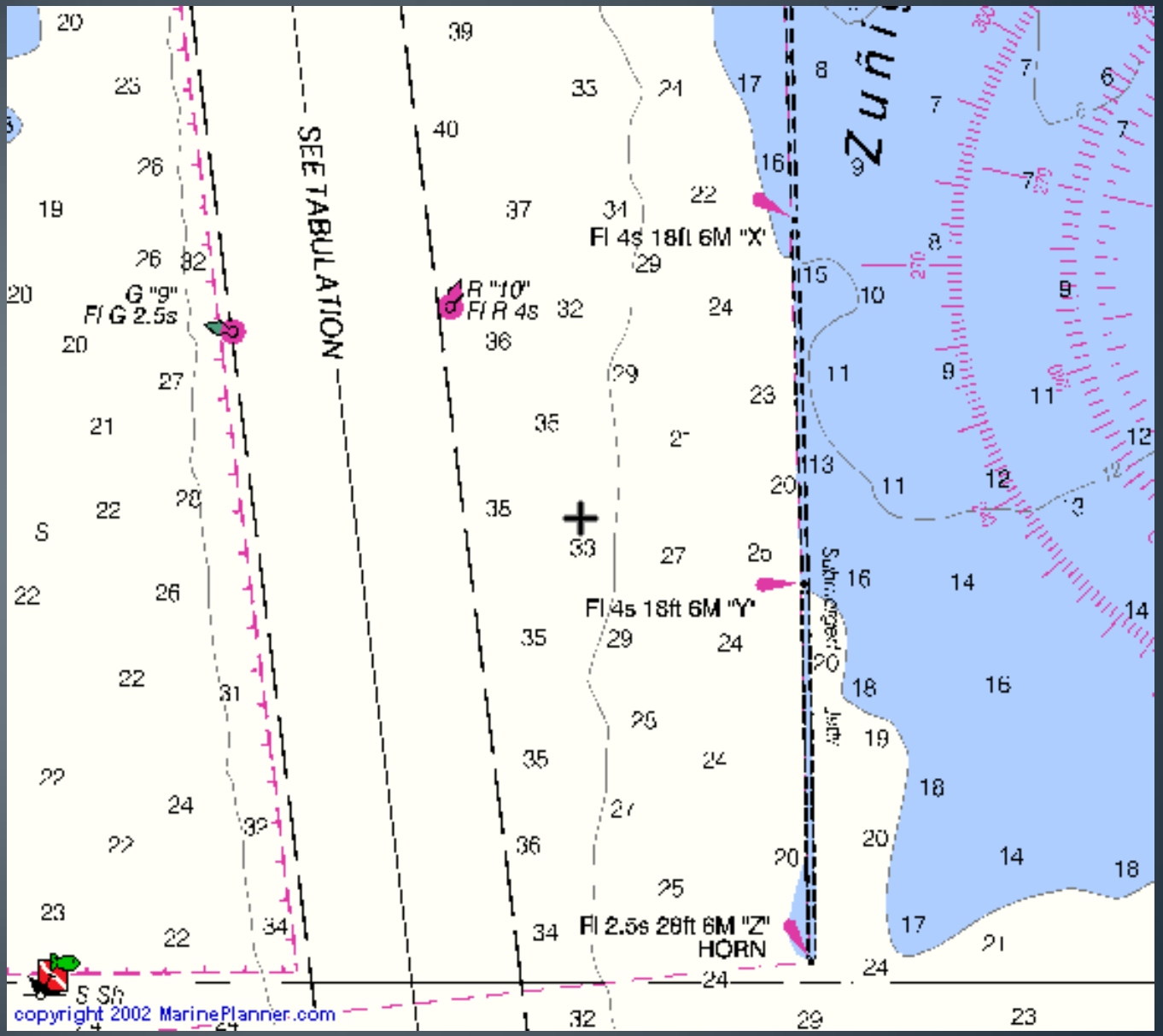
Coast Guard Area.

- Coast Guard Safety Zone


SIN
Pilos
Coast Guard
SAFETY ZONE
Hamp
Numerous
Numerous
monring
buoys
Y "A" Priv
Y "C" Priv
Y "G" Priv
Y "F" Priv
"19" Navy
Cable and Pipeline Area
COMMERCIAL ANCHORAGE AREA
110.210 (see note A)
Marker (lighted)
copyright 2002 MarinePlanner.com

Points of Interest

Submerged Jetty: Zuniga Jetty

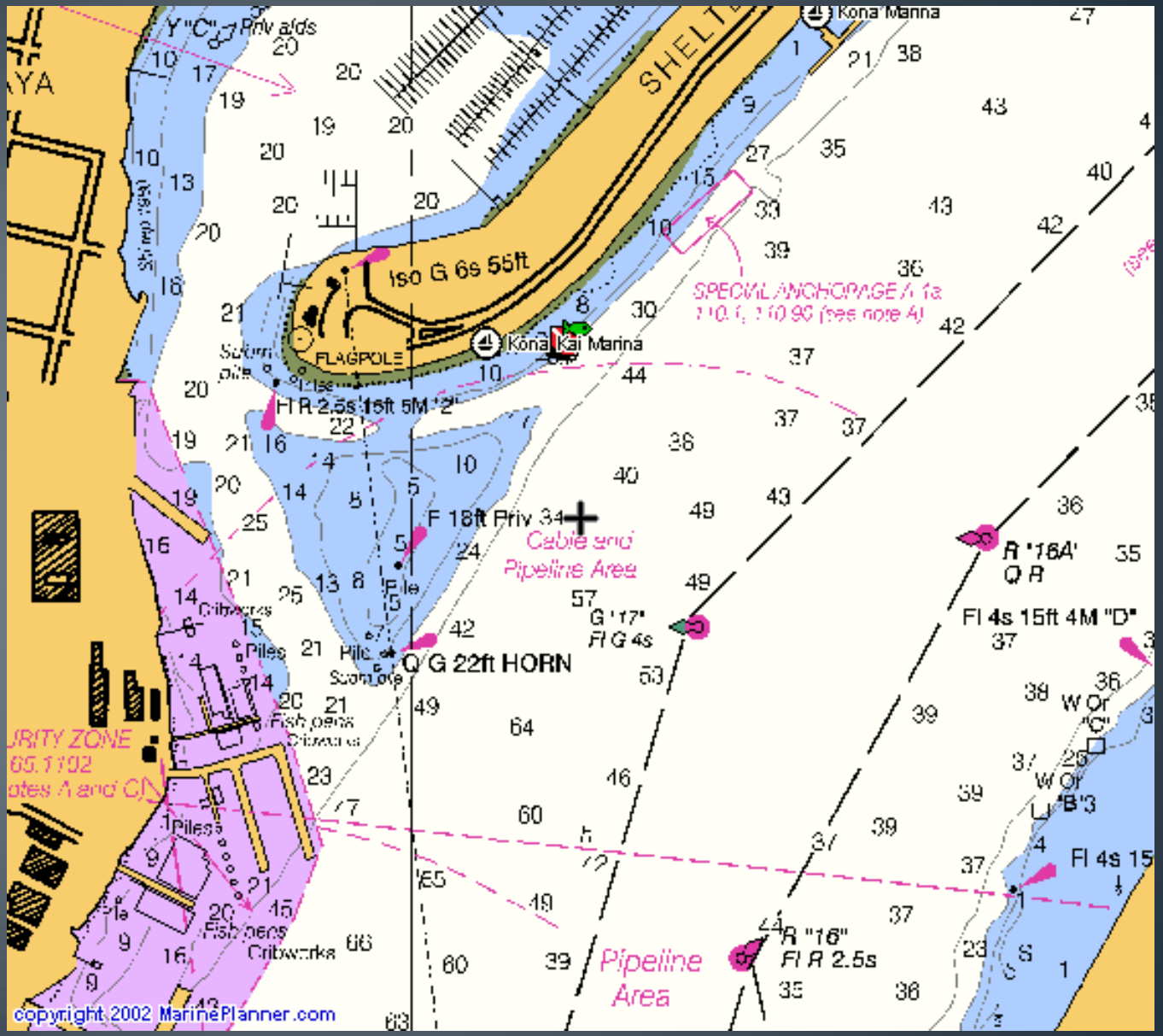

SEE TABULATION
G "9"
Fl G 2.5s
R "10"
Fl R 4s
Fl 4s 18ft 6M "X"
Fl 4s 18ft 6M "Y"
Fl 2.5s 28ft 6M "Z"
HORN
Zuñi
Submerged Jetty
S S6
copyright 2002 MarinePlanner.com

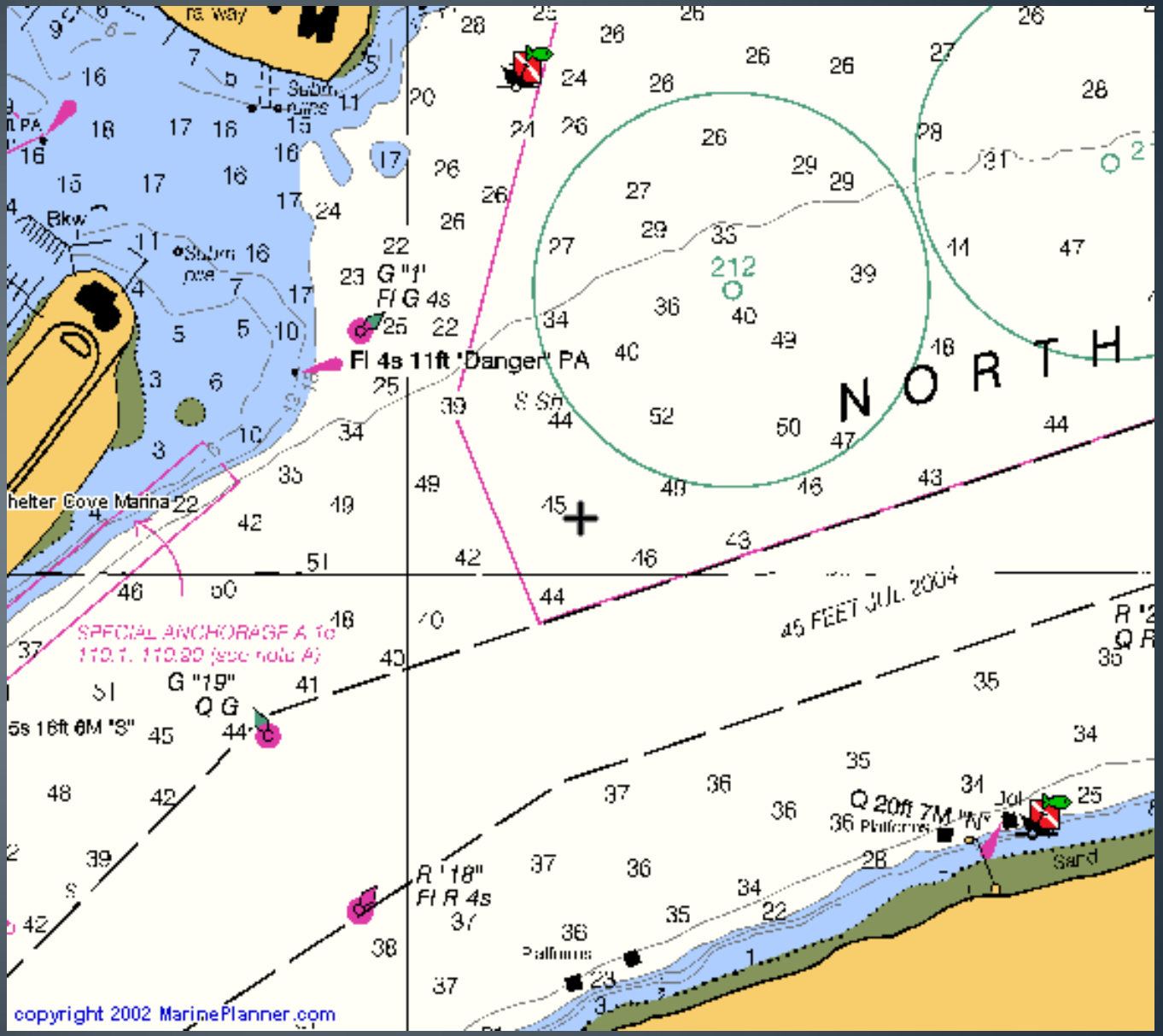
Points of Interest

Shoal Areas:

-South end of Shelter Island

-North end of Shelter Island

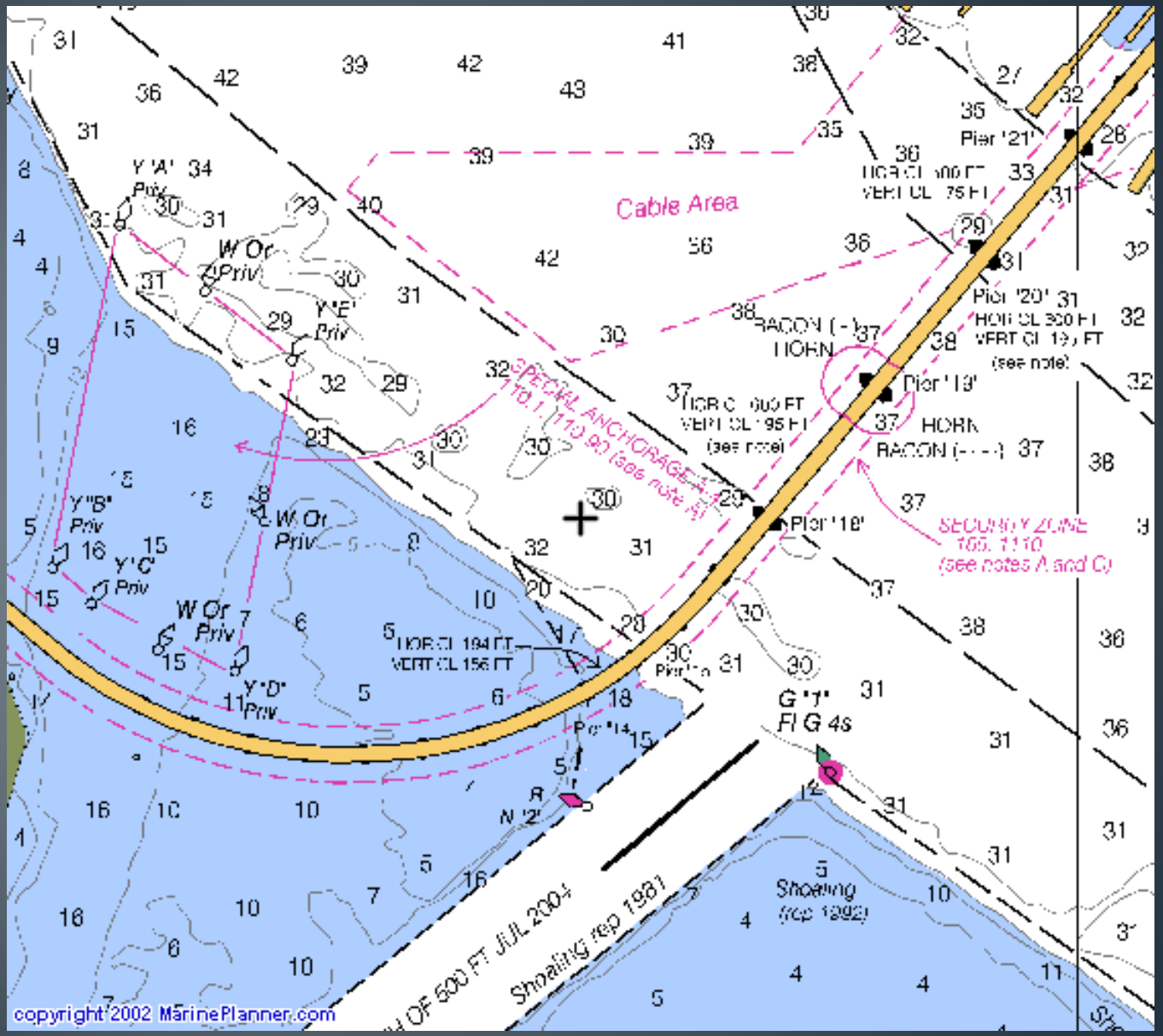

Kona Marina
Iso G 6s 55ft
FLAGPOLE
Kona Kai Marina
SPECIAL ANCHORAGE A
Fl R 2.5s 15ft 5M "2"
F 18ft Priv 34
Cable and Pipeline Area
R "16A"
Q R
Fl 4s 15ft 4M "D"
G "17"
Fl G 4s
Q G 22ft HORN
Pipeline Area
R "16"
Fl R 2.5s
Fl 4s 15
Piles
Fish pens
Cribworks
copyright 2002 MarinePlanner.com


G "1"
Fl G 4s
Fl 4s 11ft "Danger" PA
NORTH
212
helter Cove Marina
SPECIAL ANCHORAGE A To
G "19"
Q G
5s 16ft 6M "S"
R "18"
Fl R 4s
Q 20ft 7M "W"
Platforms
Sand
copyright 2002 MarinePlanner.com

Points of Interest

Shoal Areas:

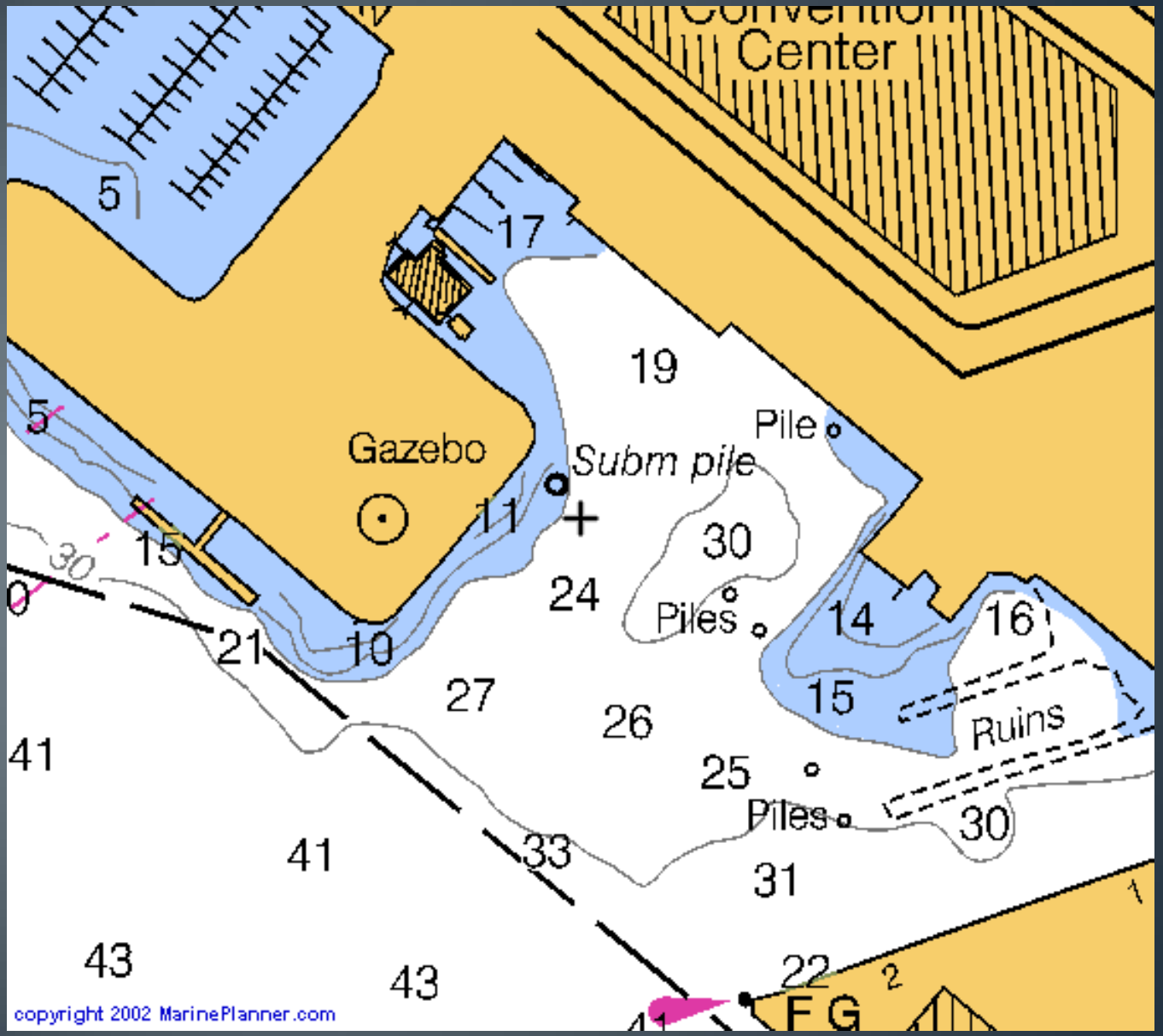
-Coronado Bay Bridge (piling 13)


Cable Area
SPECIAL ANCHORAGE A
110.1, 110.90 (see note A)
SECURITY ZONE
165, 1110
(see notes A and C)
Pier '21'
Pier '20'
Pier '19'
Pier '18'
HORN
RACON (-)
HORN
RACON (- - -)
HOR CL 194 FT
VERT CL 156 FT
Y 'A' Priv
W Or Priv
Y 'E' Priv
Y "B" Priv
Y 'C' Priv
Y 'D' Priv
G "1" Fl G 4s
Shoaling (rep 1992)
Shoaling rep 1981
OF 500 FT JUL 2004
copyright 2002 MarinePlanner.com

Points of Interest

Shoal Areas:

-Joe's Crab Shack Dock Area


Center
5
17
19
5
Gazebo
Subm pile
Pile
11
30
15
30
0
24
Piles
14
16
21
10
27
26
15
Ruins
41
25
Piles
30
41
33
31
43
43
22
2
1
F G
copyright 2002 MarinePlanner.com

Points of Interest

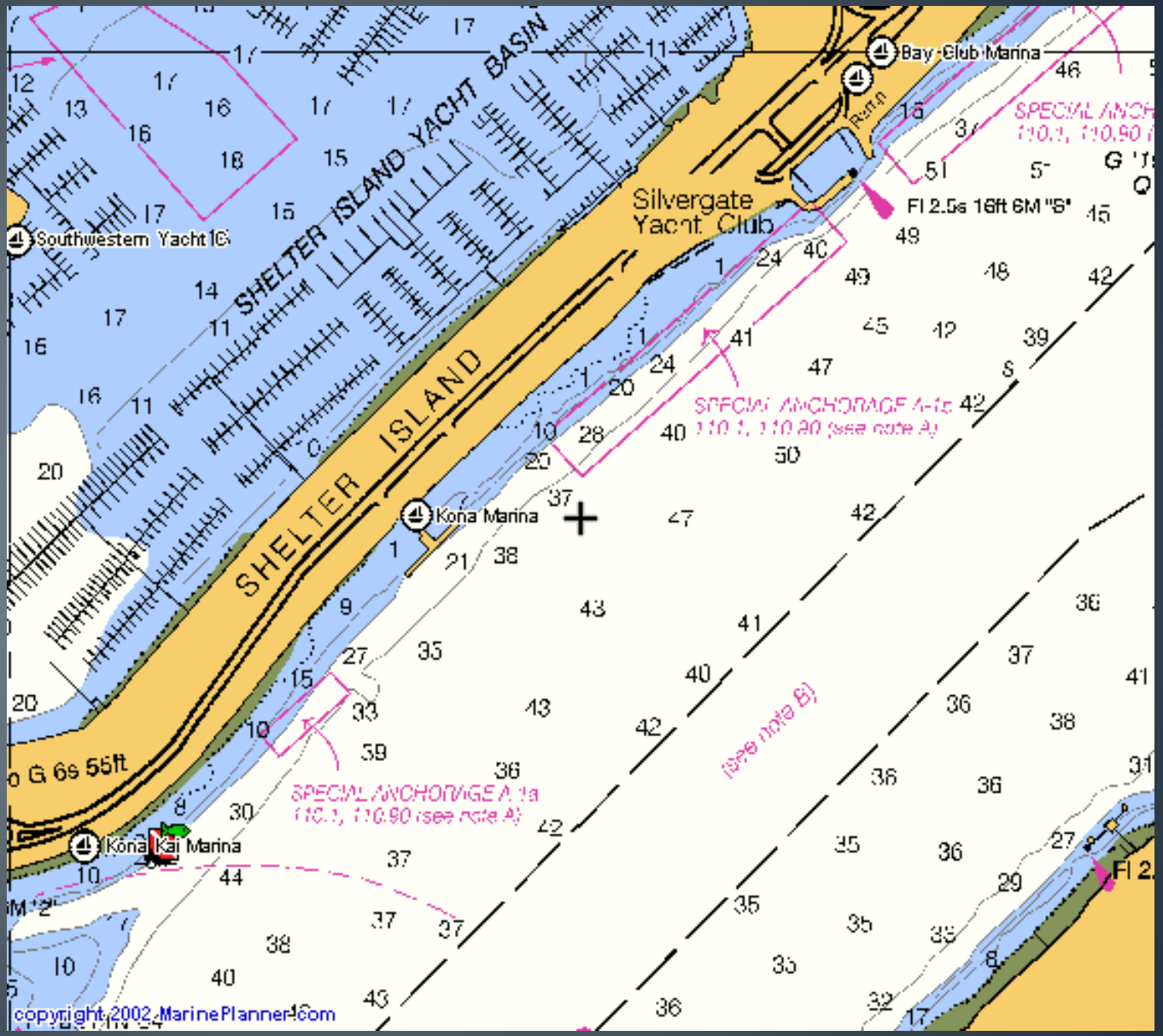
Shoal Areas:

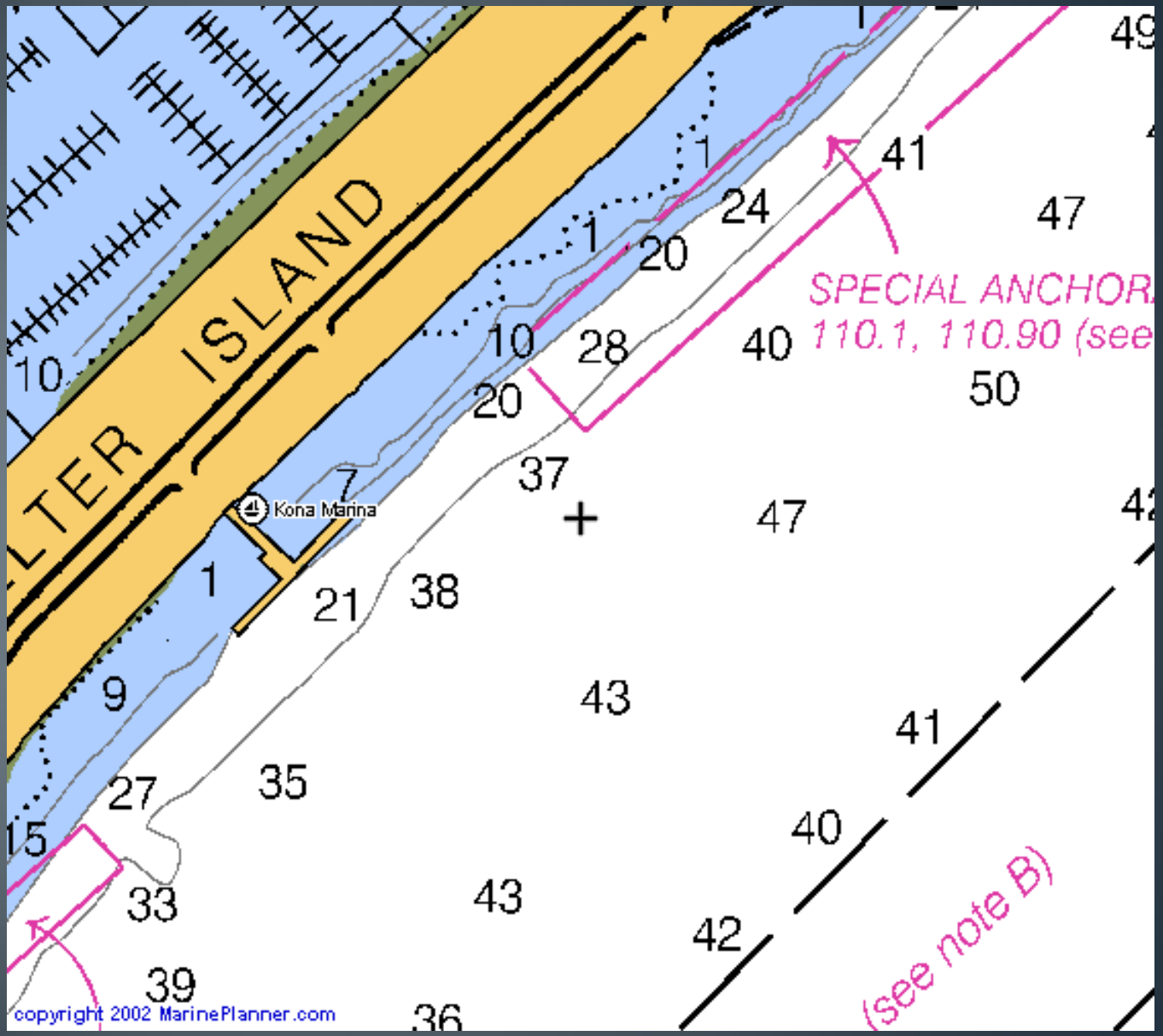
-South Bay Area (no slide available)

Points of Interest

Fishing Piers:

-Shelter Island

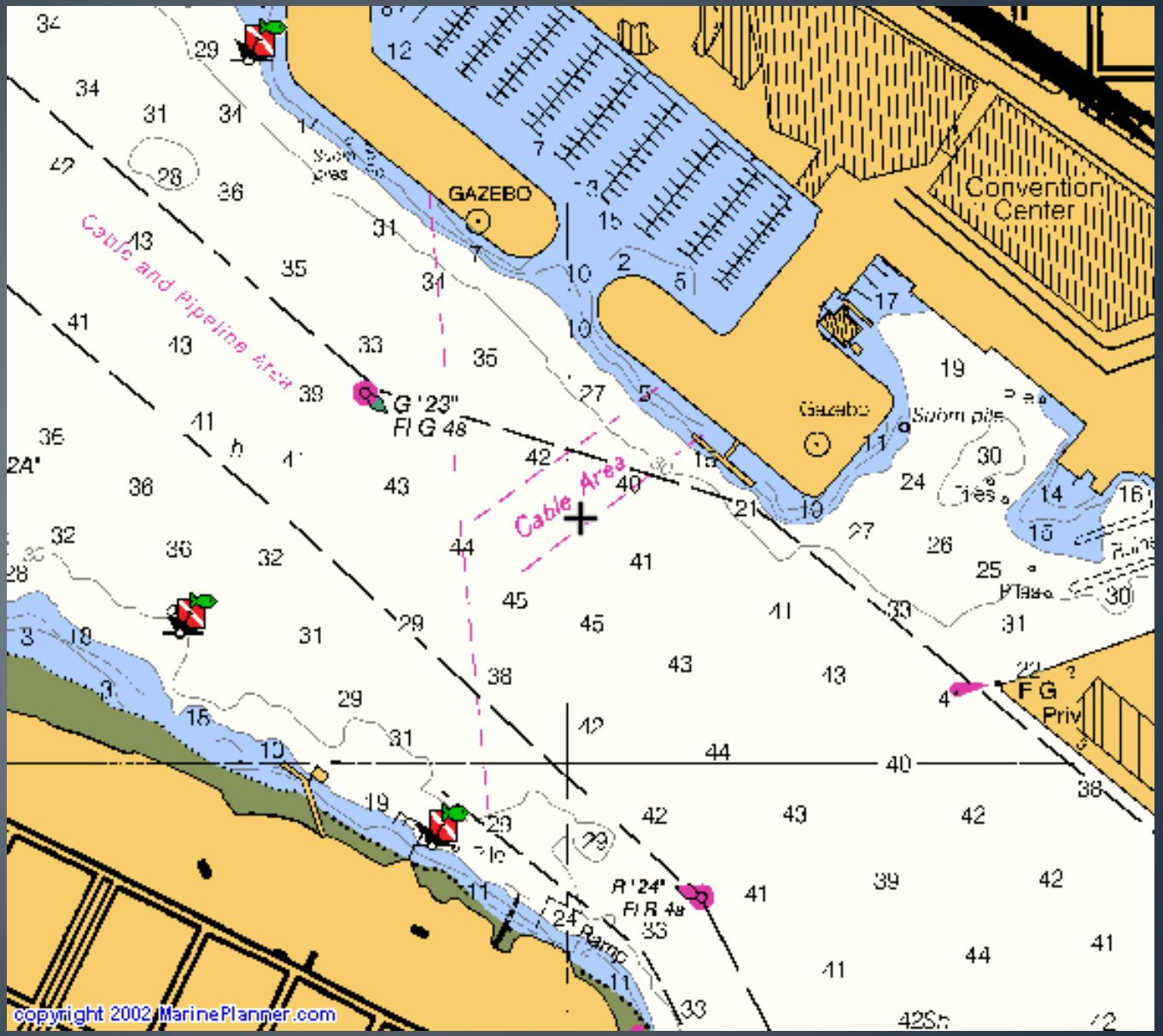

SHELTER ISLAND YACHT BASIN
SHELTER ISLAND
Silvergate Yacht Club
Bay Club Marina
Southwestern Yacht Club
Kona Marina
Kona Kai Marina
Fl 2.5s 16ft 6M "S"
G 6s 55ft
SPECIAL ANCHORAGE A-1a (110.1, 110.90 (see note A))
(see note B)
copyright 2002 MarinePlanner.com


ISLAND
Kona Marina
SPECIAL ANCHOR
110.1, 110.90 (see
(see note B)
copyright 2002 MarinePlanner.com

Points of Interest

Fishing Piers:

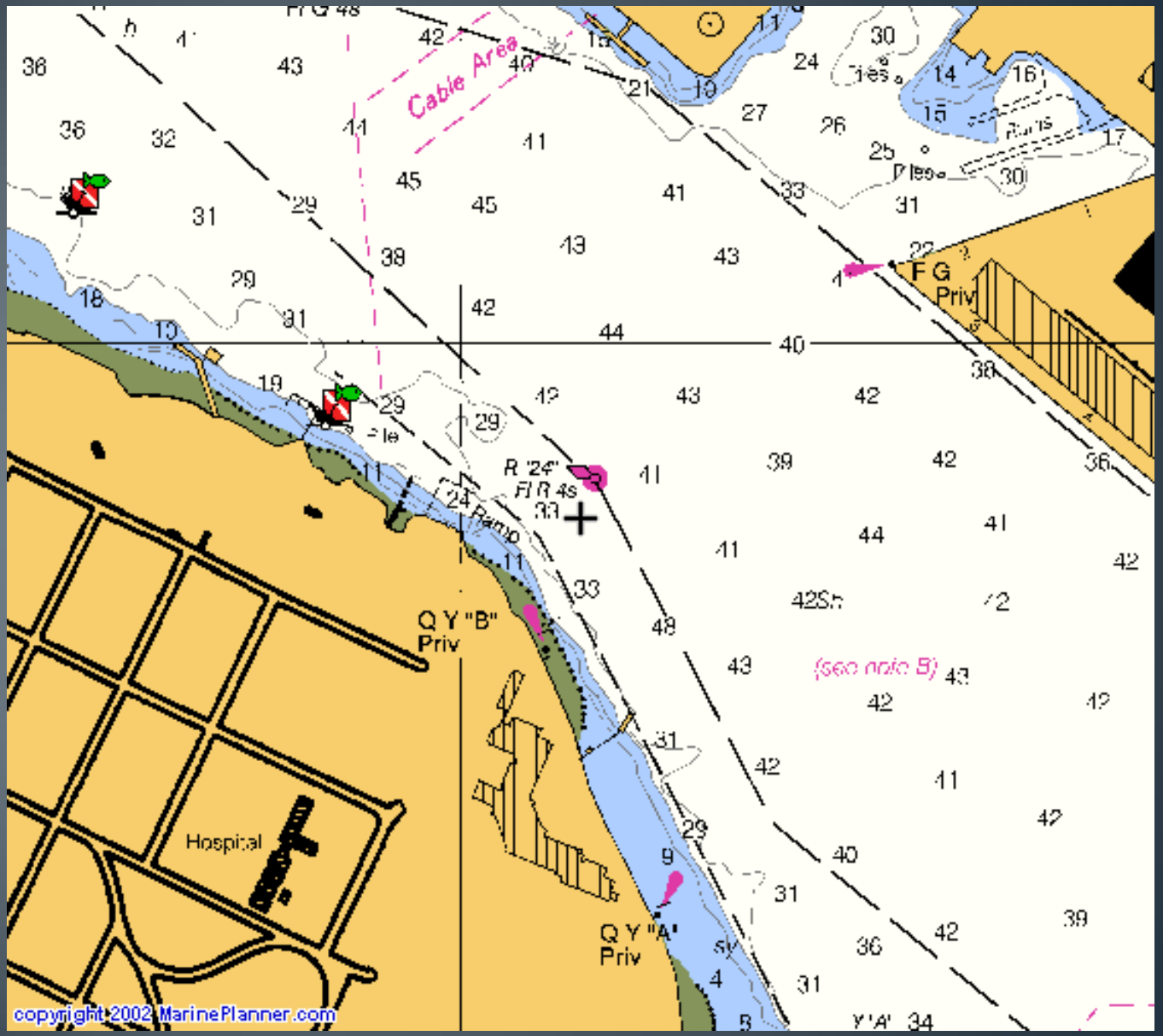
-South Marina Park


GAZEBO
Convention Center
Cable and Pipeline Area
G "23"
Fl G 4s
Cable Area
Gazebo
Storm pile
R "24"
Fl R 4s
F G
Priv
copyright 2002 MarinePlanner.com

Points of Interest

Fishing Piers:

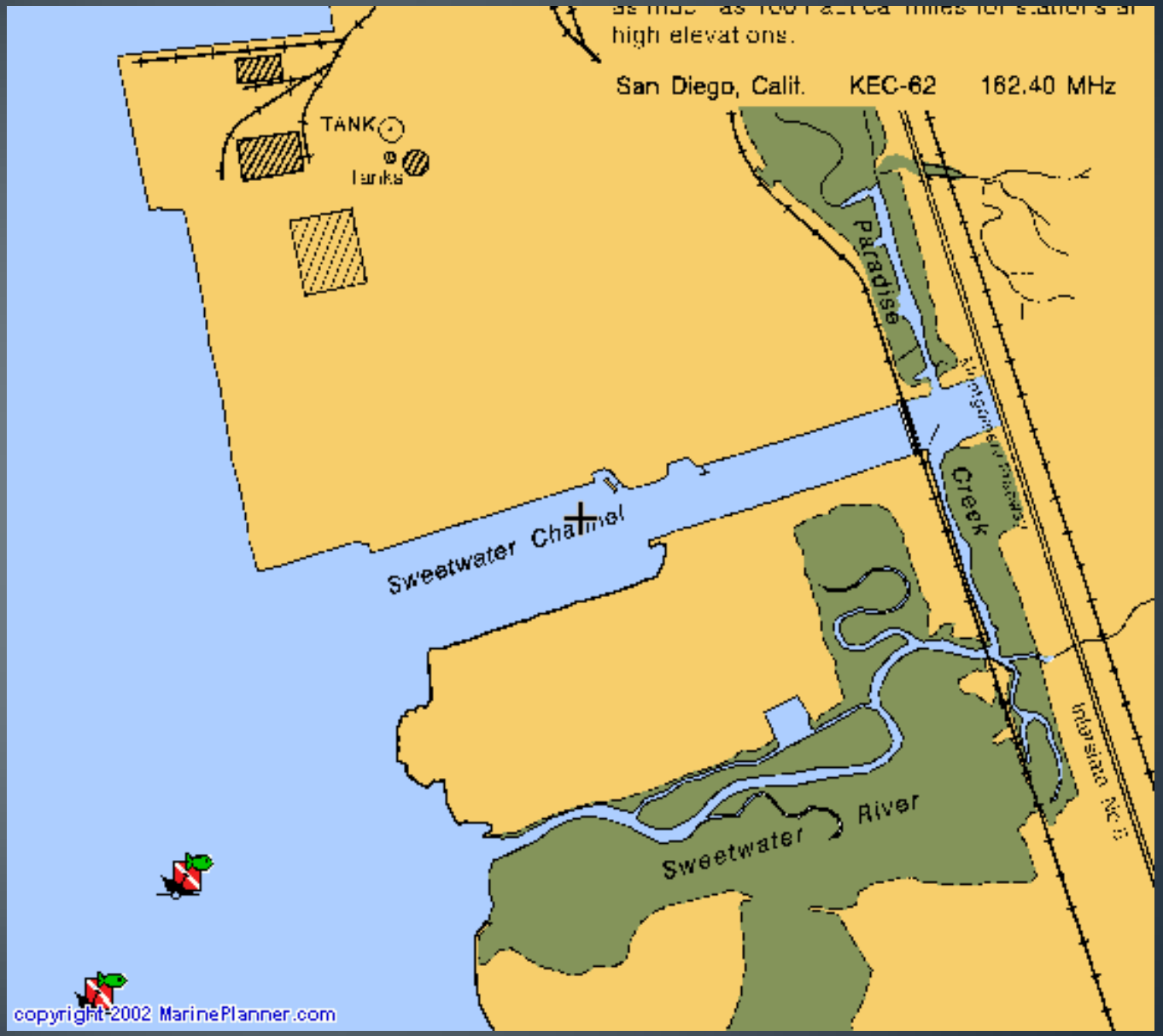
-Coronado Landing


Cable Area
F G
Priv
R "24"
Fl R 4s
24 Ramp
Q Y "B"
Priv
(see note B)
Hospital
Q Y "A"
Priv
copyright 2002 MarinePlanner.com

Points of Interest

Fishing Piers:

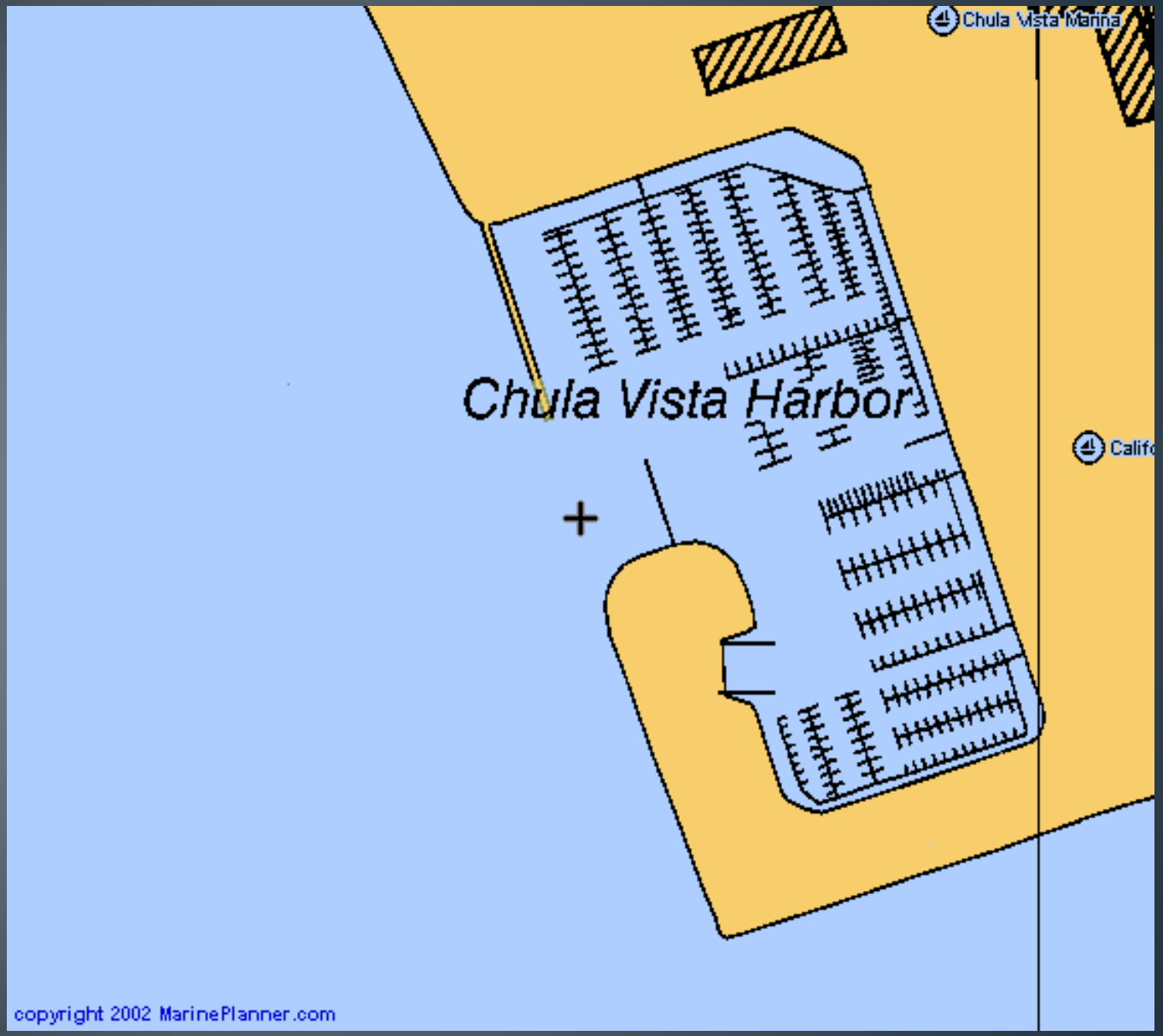
-National City Pepper Park


high elevations.
San Diego, Calif. KEC-62 162.40 MHz
TANK
Tanks
Paradise
Creek
Sweetwater Channel
Sweetwater River
Interstate 5
copyright 2002 MarinePlanner.com

Points of Interest

Fishing Piers:

-Chula Vista


Chula Vista Marina
Chula Vista Harbor
copyright 2002 MarinePlanner.com

Points of Interest

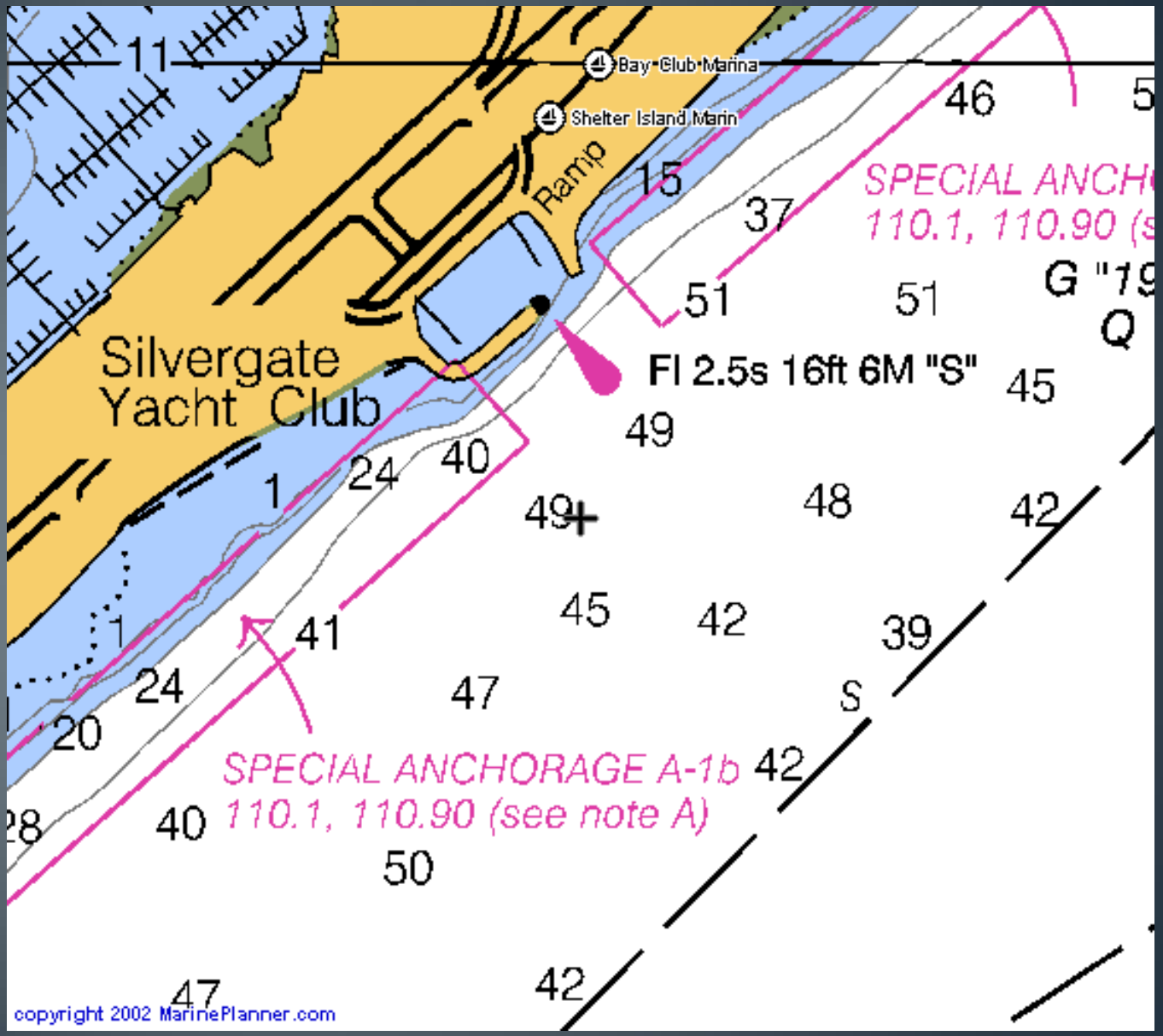
Fishing Piers:

-US Navy on North Island(no slide)

Points of Interest

Launching Ramps:

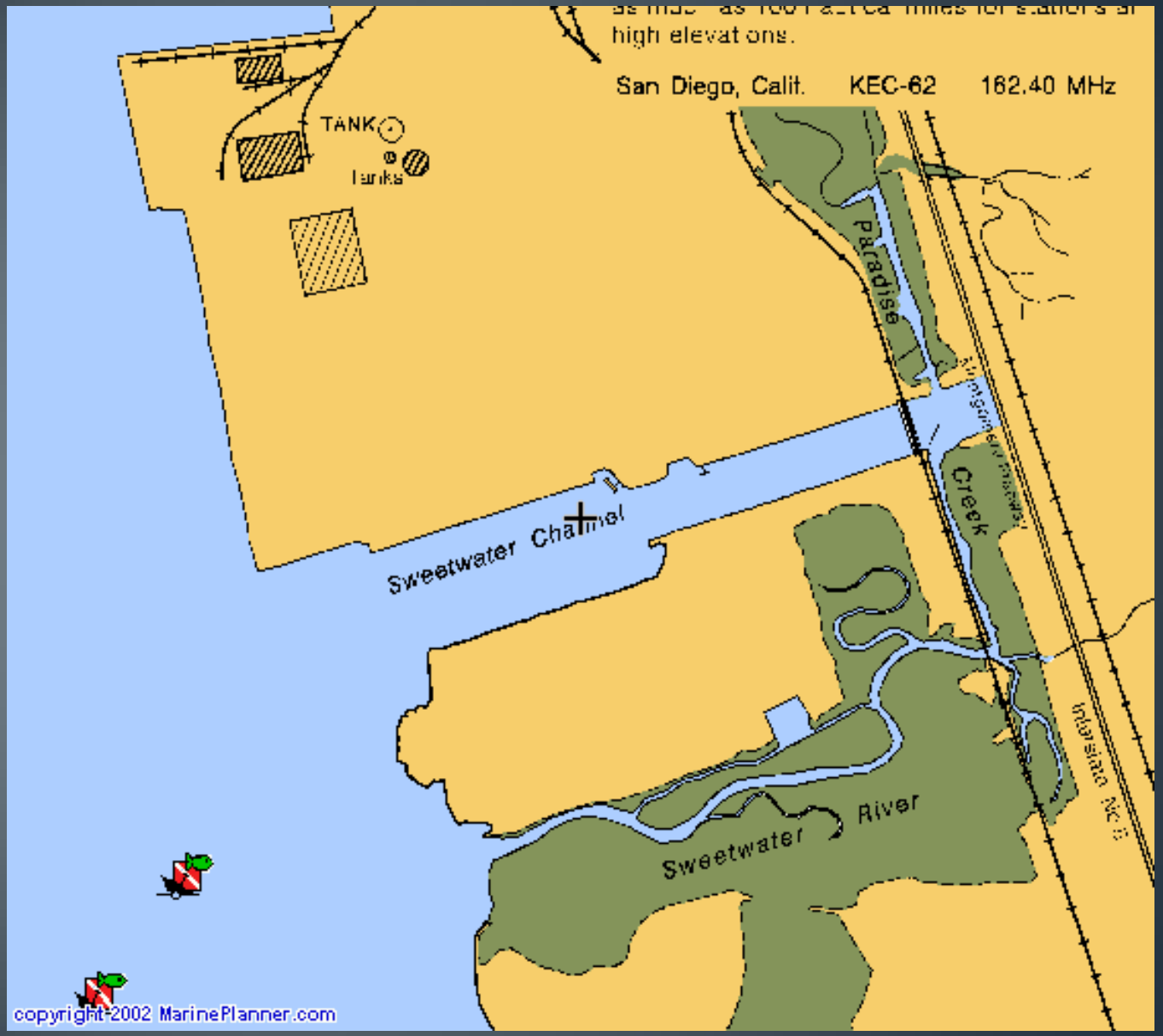
-Shelter Island


11
Bay Club Marina
Shelter Island Marin
Ramp
15
37
46
5
SPECIAL ANCH
110.1, 110.90 (s
G "19
Q
51
51
Silvergate
Yacht Club
Fl 2.5s 16ft 6M "S"
45
49
40
24
1
49
48
42
45
42
39
41
1
24
47
S
20
SPECIAL ANCHORAGE A-1b
110.1, 110.90 (see note A)
42
28
40
50
47
42
copyright 2002 MarinePlanner.com

Points of Interest

Launching Ramps:

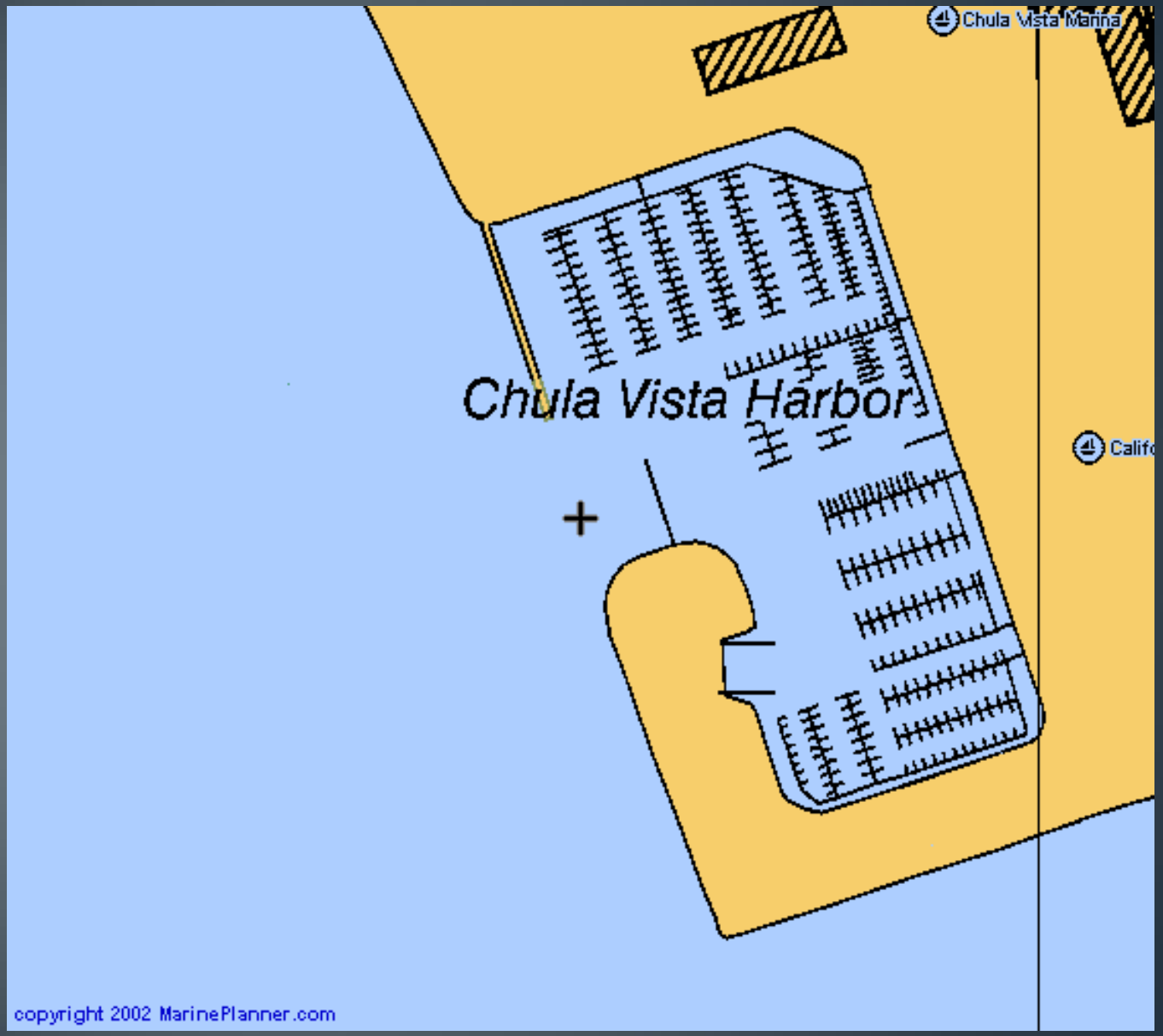
-National City


high elevations.
San Diego, Calif. KEC-62 162.40 MHz
TANK
Tanks
Paradise
Creek
Sweetwater Channel
Sweetwater River
Interstate 5
copyright 2002 MarinePlanner.com

Points of Interest

Launching Ramps:

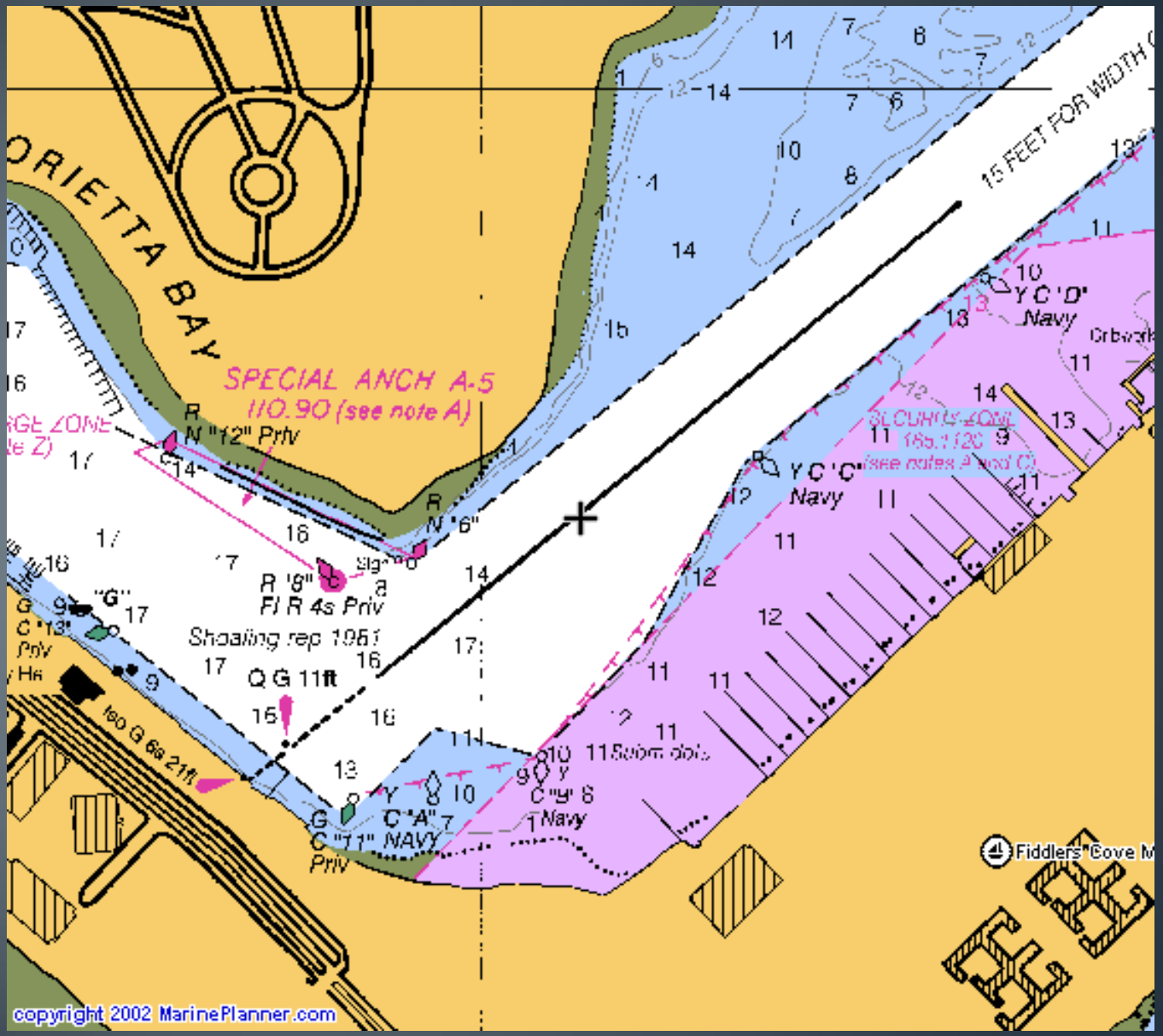
-Chula Vista


Chula Vista Marina
Chula Vista Harbor
copyright 2002 MarinePlanner.com

Points of Interest

Launching Ramps:

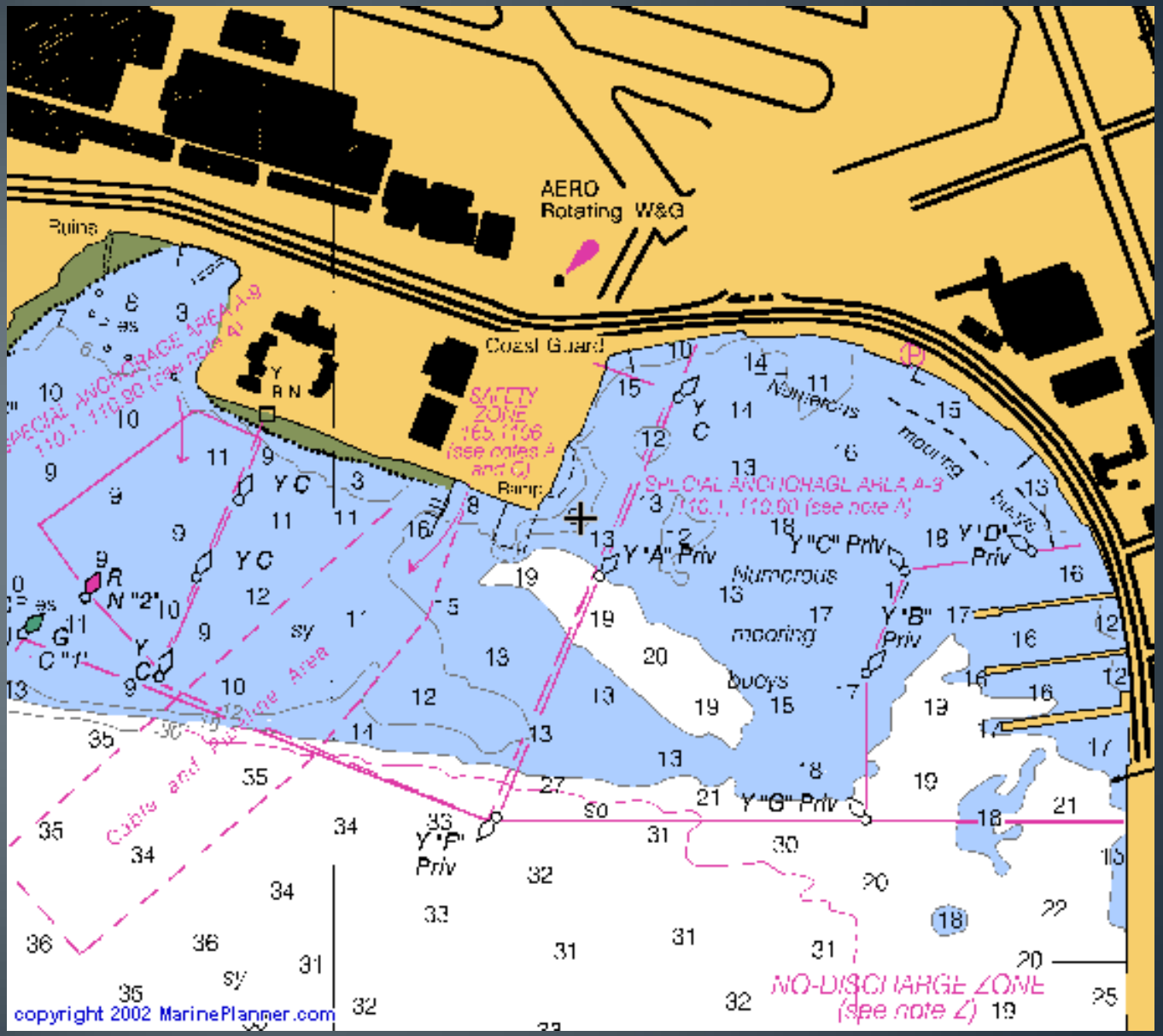
-Coronado

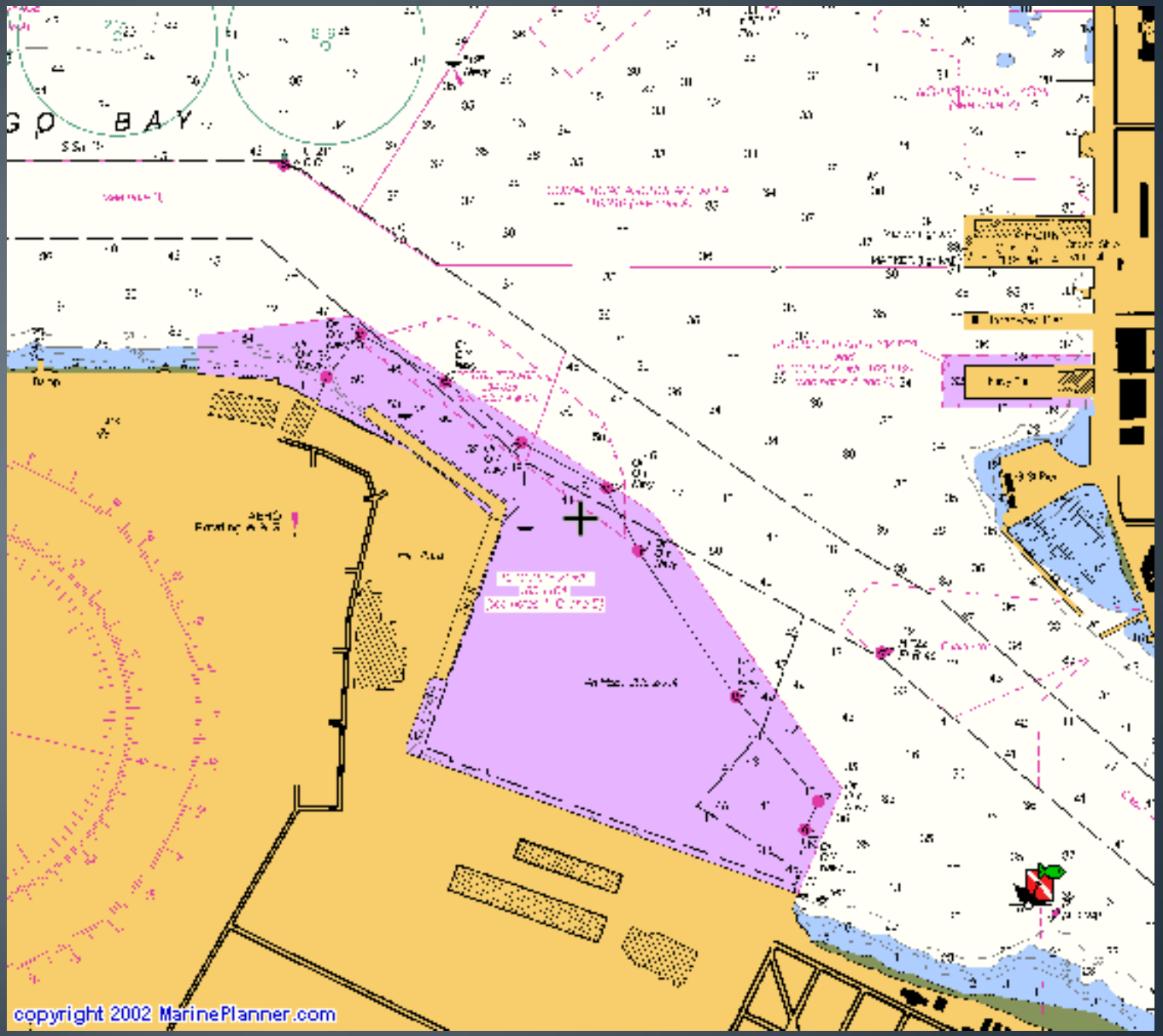

ORIETTA BAY
SPECIAL ANCH A-5
110.90 (see note A)
15 FEET FOR WIDTH
R
N "12" Priv
R
N "6"
R "8"
Fl R 4s Priv
Shoaling rep 1951
Q G 11ft
"G"
C "13"
Priv
Iso G 6s 21ft
G
C "11" NAVY
Priv
C "A" 7
Y
C "B" 8
Navy
Y C "C"
Navy
Y C "D"
Navy
Fiddlers Cove M
copyright 2002 MarinePlanner.com

Points of Interest

Launching Ramps:

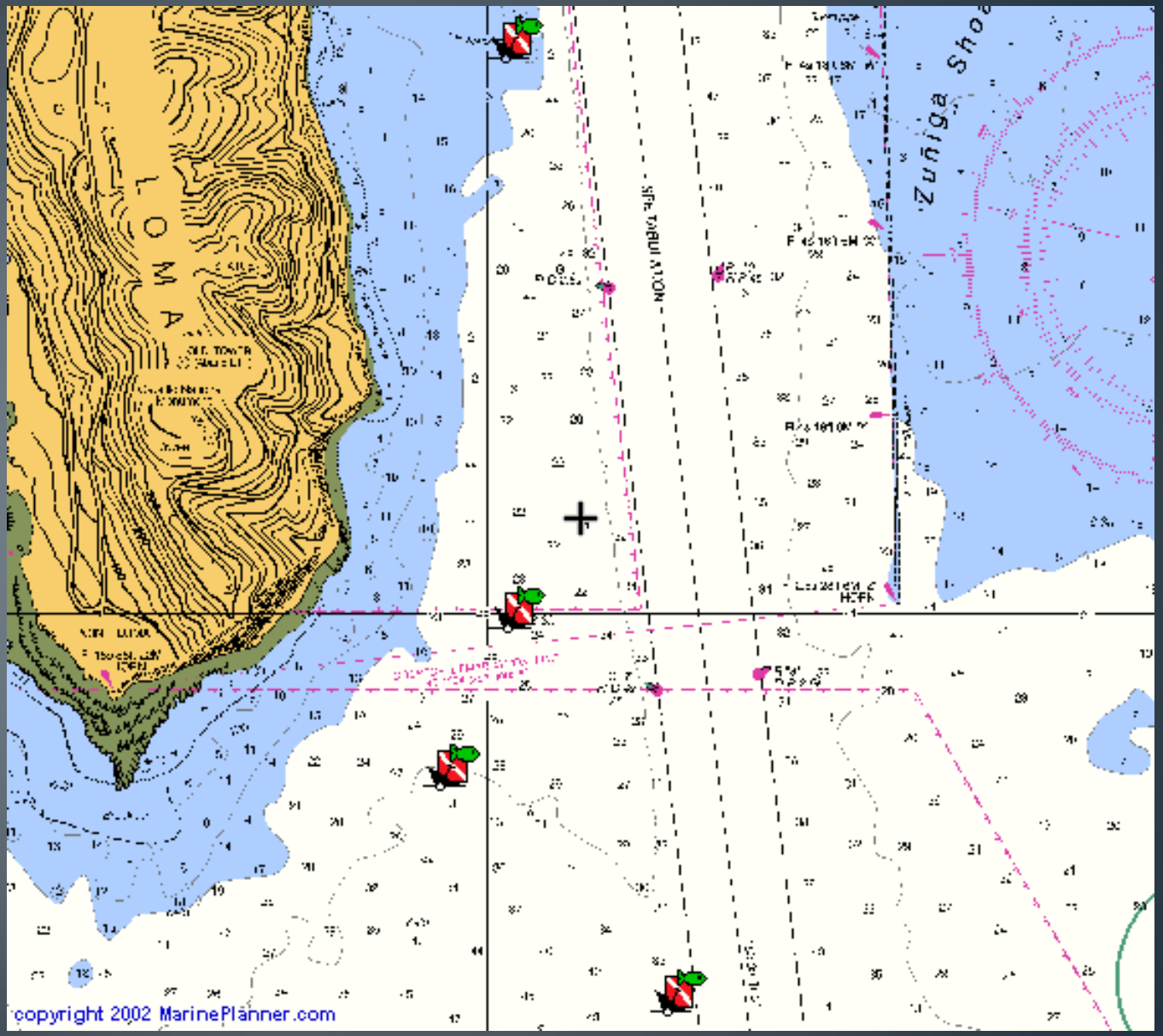
-Military (Coast Guard And Navy)


AERO
Rotating W&G
Ruins
Coast Guard
SAFETY ZONE 165.1156 (see notes A and G)
Ramp
SPECIAL ANCHORAGE AREA A-9 110.1, 110.60 (see note A)
Numerous mooring buoys
Y "A" Priv
Y "B" Priv
Y "C" Priv
Y "D" Priv
Y "E" Priv
Y "G" Priv
Cable and Pipeline Area
NO-DISCHARGE ZONE (see note Z)
copyright 2002 MarinePlanner.com


BAY
copyright 2002 MarinePlanner.com

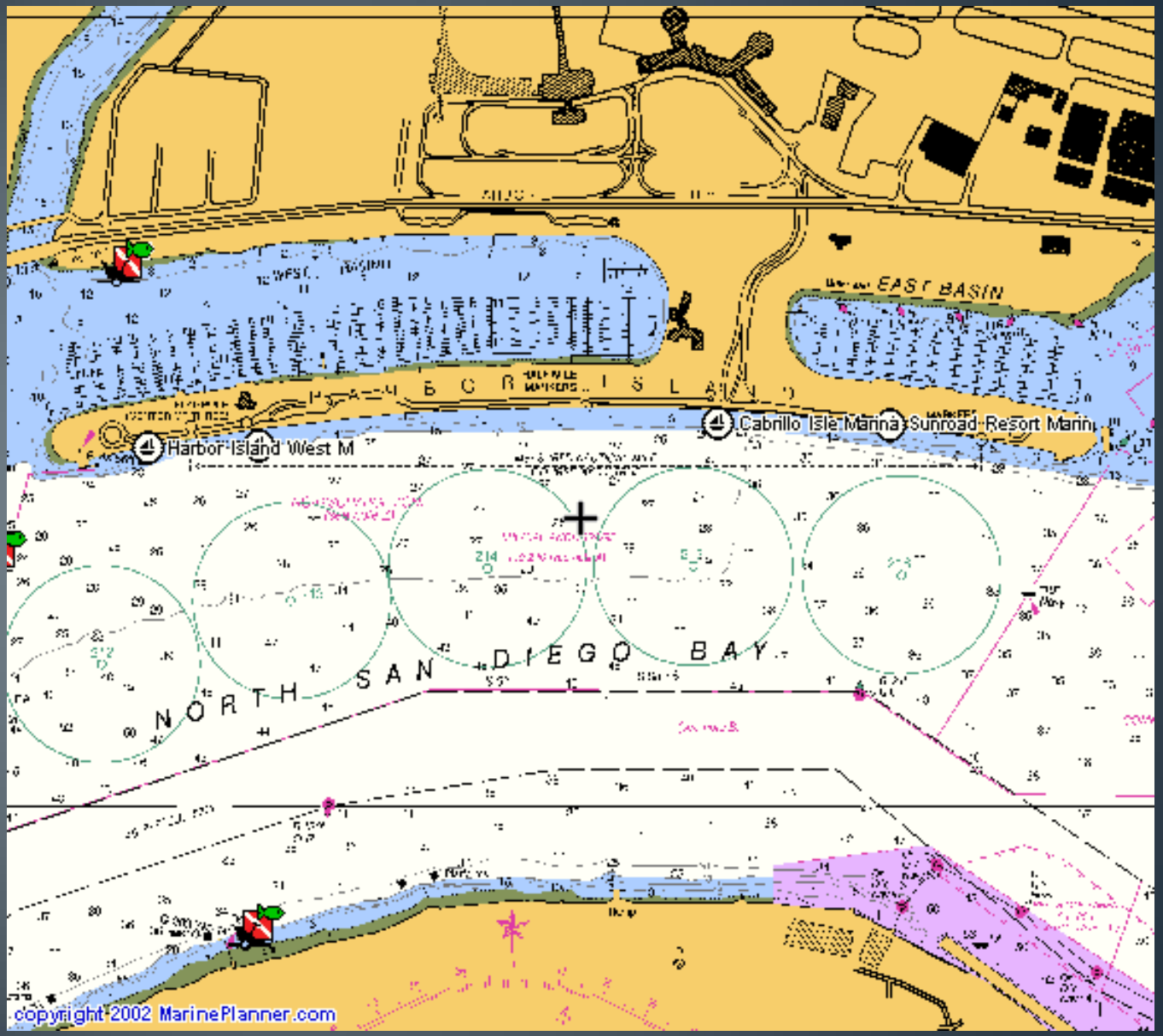
Wrecks

- Symbols located throughout the bay


LOMA
Zuñiga Sho
copyright 2002 MarinePlanner.com

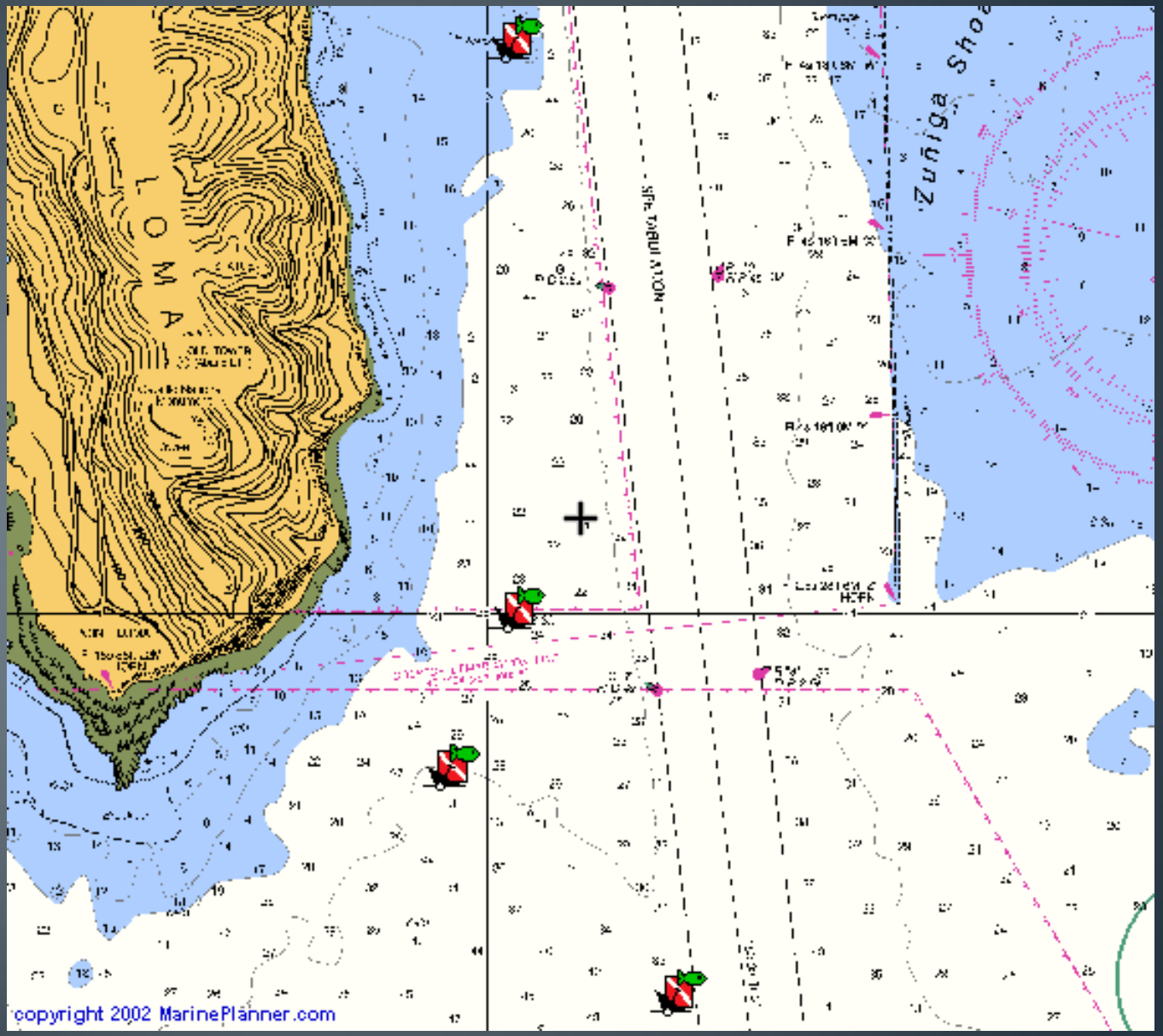
Measured Nautical Mile

- East tip to West tip of Harbor Island


EAST BASIN
Harbor Island West M
Cabrillo Isle Marina
Sunroad Resort Marin
NORTH SAN DIEGO BAY
copyright 2002 MarinePlanner.com

Line of Demarcation

- There are two sets of navigation rules; inland and international.
- A nautical chart will show you the demarcation lines where the rules change from international to inland and vice versa.
- In general, these demarcation lines follow the coastline and cross inlets and bays.
- On the seaward side of the demarcation lines international rules apply.


LOMA
Zuñiga Sho
copyright 2002 MarinePlanner.com

QUESTIONS?

TEST

SD HPD



Boating Law

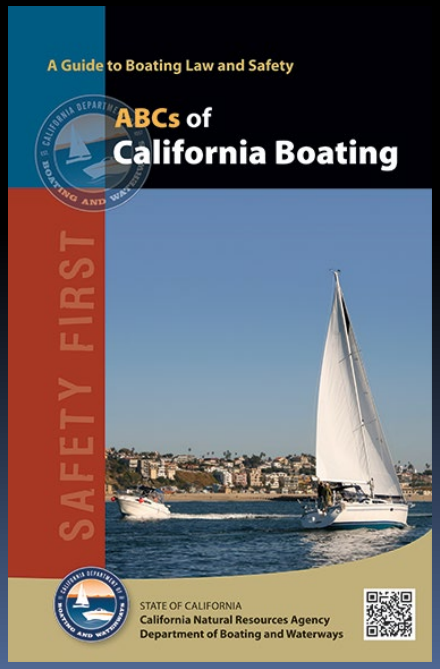
Objectives

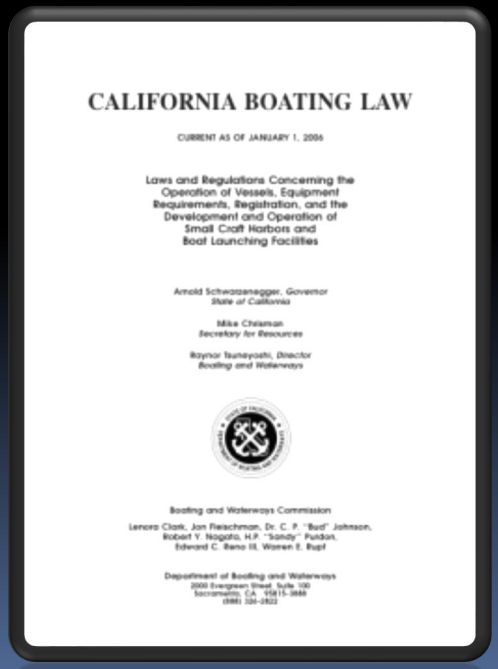
The student will be familiar with the basic laws commonly used in their daily duties as a maritime law enforcement officer.

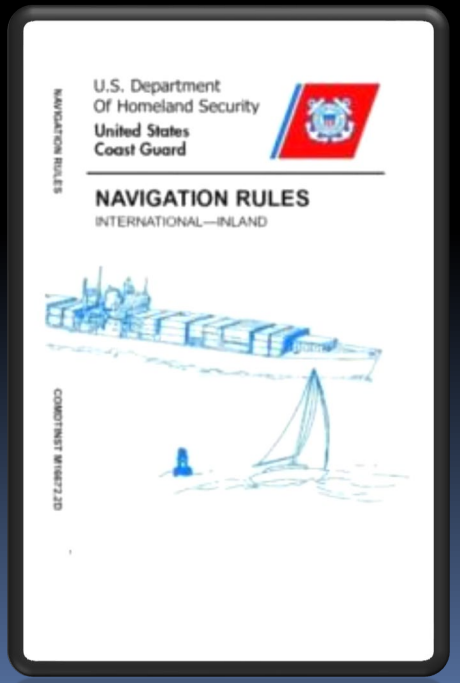


Purpose

The Purpose of this block of instruction is to introduce the students to the commonly referenced laws that govern boating on our waterways.







Patrol

- What tools are available to you in patrol?

PC

Muni Code

CVC

H&S

B&P

- H&N
- F&G
- Port Tariffs
- CFR
- CCR Title 13,14,etc
- UPD



Authority

663.6 H&N

Every vessel shall stop and allow police to come along side.



Inspection Authority

663 H&N

Provides inspection authority where the peace officer has probable cause to believe that a violation of state law or regulations or local ordinance exists.



CVC 9845

- The director, deputy director, registrar, deputy registrar, investigators of the department, and peace officers, as defined in Chapter 4.5 (commencing with Section 830) of the Penal Code, may inspect the hull identification number, certificate of number, and certificate of ownership of any vessel, as defined in Section 9840, when transported on a highway, or in any public garage, repair shop, public or private marina, dry storage facility, new or used vessel sales lot or boat yard, or other similar establishment for the purpose of investigating the ownership and registration of vessels, locating stolen vessels, and for inspection of wrecked, dismantled, or abandoned vessels. The authority to inspect pursuant to this section does not extend to any enclosed living area aboard a vessel.

Federal Boat Safety Act of 1971(FBSA/71)

Established minimum safety standards for boats and associated equipment.



Common Movers:







Movers continued









How ‘bout this guy?



Teak Surfing

Anthony Farr and Stacy Beckett Boating Safety Act of 2004











BOAT ACCIDENT







Registration & Hull







Required Safety Equipment



PFDs



PERSONAL FLOTATION DEVICES (PFDS)

Off-Shore Life Jacket (Type I PFD)

Best in open, rough or remote water where rescue may be slow. Type I's float you best, turn most unconscious wearers face up in the water, and are highly visible.

Throwable Device (Type IV PFD)

Use in calm inland water with heavy boat traffic where help is always nearby. Type IV's do not help unconscious persons, and are not designed for non-swimmers or children. Type IV's are not suitable for many hours in rough water.

Near-Shore Buoyant Vest (Type II PFD)

Good in calm, inland water, or where there is a good chance of fast rescue. Less bulk. Type II's will turn many, but not all, unconscious wearers face up in the water, but Type II's are not suitable for long hours in rough water.

Hybrid Device (Type V PFD)

High flotation when inflated. Good for continuous wear. However, may not adequately float some wearers unless this PFD is partially inflated. Type V's must be used according to approval conditions on label.

Flotation Aid (Type III PFD)

Good in calm, inland water or where there is a good chance of fast rescue. Generally the most comfortable PFD. Type III's are not good for use in rough water and the wearer may have to tilt head back to avoid face-down position in water.



Sound Signaling Devices











Vessels 40’ or longer are required to carry a whistle and a bell to meet the sound signaling device requirements.

Visual Distress Signals











Flame Arresters, Ventilation and Extinguishers



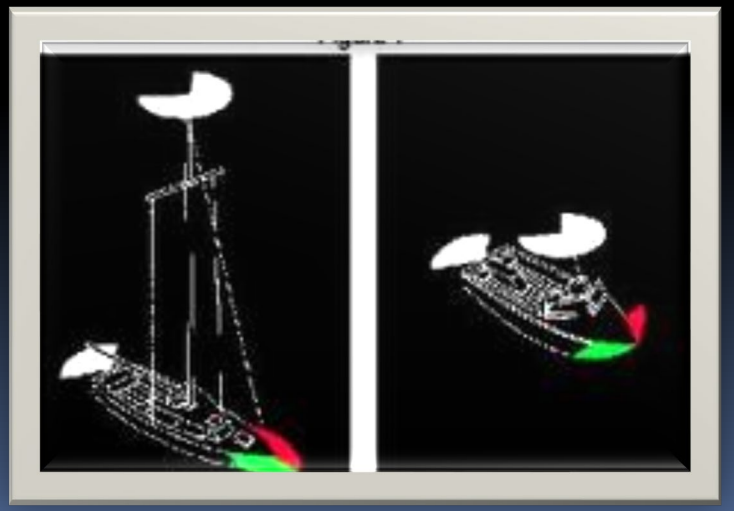




Lighting







- Proper display of a dive flag





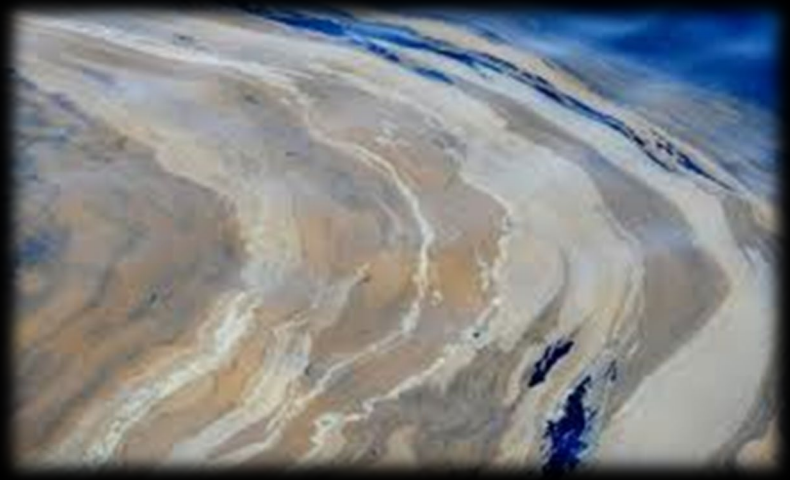






Termination of Voyage







Vessel Impounds



Fish & Game









- Citing Offenders



In Conclusion

Open your eyes, your ears and above all, your mind.

Keep your resources handy.

Knowledge is a tool.

Be safe out there.



What Are Your Questions



Marlinspike Seamanship



MLETC





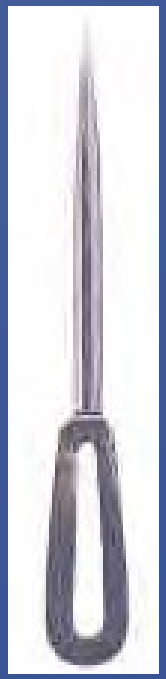
Purpose

- The purpose of this block of instruction is to familiarize the student with the types of lines and common knots used in boating.

Marlin Spike

- The art of seamanship that includes the tying of various knots.





Types of Line

- Natural
  - Manila
  - Flax
  - Hemp
  - Jute
  - Sisal
- Synthetic
  - Nylon:
  - Strongest and can stretch 30-50%
  - Polyester:
  - Does not stretch
  - Aramid fiber (Kevlar)
  - Strong and no stretch (Sailing)
  - Amsteel
  - Polypropylene:
  - Doesn't last as long in sun but floats

Rope Construction

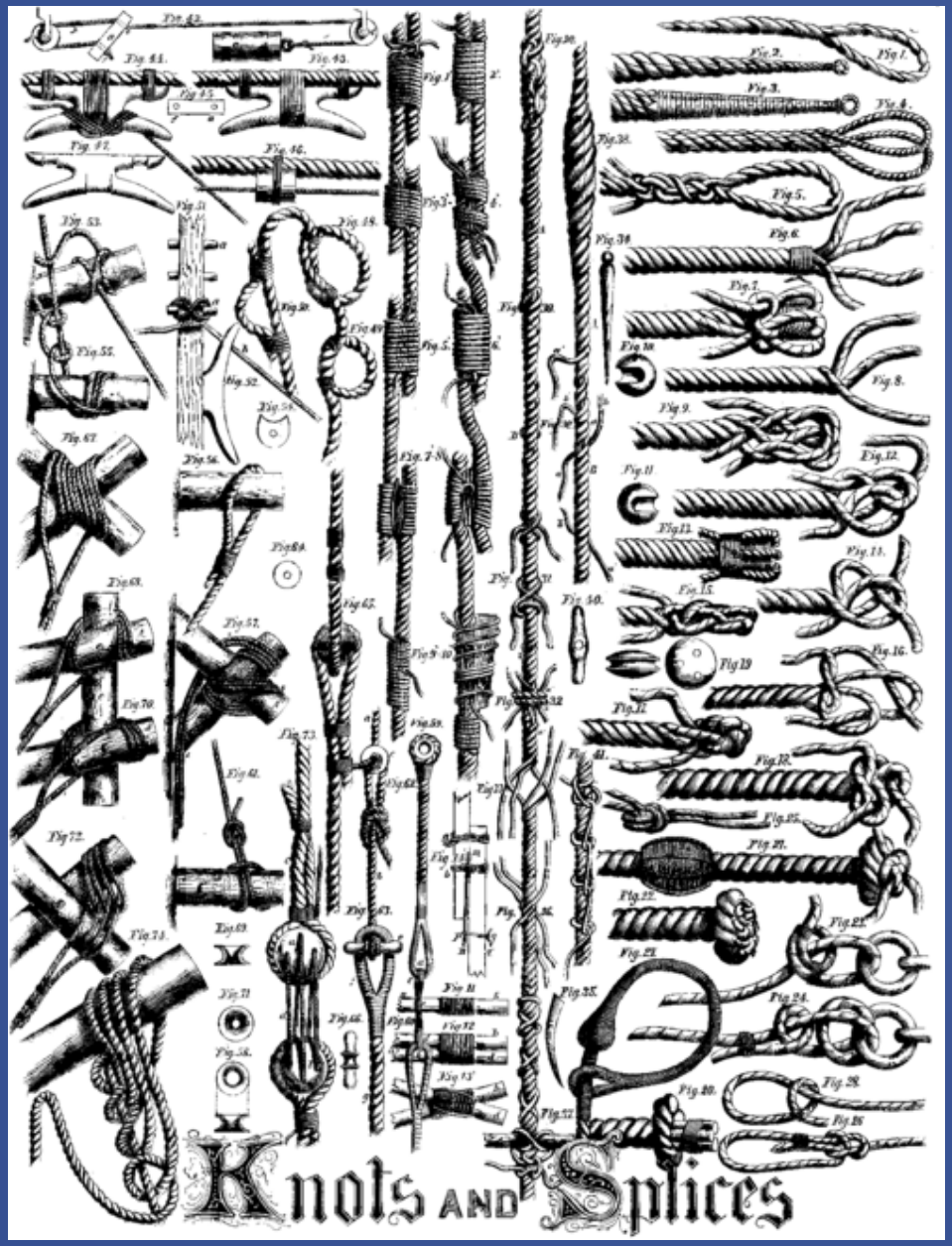
- Three Strand



- Braided

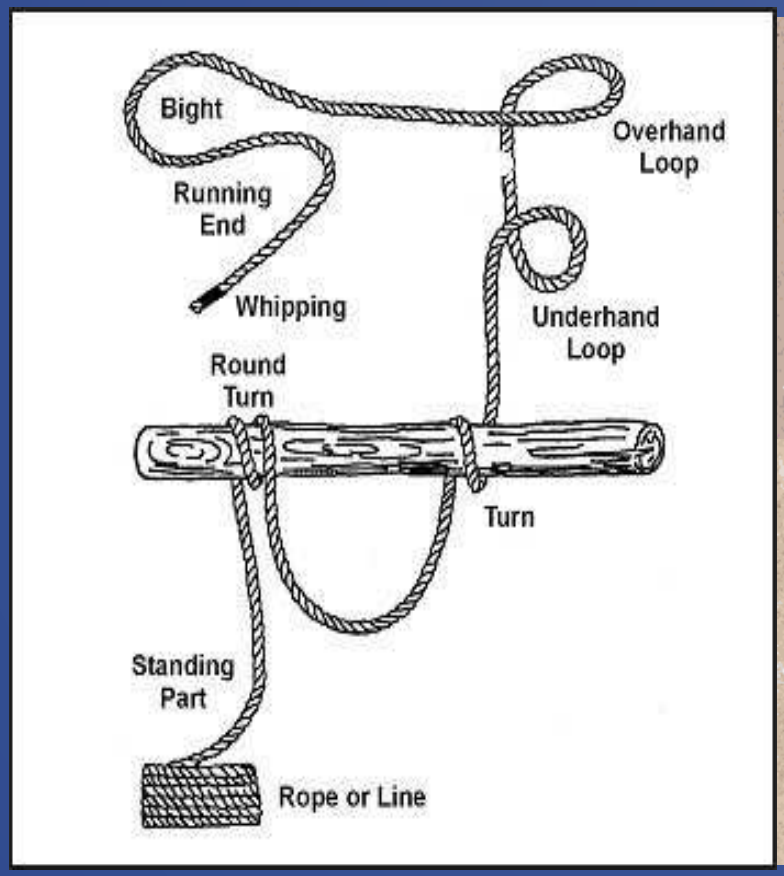


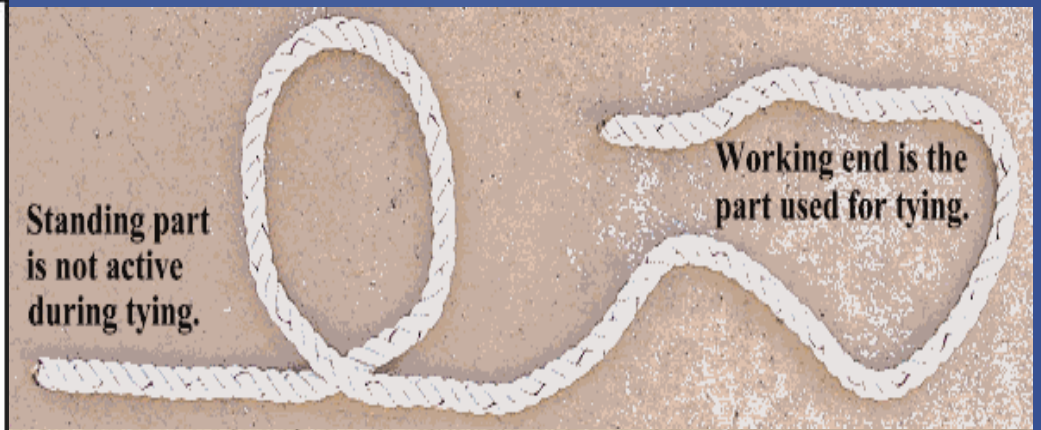
Knots

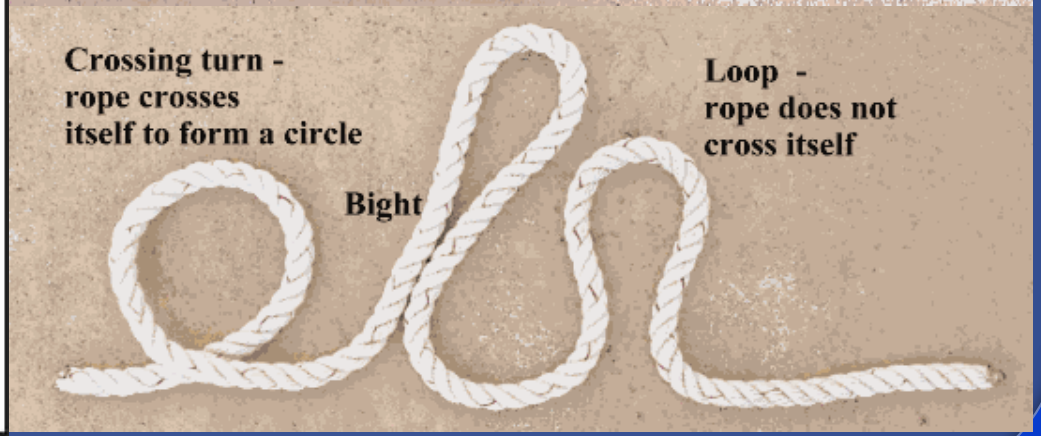


Anatomy of a knot

All knots are made up by variations of "Bights", "Loops" and "Crossing Turns"







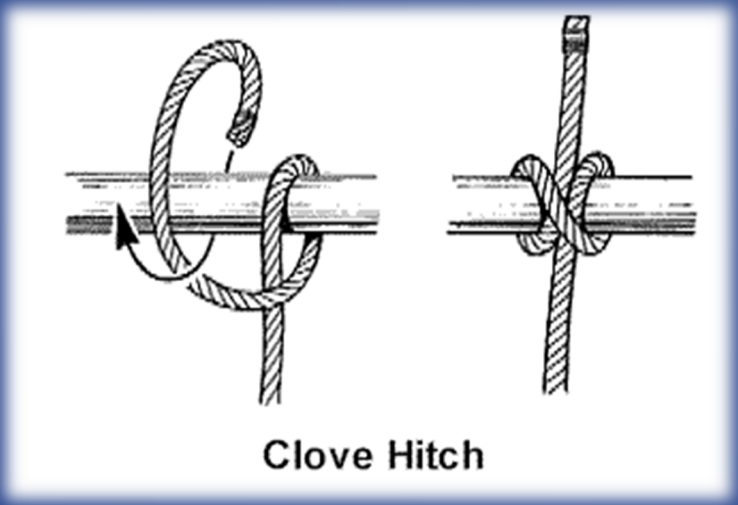
Bowline

- **Bowline** - A knot used to form an eye or loop at the end of a line. A knot with many uses, it is simple and strong, its loop will not slip, and it is easily untied after being exposed to a strain

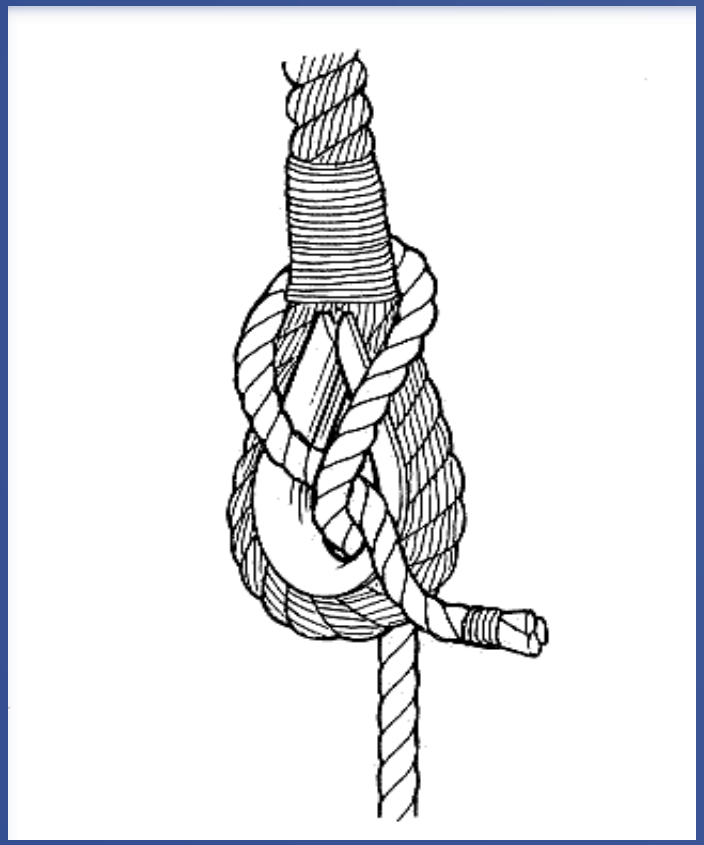


Clove Hitch

- Pros
  - Quick
  - Easy
  - Additional half hitches will add to stability
- Cons
  - May jam under heavy tension, making it uneasy to untie.
  - May untie when subjected to strain and release.



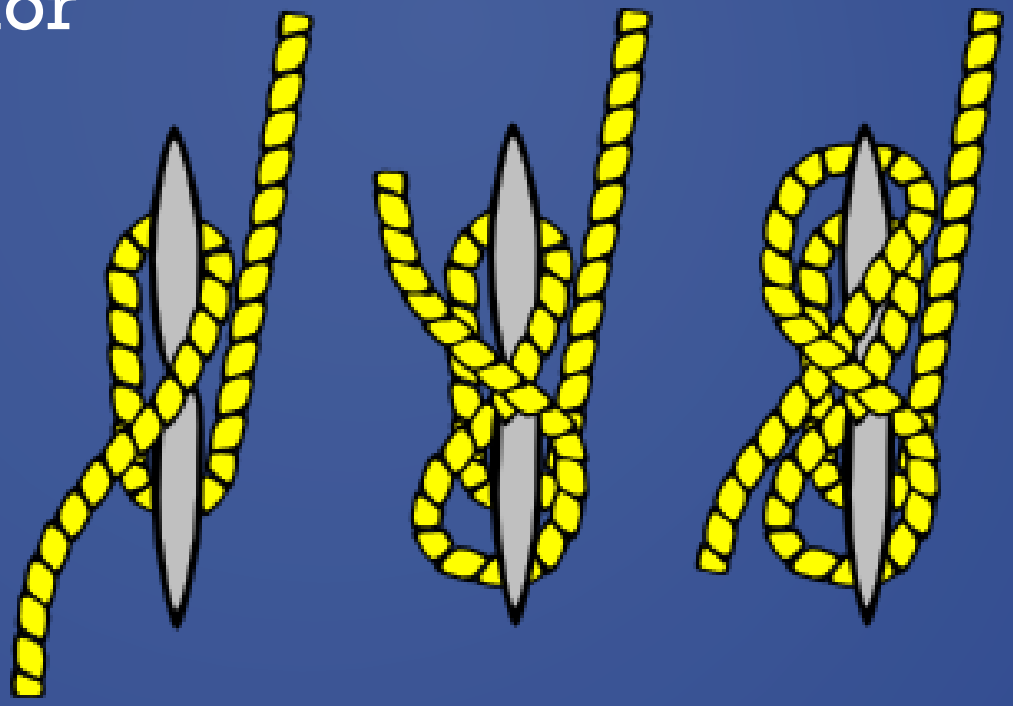
Becket / Sheet Bend



- **Becket/Sheet Bend** - A hitch used to join two ropes. It can be used between lines of different diameters

Cleat Hitch

- **Cleat Hitch-**Securely ties vessel to cleat for mooring.



Flemish

Neatness counts, especially because it's also safer. Don't throw lines in heaps about the boat. They'll kink, tangle or jam when you need them and you and your passengers are likely to trip over them.



Stowing Lines











Maintenance

- Keep lines clean
- Don't let it kink
- Guard against Chafing and Abrasion
- Avoid friction damage
- Use the right size line for the job
- Inspect and replace damaged lines

Time to Replace?

1



2



3



4



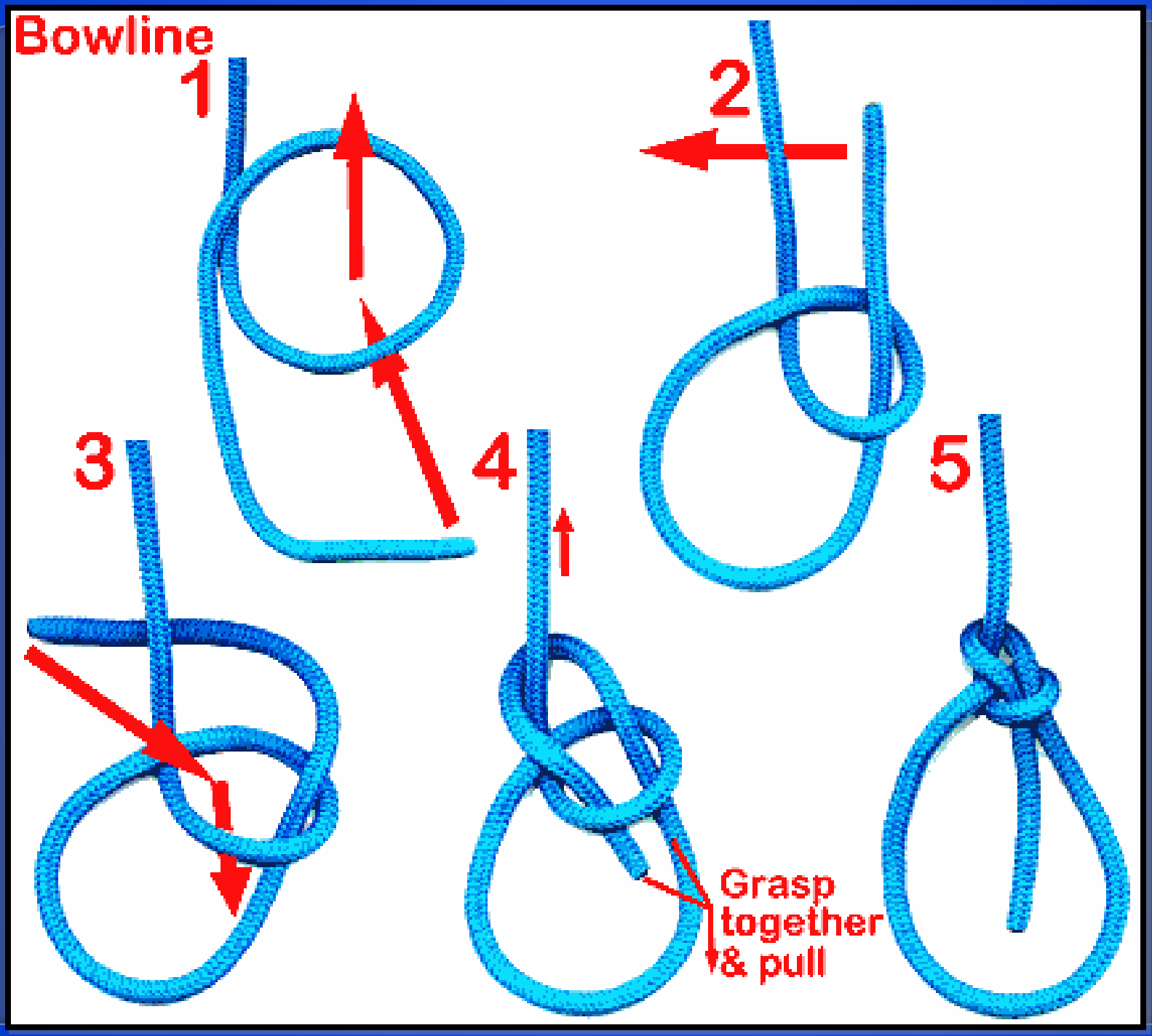
5

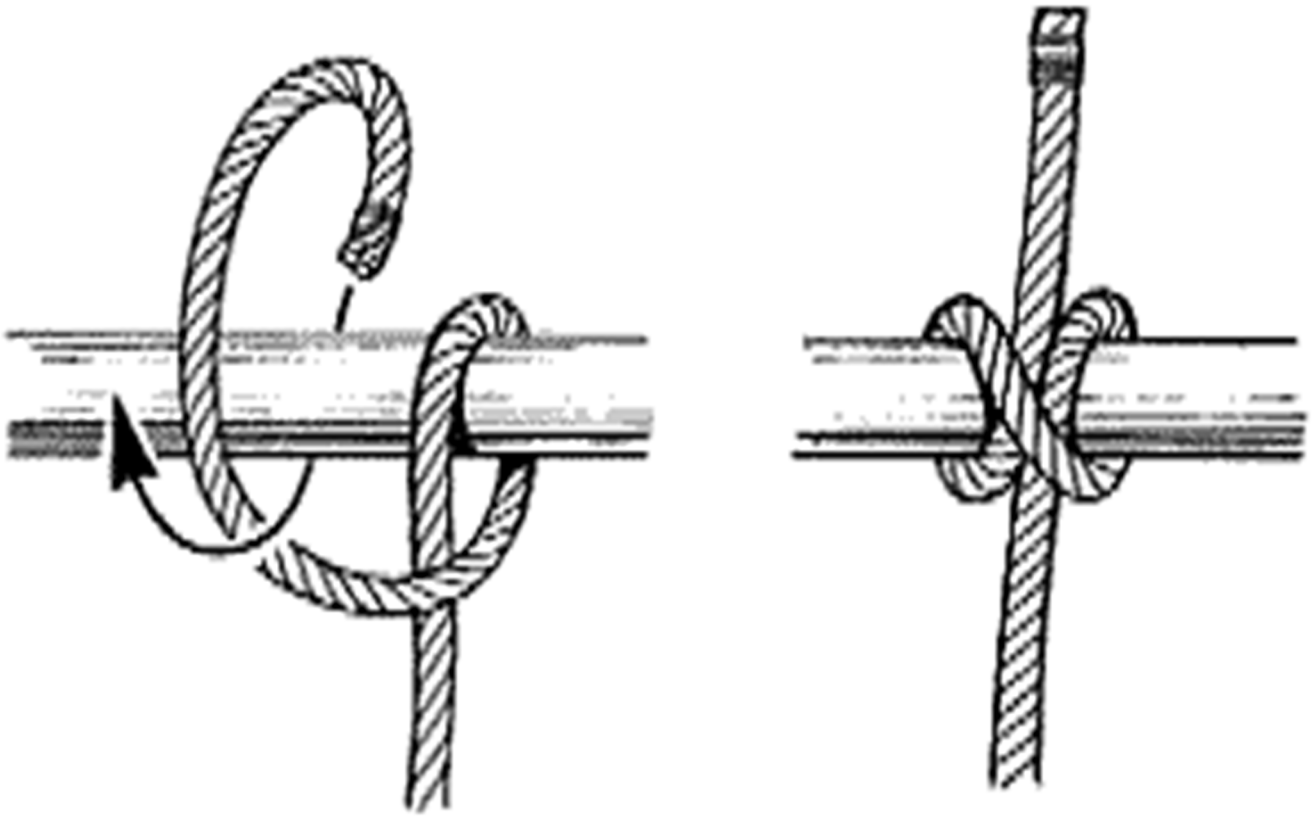


6

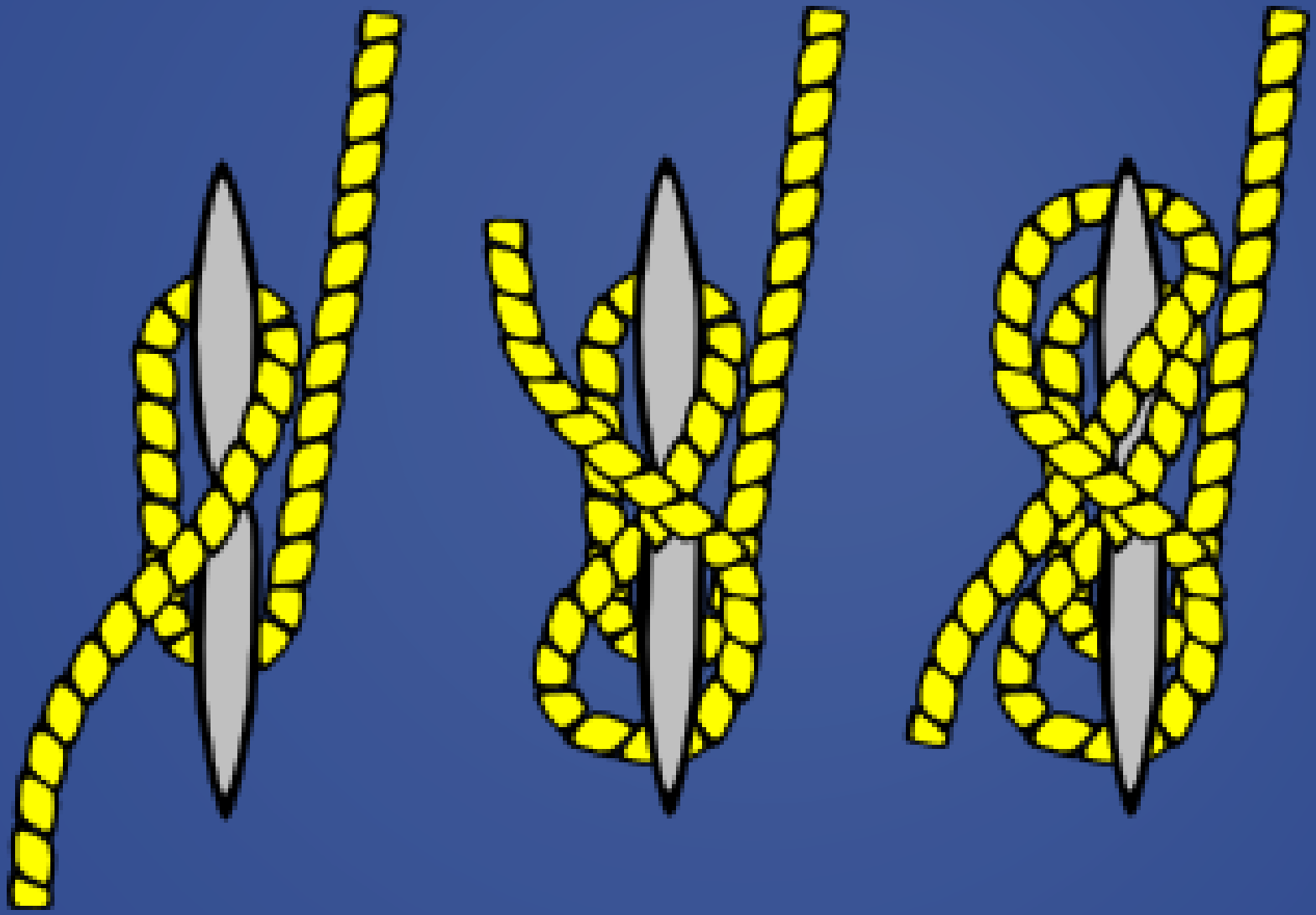


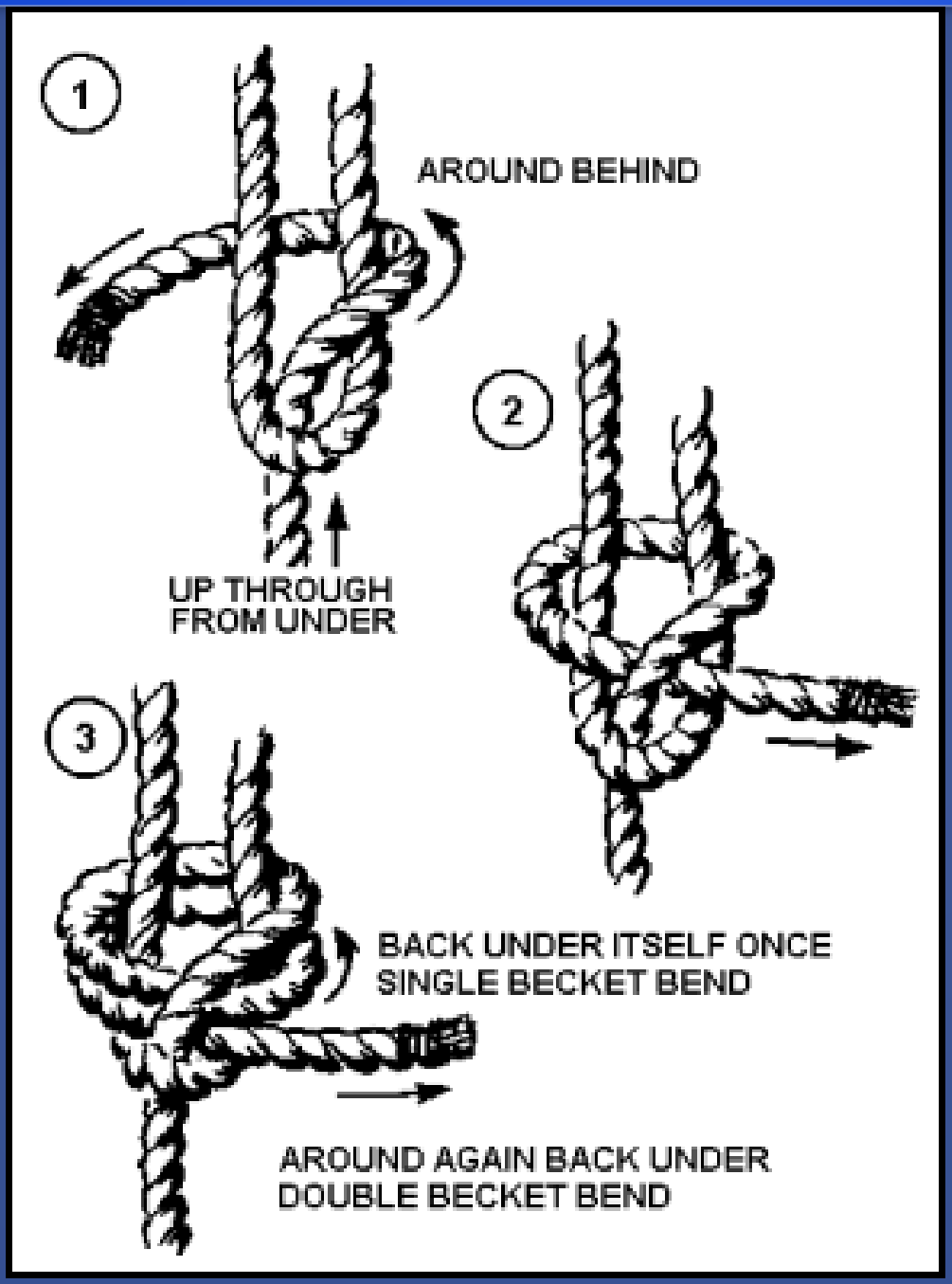
Break up into groups


Bowline
1
2
3
4
5
Grasp
together
& pull



Clove Hitch




1
AROUND BEHIND
UP THROUGH
FROM UNDER
2
3
BACK UNDER ITSELF ONCE
SINGLE BECKET BEND
AROUND AGAIN BACK UNDER
DOUBLE BECKET BEND

NAVIGATION RULES

- Part A: General
- Part B: Steering

  &

  Sailing Rules





WHO HAS RIGHT OF WAY?

ONLY	**Overtaken**
NEW	**NUC**
REELS	**RAM**
CATCH	**CBD** (International Only)
FISH	**Fishing**
SO	**Sailing**
PURCHASE	**Power**
SOME	**SeaPlane**
OFTEN	**Overtaking**

Introduction

International Rules

The COLREGs are derived from a multilateral treaty called the Convention on the International Regulations for Preventing Collisions at Sea, 1972, and became effective on July 15, 1977. The Rules (commonly called 72 COLREGS) are part of the Convention, and vessels flying the flags of states ratifying the treaty are bound to the Rules.

These Rules are applicable on waters outside of established navigational lines of demarcation. The lines are called COLREGS Demarcation Lines and delineate those waters upon which mariners shall comply with the Inland and International Rules.

INLAND RULES

Following the 72 COLREGS a new effort was made to unify and update the various inland navigation rules. This effort culminated in the enactment of the Inland Navigation Rules Act of 1980.

This legislation sets out Rules 1 through 38 – the main body of the Rules.

International / Inland

International



Inland

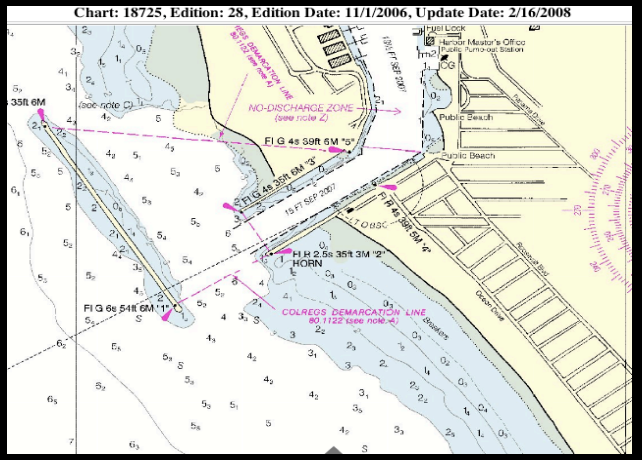
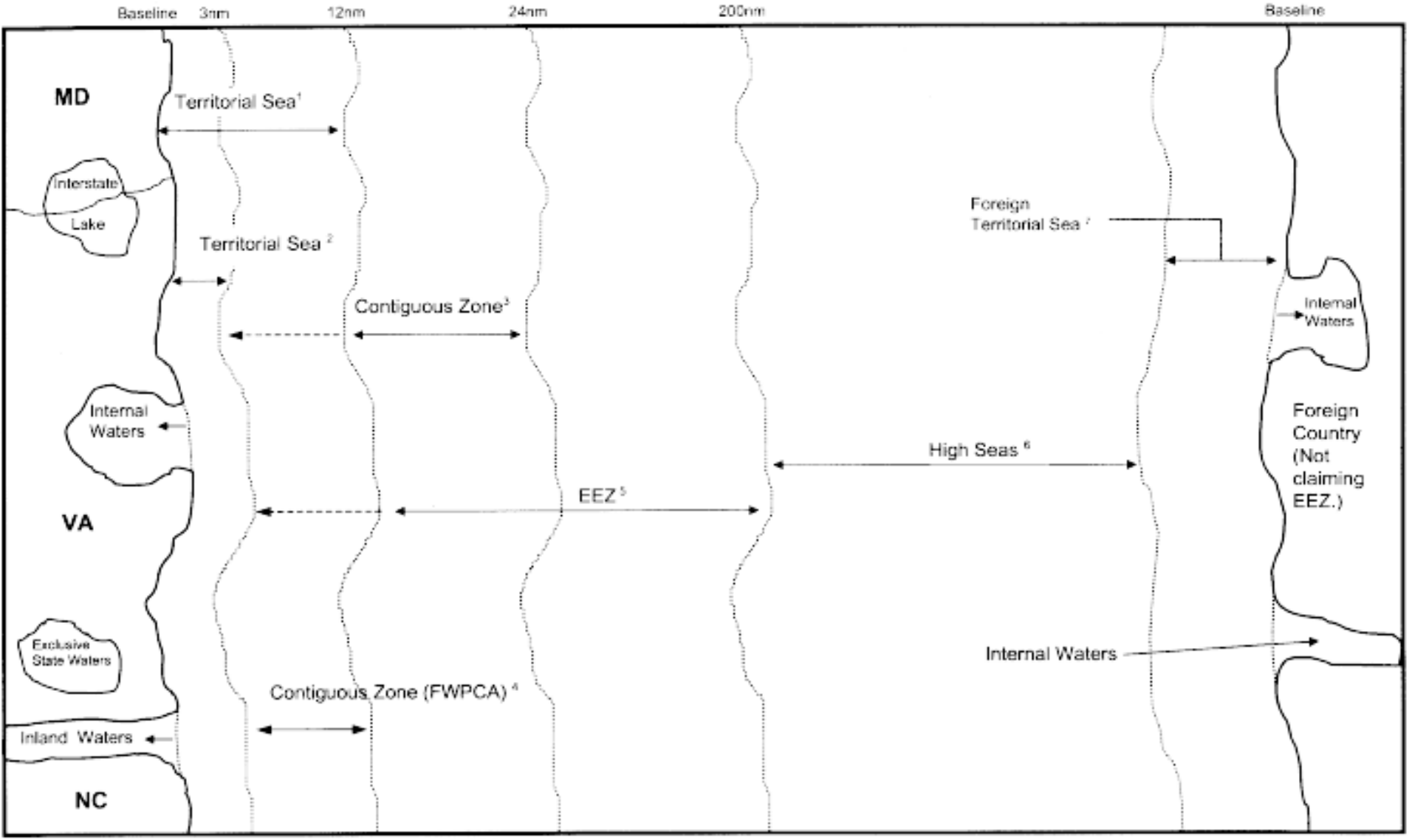




FIGURE 2.1. JURISDICTIONAL AREAS



[1] Territorial sea for purposes identified in §2.22(a)(1).
[2] Territorial sea for purposes identified in §2.22(a)(2).
[3] Contiguous zone as described in §2.28(b), varies with territorial sea width for particular purpose involved.
[4] Contiguous zone as described in §2.28(a), for Federal Water Pollution Control Act purposes.
[5] Exclusive Economic Zone (EEZ) is measured from the seaward limit of the territorial sea, as variously defined in §2.22(a), to a distance of 200 nautical miles from the baseline. The inner (shoreward) boundary of the EEZ will vary for particular purposes.
[6] High seas as defined in §2.32(d). When a nation has not proclaimed an EEZ, the high seas begin at the seaward edge of their territorial sea.
[7] The U.S. recognizes territorial sea claims of other nations up to a maximum distance of 12 nautical miles from the baseline.

RULE 1: Application

Sections (a - f)



These Rules apply to all vessels upon the inland waters of the United States, and to vessels of the United States on the Canadian waters of the Great Lakes to the extent that there is no conflict with Canadian law.

Rule 2 Responsibility

- (a) Nothing in these Rules shall exonerate any vessel, or the owner, master, or crew thereof, from the consequences of any neglect to comply with these Rules or the neglect of any precaution which may be required by the ordinary practice of seaman, or by the special circumstances of the case.

Rule 3

General Definitions

(a)The word “Vessel” includes every description of water craft, including non-displacement craft and seaplanes, used or capable of being used as a means of transportation on water.

(b)The term “Power-Driven Vessel” means any vessel propelled by machinery.

(c)The term “Sailing Vessel” means any vessel under sail provided that propelling machinery, if fitted, is not being used.

(d)The term “Vessel Engaged in Fishing” means any vessel fishing with nets, lines, trawls, or other fishing apparatus which restricts maneuverability.

Rule 3 (cont.)

(e) The word "Seaplane" includes any aircraft designed to maneuver on the water.

(f) The term "Vessel Not Under Command" means a vessel which through some exceptional circumstances is unable to maneuver as required by these Rules and is therefore unable to keep out of the way of another vessel.

(g) The term "Vessel Restricted in Her Ability to Maneuver" means a vessel which from the nature of her work is restricted in her ability to maneuver as required by these Rules and is therefore unable to keep out of the way of another vessel.

(h) The word "Underway" means that a vessel is not at anchor, or made fast to the shore, or aground.

Rule 3 (cont.)

(h) (International Only) The term "Vessel Constrained by Her Draft" means a power driven vessel which, because of her draft in relation to the available depth and width of navigable water is severely restricted in her ability to deviate from the course she is following.

(k) The term "Restricted Visibility" means any condition in which visibility is restricted by fog, mist, falling snow, heavy rainstorms, sandstorms, or any other similar causes.

(o) "Inland Waters" means the navigable waters of the United States shoreward of the navigational demarcation lines dividing the high seas from harbors, rivers and other inland waters of the United States and Great Lakes on the U.S. side of the international boundary.

Rule 5: Look-out



- At all times…
- Maintain a proper look-out
- By sight, hearing, and all available means
- Make a full appraisal of the situation.

Rule 6: SAFE SPEED

September 4, 1940

San Pedro, California

Rests 4 miles outside the Port of Los Angeles at 100 ft deep

Cause of accident

Unsafe speed ***(Rule 6)***

10-13 Knots in patchy fog

Killed 3 Adults/ 5 Teenagers



Rule 7: Risk of Collision



Rule 8: Action to avoid collision



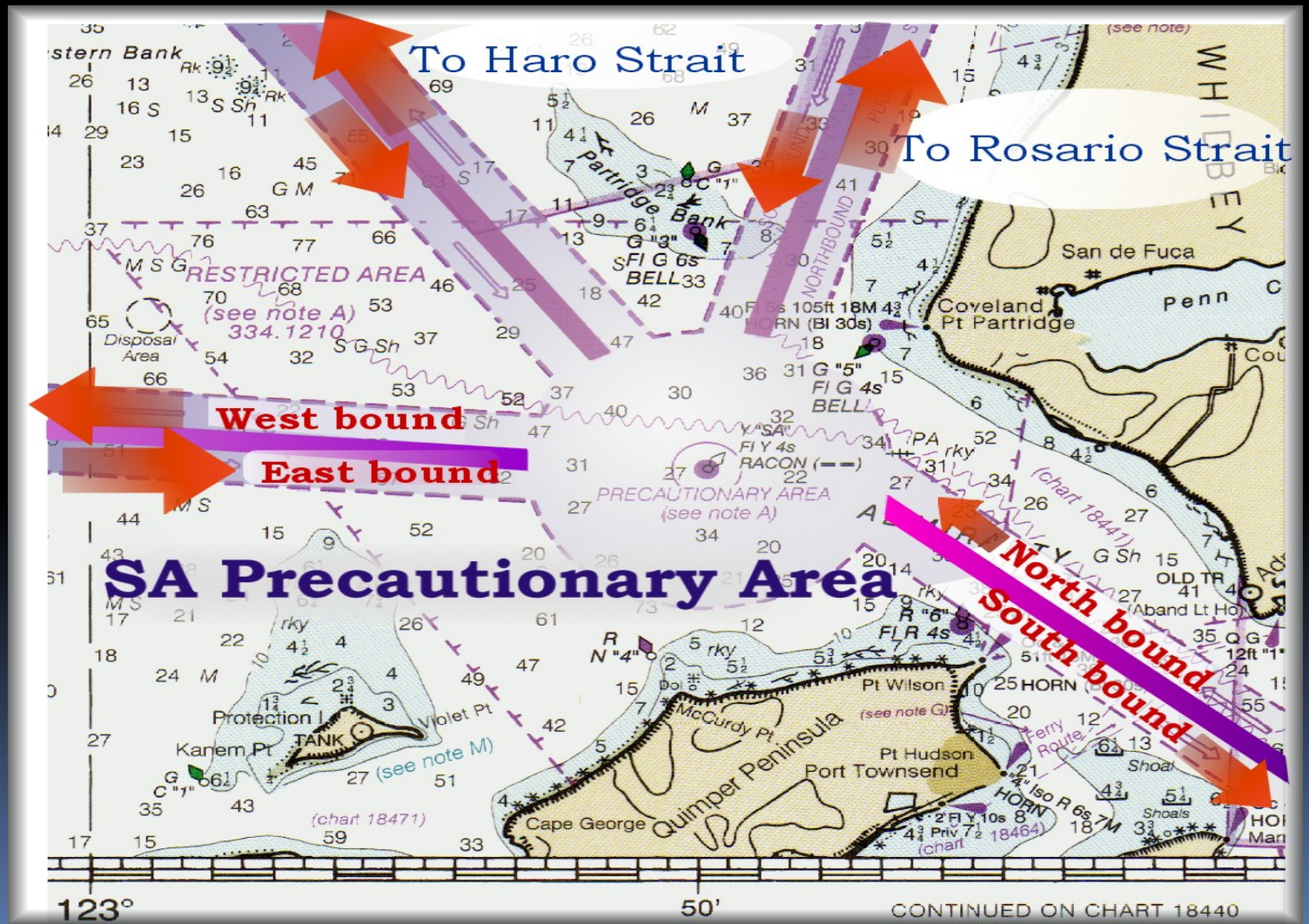
Rule 9: Narrow Channels



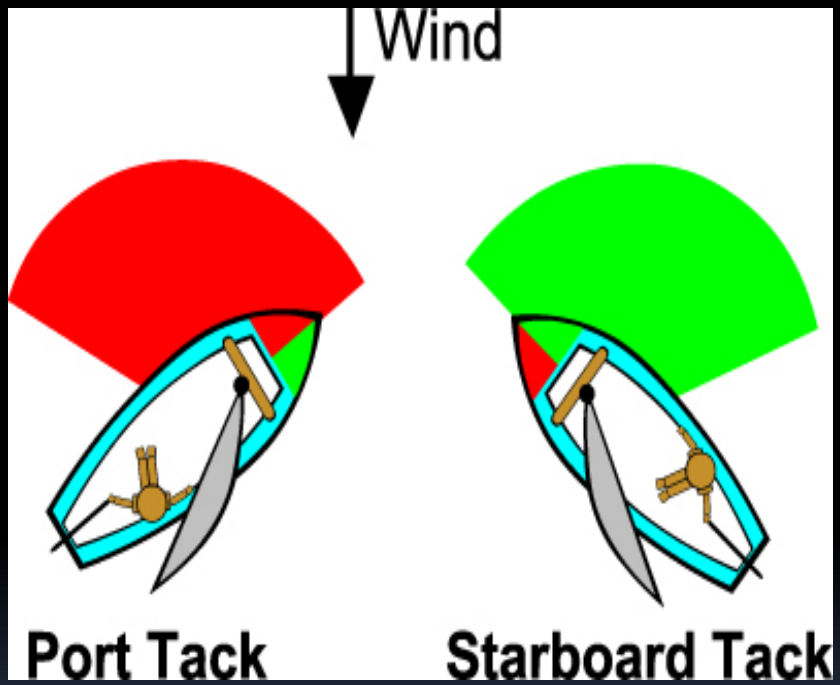
Rule 9



Rule 10: Traffic separation scheme



Rule 12: Sailing Vessels



- On different side:

  vessel with wind on port side gives way.
- On same side:

  Vessel to windward gives way.

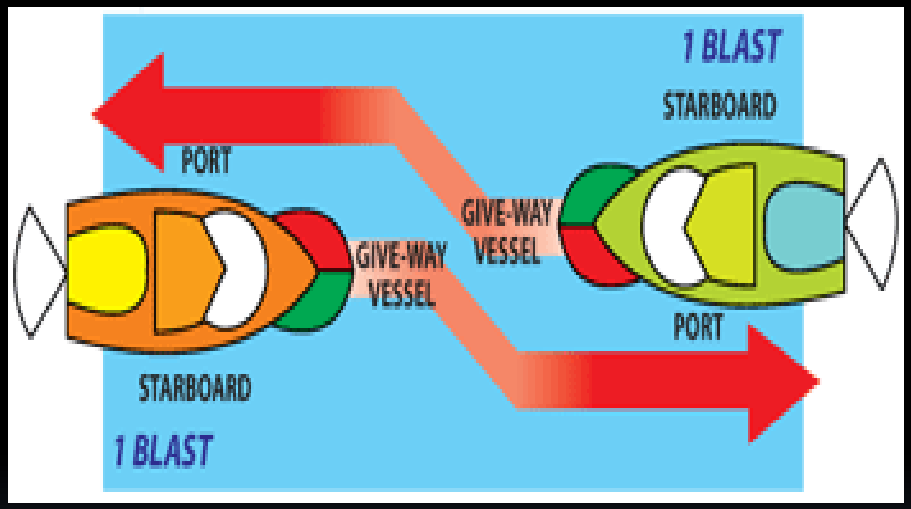
Rule 13: Overtaking



- Shall keep out of the way of the vessel being overtaken.
- Coming up from more than 22.5° abaft her beam.
- When in doubt, assume it exists.
- Shall not turn an overtaking situation into a crossing situation.

Rule 14: Head-on Situation

Power Driven Vessels:



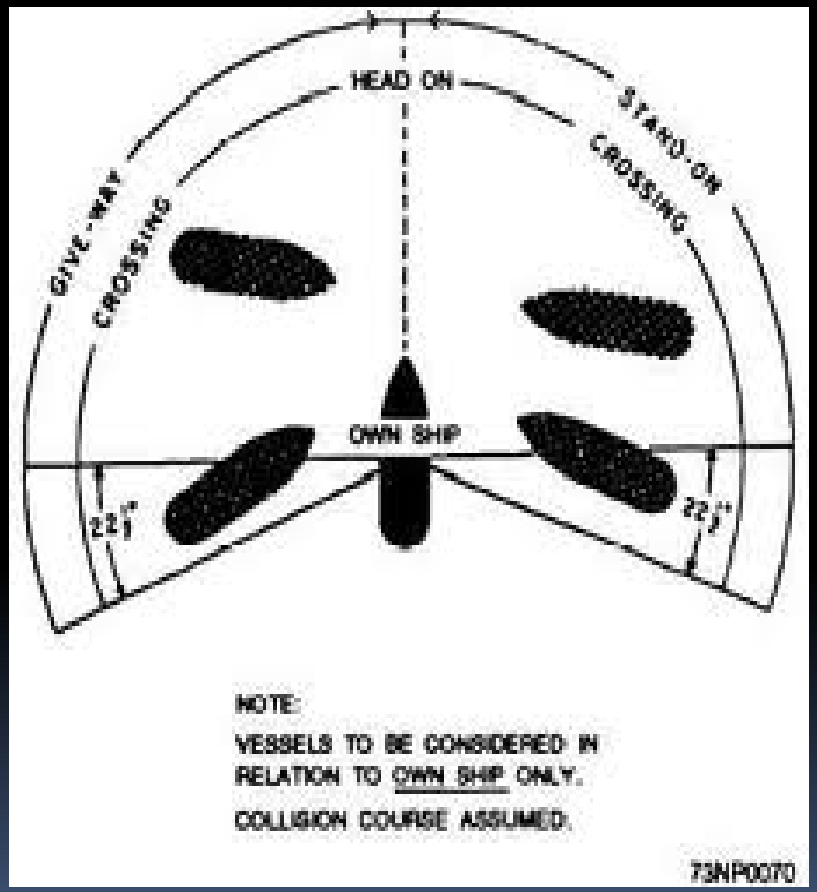
- On Reciprocal or nearly reciprocal courses.
- Involves risk of collision
- Each shall alter her course to starboard.
- When in doubt, assume it exists.

Head-on Situation cont.



- A vessel proceeding downbound, with the current.
- Shall have right-of-way.
- Shall propose manner of passage.
- Shall initiate the maneuvering signal.

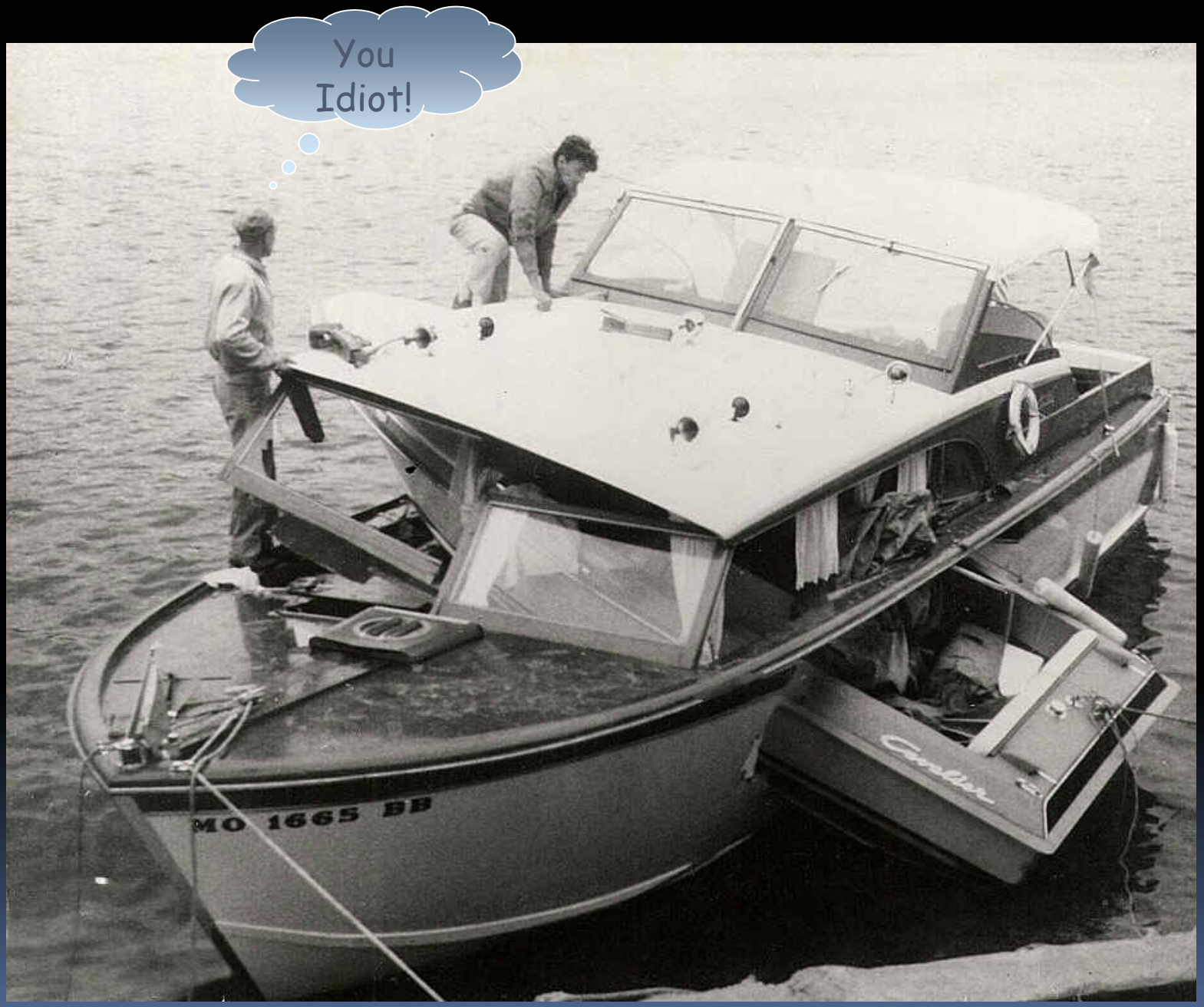
Rule 15: Crossing Situation



- If it involves risk of collision.
- Vessel to port gives way.

And shall:

- If possible, avoid crossing ahead of the other vessel.

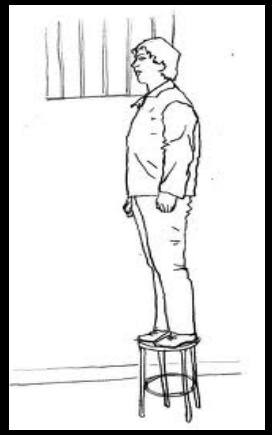

You
Idiot!
MO 1665 BB

Rule 16: Give Way Vessel



- Shall – so far as possible.
- Take early and substantial action.
- To keep well clear.

Rule 17: Stand-on Vessel





- Shall keep her course and speed.
- May deviate from these rules to avoid collision.
- The above vessel shall not come to port for a vessel on her port side.

Rule 18: Responsibility

ONLY	Overtaken
NEW	NUC
REELS	RAM
CATCH	CBD (International Only)
FISH	Fishing
SO	Sailing
PURCHASE	Power
SOME	Sea Plane
OFTEN	Overtaking

Rule 19: Restricted Visibility



Vessels not in sight of one another.

In or near restricted visibility.

Shall:

- Proceed at safe speed.
- Due regard to prevailing circumstances/conditions.
- What if you have a radar contact?
- What if you hear a fog signal forward of your beam?

NAVIGATION RULES

- Part C: Lights & Shapes
- Part D: Sound & Light Signals



Lights and Shapes



Rule 20

Application

(a) Rules in this Part shall be complied with in all weathers.

(b) The Rules concerning lights shall be complied with from sunset to sunrise, and during such times no other lights shall be exhibited, except such lights as cannot be mistaken for the lights specified in these Rules or do not impair their visibility or distinctive character, or interfere with the keeping of a proper look-out.

(c) The lights prescribed by these Rules shall, if carried, also be exhibited from sunrise to sunset in restricted visibility and may be exhibited in all other circumstances when it is deemed necessary.

(d) The Rules concerning shapes shall be complied with by day.

Rule 21

Definitions

(a) "Masthead light" means a white light placed over the fore and aft centerline of the vessel showing an unbroken light over an arc of the horizon of 225 degrees and so fixed as to show the light from the right ahead to 22.5 degrees abaft the beam on either side of the vessel.

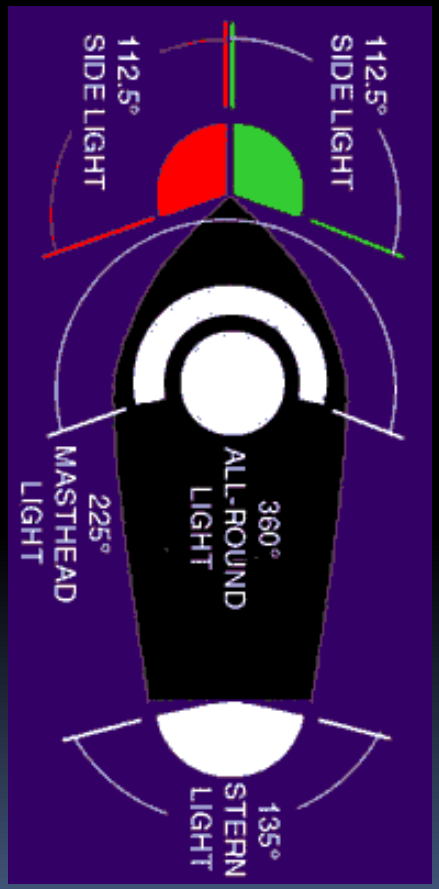
(b) "Sidelights" mean a green light on the starboard side and a red light on the port side each showing an unbroken light over an arc of the horizon of 112.5 degrees and so fixed as to show the light from right ahead to 22.5 degrees abaft the beam on its respective side.

(c) "Stern light" means a white light placed as nearly as practicable at the stern showing an unbroken light over an arc of the horizon of 135 degrees and so fixed as to show the light 67.5 degrees from right aft on each side of the vessel.

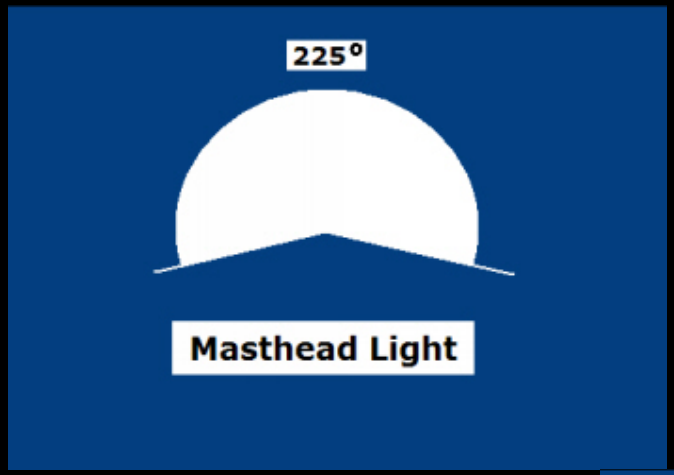
(d) "Towing light" means a yellow light having the same characteristics as the stern light defined in paragraph (c) of this Rule.

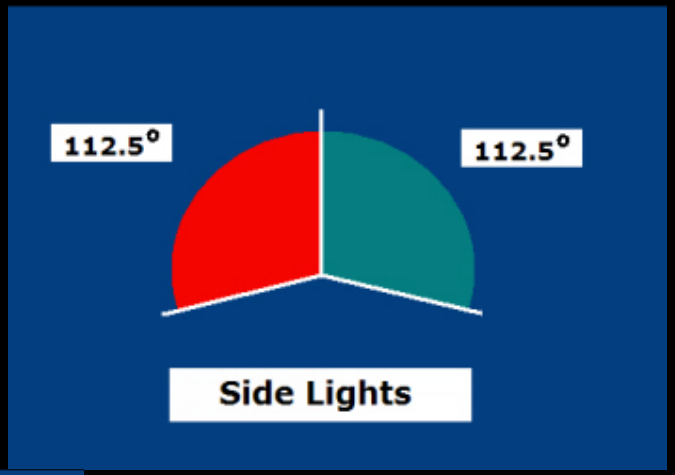
(e) "All-round light" means a light showing an unbroken light over an arc of the horizon of 360 degrees.

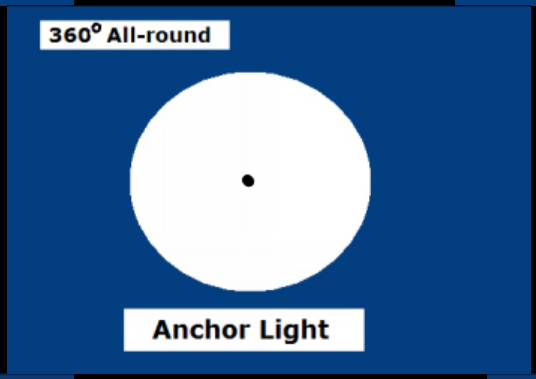
Rule 21: Definitions

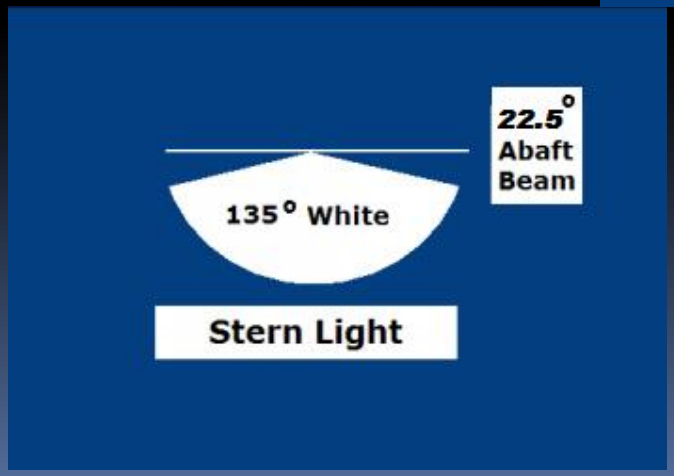


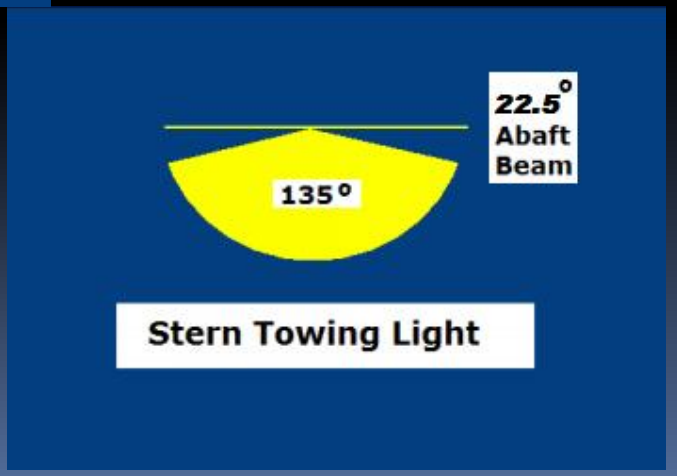
- Sidelights
- Stern light
- Towing Light
- Masthead Light
- All-round Light
- Special Flashing Light

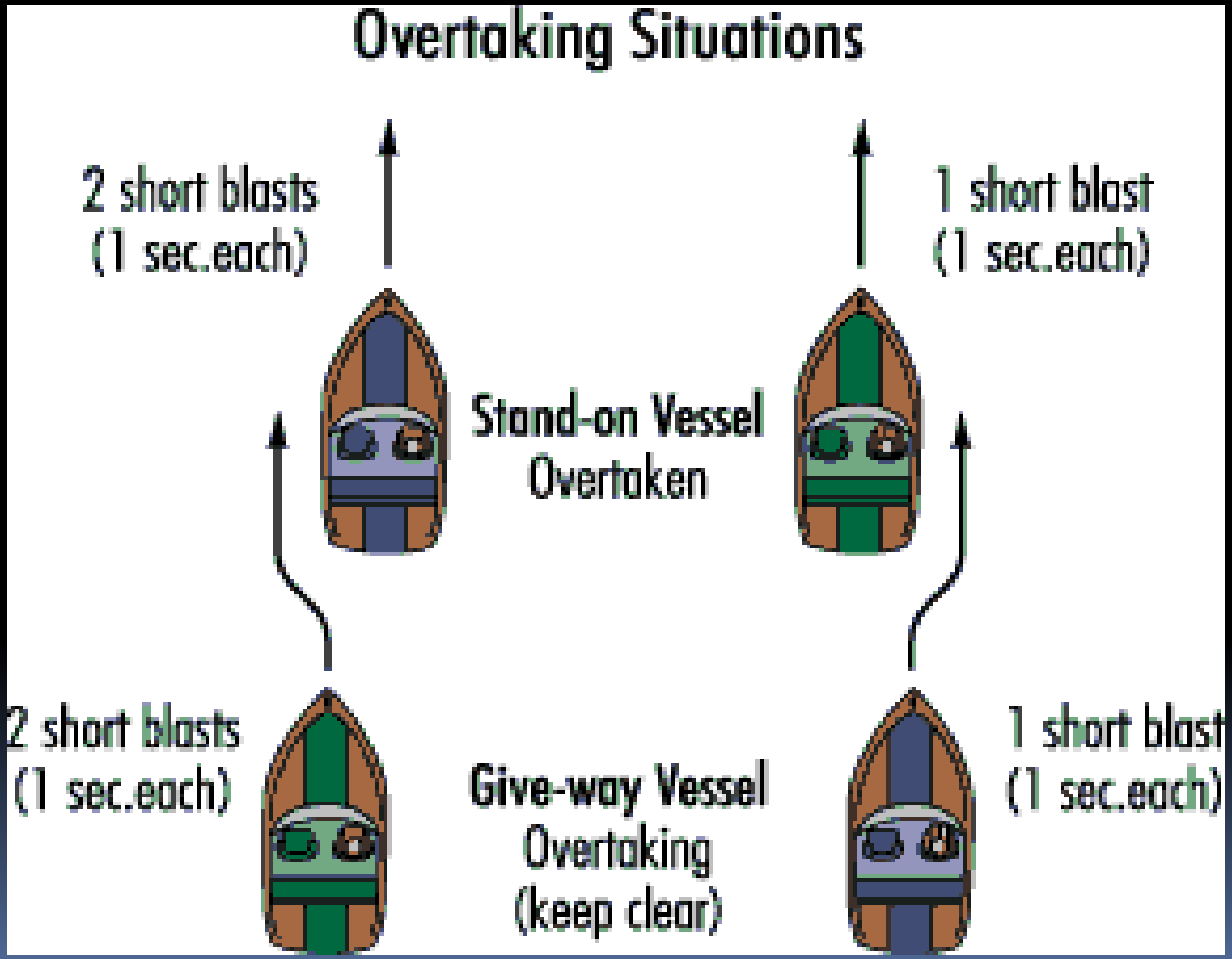

225°
Masthead Light


112.5°
112.5°
Side Lights

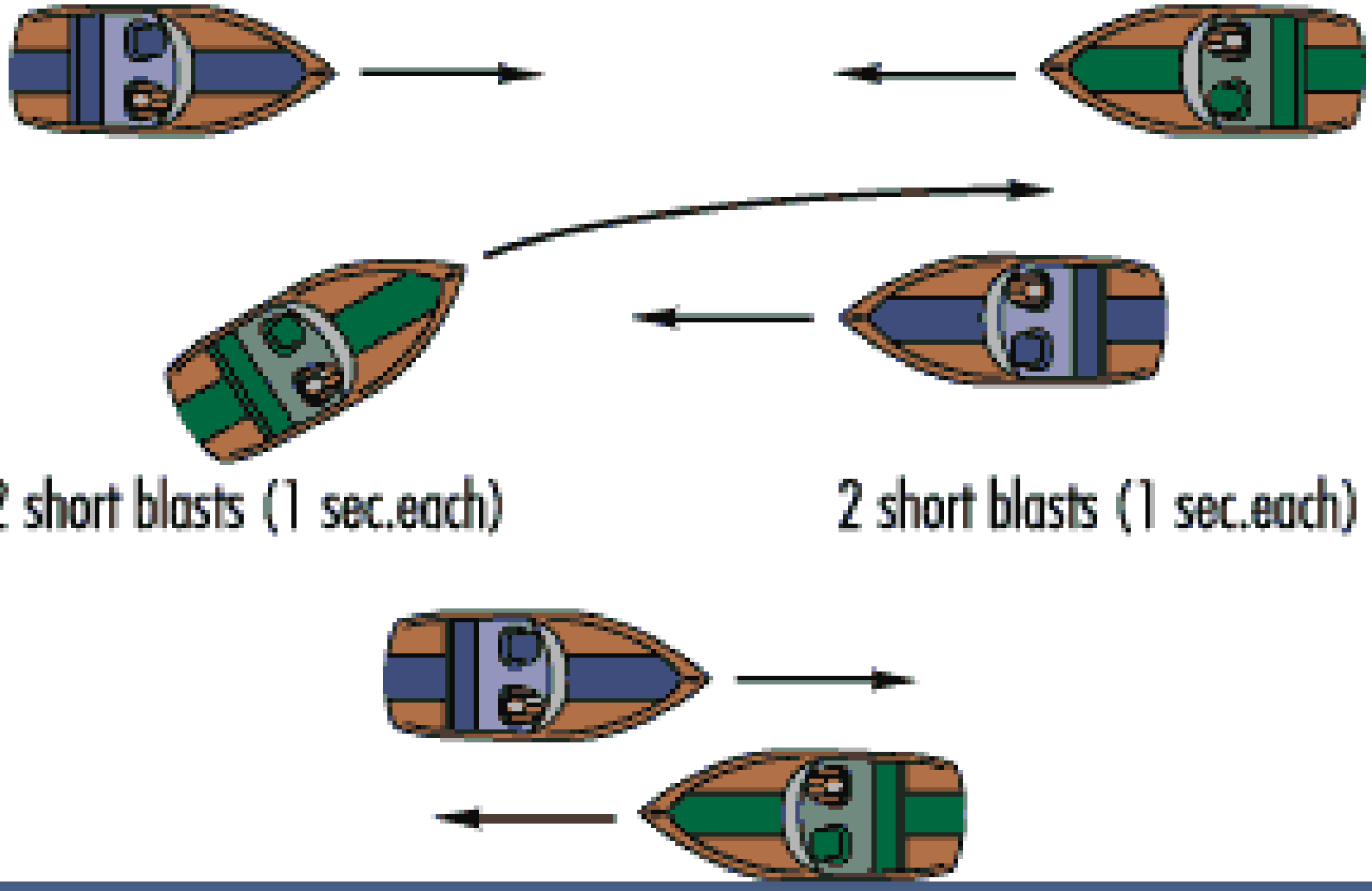

360° All-round
Anchor Light


22.5°
Abaft
Beam
135° White
Stern Light


22.5°
Abaft
Beam
135°
Stern Towing Light


Overtaking Situations
2 short blasts
(1 sec.each)
1 short blast
(1 sec.each)
Stand-on Vessel
Overtaken
2 short blasts
(1 sec.each)
Give-way Vessel
Overtaking
(keep clear)
1 short blast
(1 sec.each)

Vessels generally pass portside to portside. However, vessels may pass starboard to starboard if proper signals are given.



2 short blasts (1 sec.each)

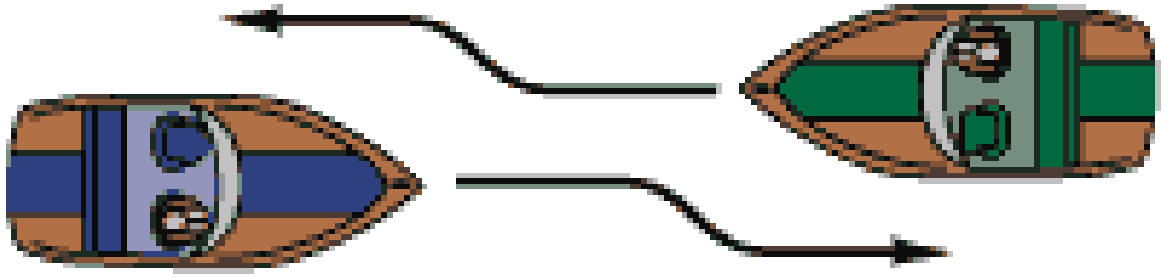
2 short blasts (1 sec.each)

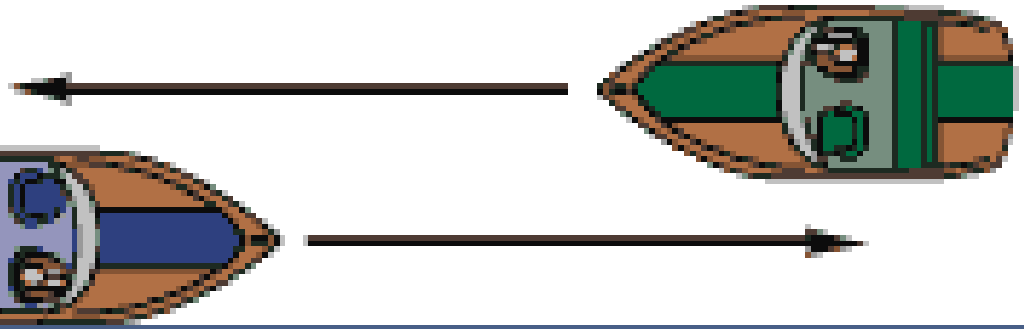
Meeting Head-On or Nearly So Situations



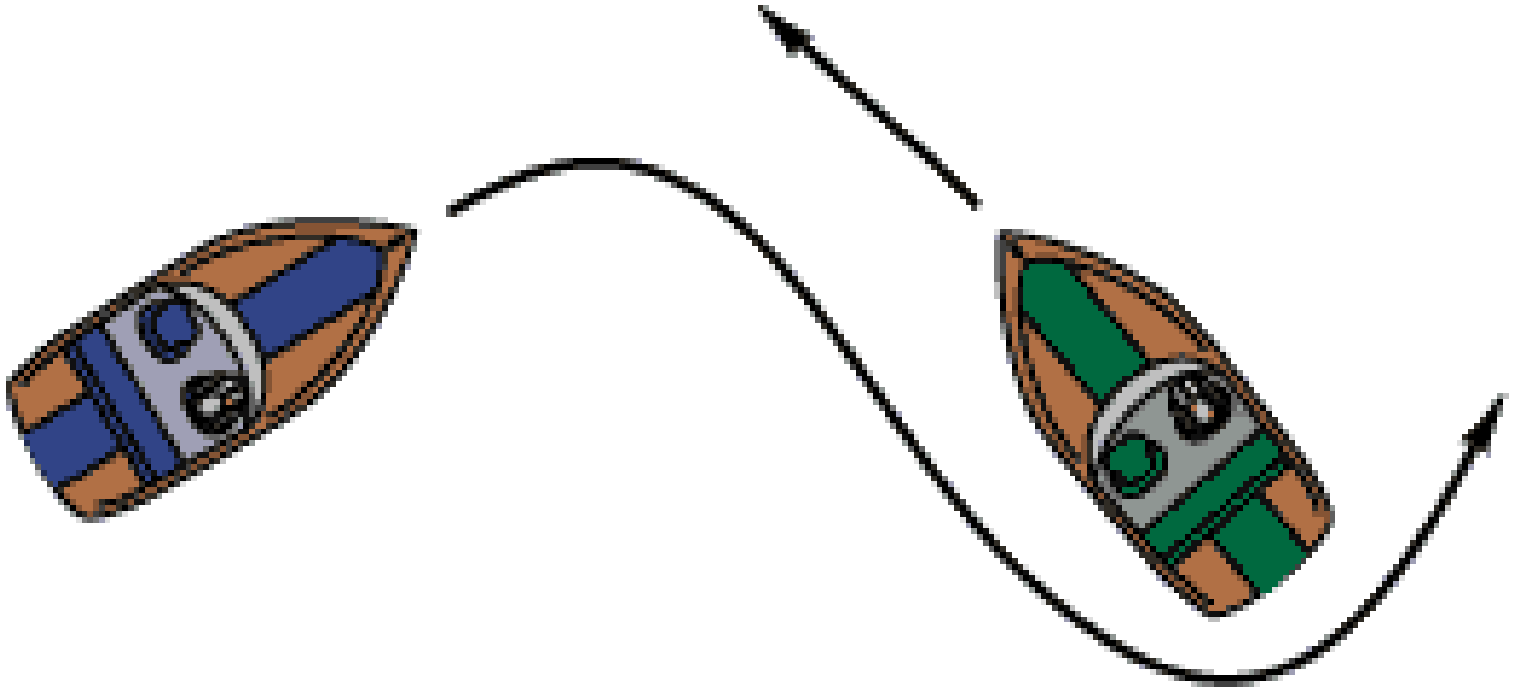
1 short blast (1 sec.)

1 short blast (1 sec.)





Crossing Situations



Give-way Vessel

. . . give way

1 short blast (1 sec.)

Stand-on Vessel

. . . hold course and speed

1 short blast (1 sec.)

Rule 23

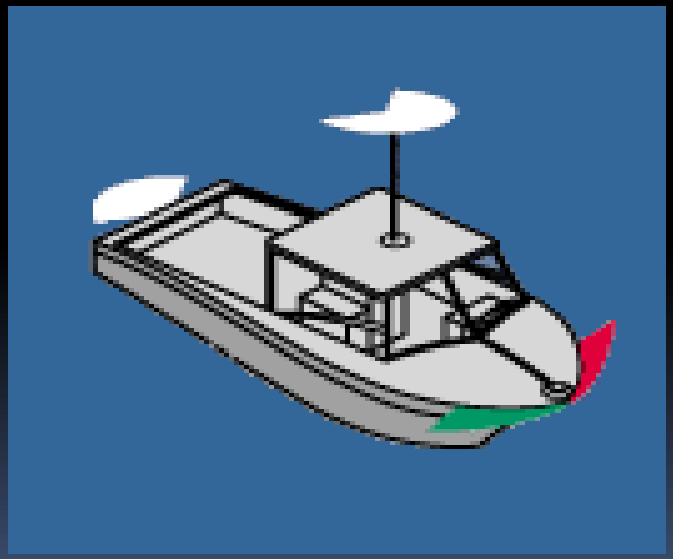
Power-driven Vessels Underway

(a) A power-driven vessel underway shall exhibit:

(i) a masthead light forward

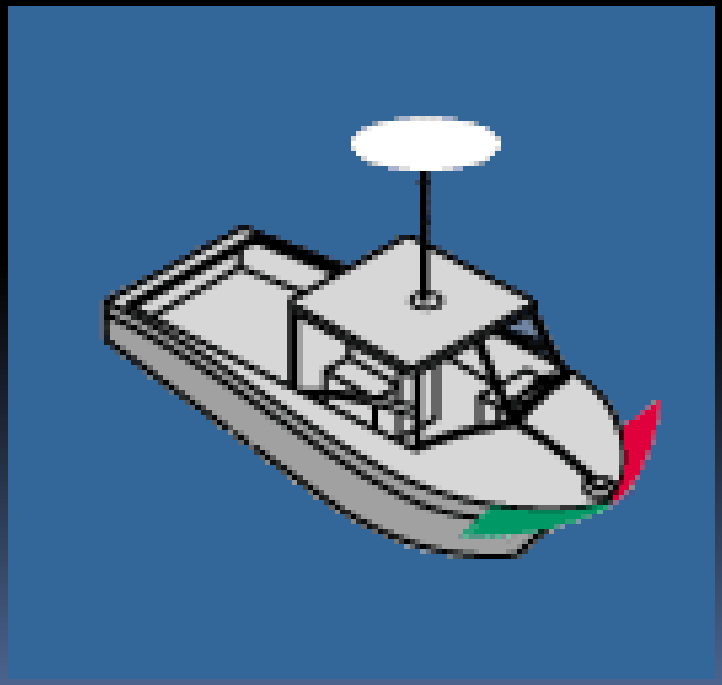
(ii) Sidelights; and

(iii) a stern light



Rule 23 (cont.)

(c) A power-driven vessel of less than 12 meters in length may, in lieu of the lights prescribed in paragraph (a) of this Rule, exhibit an all-round white light and side lights



Rule 24

Towing and Pushing

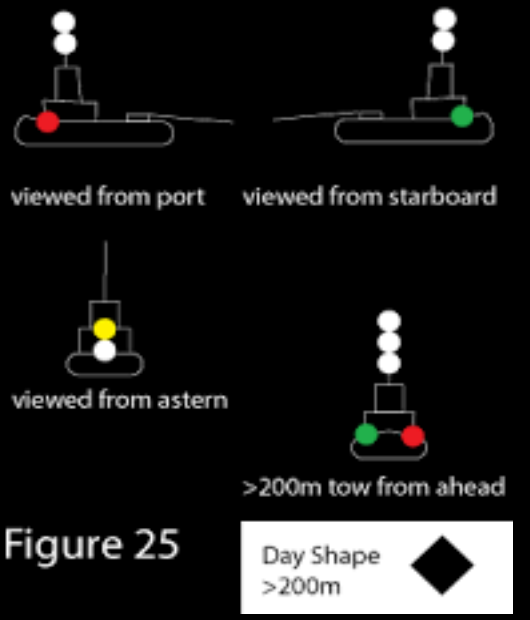


Figure 25

A power-driven vessel when towing astern shall exhibit:

(i) instead of the light prescribed either in Rule 23(a)(i) or 23 (a)(ii), two masthead lights in a vertical line. When the length of the tow, measuring from the stern of the towing vessel to the after end of the tow exceeds 200 meters, three such lights in a vertical line;

(ii) sidelights;

(iii) a stern light;

(iv) a towing light in a vertical line above the stern light; and

(v) when the length of tow exceeds 200 meters, a diamond shape where it can best be seen.

Rule 25

A sailing vessel underway shall exhibit:

(i) sidelights; and

(ii) a stern light

(b) In a sailing vessel of less than 20 meters in length the lights prescribed in paragraph (a) of this Rule may be combined in one lantern carried at or near the top of the mast where it can best be seen.

(d) (i) A sailing vessel of less than 7 meters in length shall, if practicable, exhibit the lights prescribed in paragraph (a) or (b) of this Rule, but if she does not, she shall have ready at hand an electric torch or lighted lantern showing a white light which shall be exhibited in sufficient time to prevent collision.

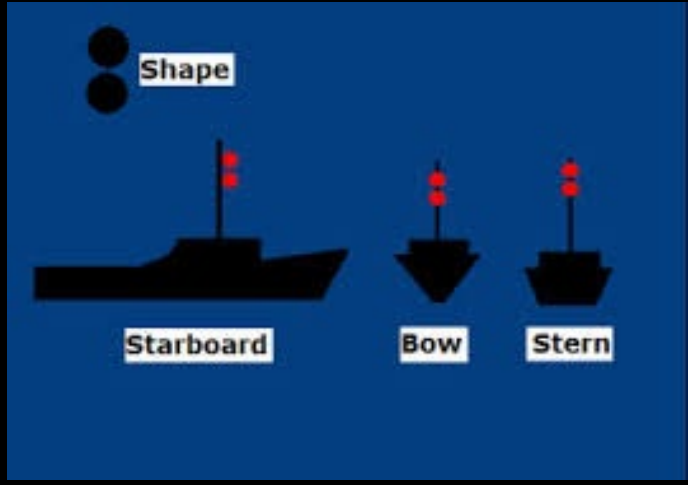








Rule 27



Vessels Not Under Command or Restricted in Their Ability to Maneuver

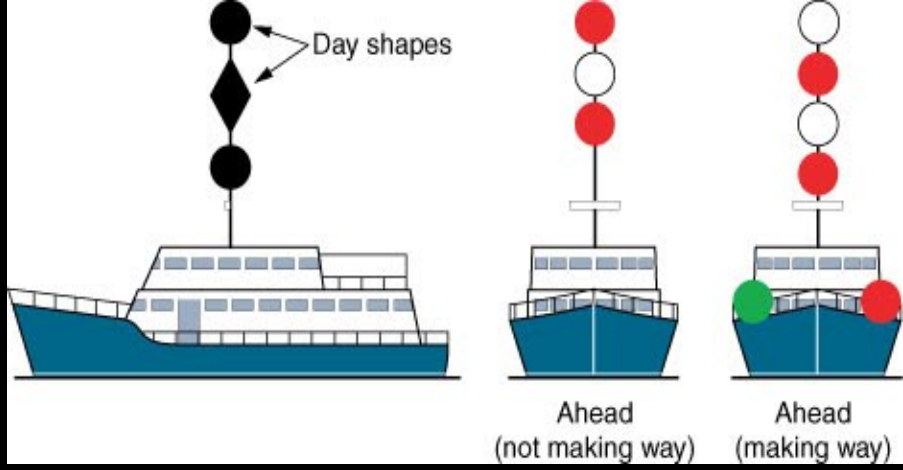
(a) A vessel not under command shall exhibit:

(i) two all-round red lights in a vertical line where they can best be seen;

(ii) two balls or similar shapes in a vertical line where they can best be seen; and

(iii) when making way through the water, in addition to the lights prescribed in this paragraph, sidelights and a stern light.

Rule 27 (cont.)



(b) A vessel restricted in her ability to maneuver shall exhibit:

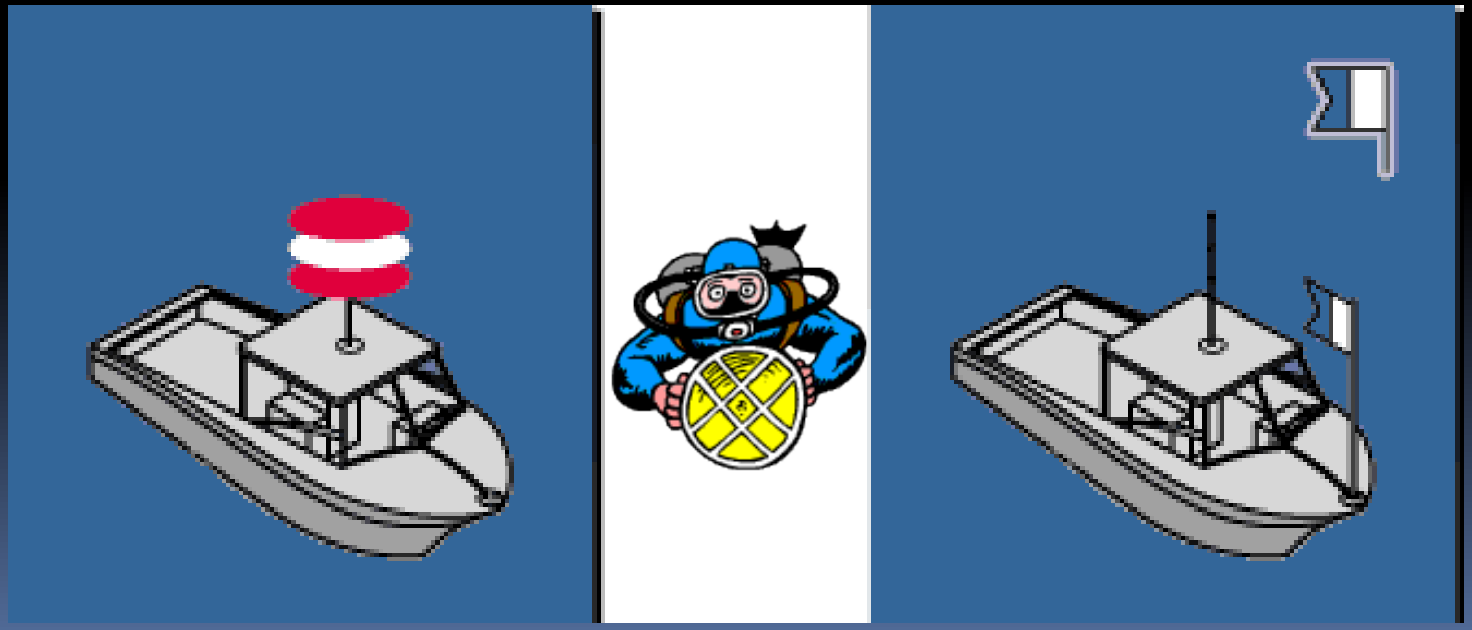
(i) three all-round lights in a vertical line where they can best be seen. The highest and lowest of these lights shall be red and the middle light shall be white.

(ii) Three shapes in a vertical line where they can best be seen. The highest and lowest of these shapes shall be balls and the middle one a diamond.

(iii) when making way through the water, masthead lights, sidelights and a stern light, in addition to the lights prescribed in subparagraph (b)(i).

Rule 27 (cont.)

(e) Whenever the size of a vessel engaged in diving operations makes it impracticable to exhibit all lights and shapes prescribed in paragraph (d) of this Rule, the following shall be exhibited:



Rule 29

Pilot Vessels

A vessel engaged on pilotage duty shall exhibit:

(i) at or near the masthead, two all-round lights in a vertical line, the upper being white and the lower red;

(ii) when underway, in addition, sidelights and a stern light.

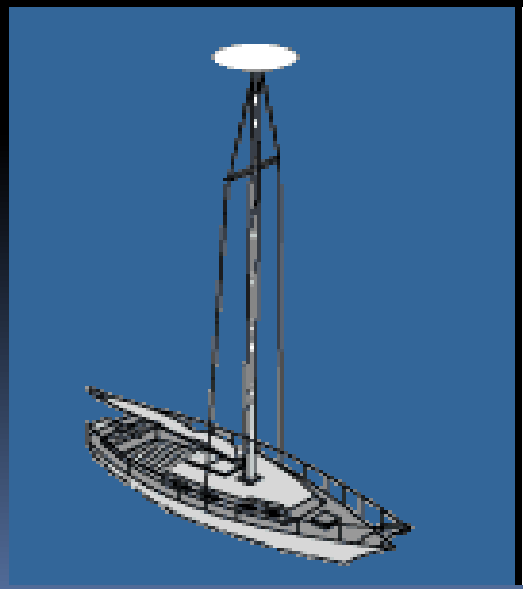


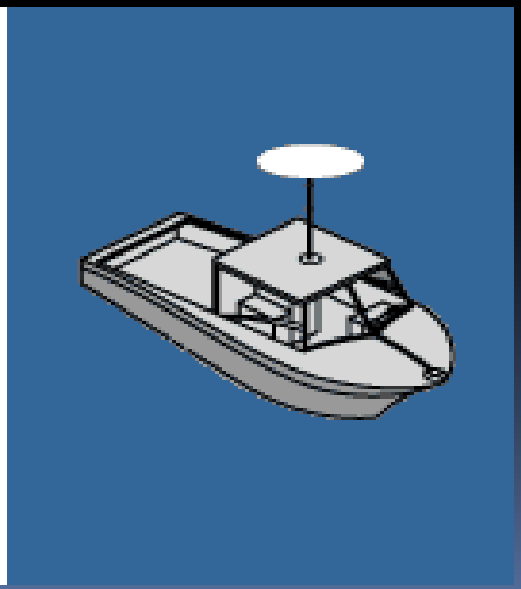


Rule 30

Anchored Vessels

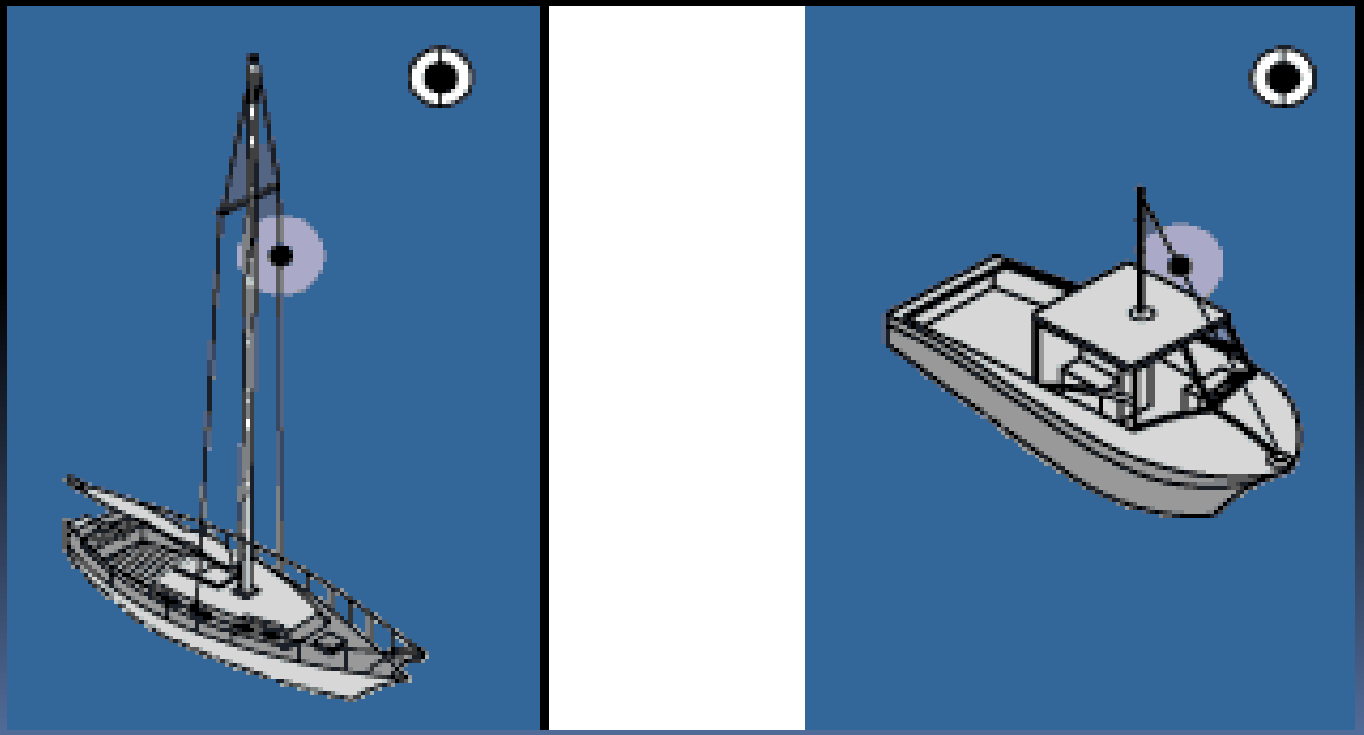
AT NIGHT: All vessels greater than 7 meters in length at anchor must display anchor lights. If your vessel is less than 164 feet/50 meters in length, then its anchor light is an all-around white light visible where it can best be seen from all directions





Rule 30 (cont.)

DURING THE DAY: All vessels greater than 7 meters in length at anchor must display, forward where it can be best seen, a black ball shape.



Sound and Light Signals



Sound Signaling Devices











Rule 32

Definitions

(a) The word "whistle" means any sound signaling appliance capable of producing the prescribed blast and which complies with specifications in Annex III to these Rules.

(b) The term "short blast" means a blast of about 1 seconds duration.

(c) The term "prolonged blast" means a blast of from 4 to 6 seconds' duration.

Rule 34

Maneuvering and Warning Signals

(a) When power-driven vessels are in sight of one another and meeting or crossing at a distance within half a mile of each other, each vessel underway, when maneuvering as authorized or required by these Rules:

(i) shall indicate that maneuver by the following signals on her whistle: one short blast to mean "I intend to leave you on my port side"; two short blasts to mean "I intend to leave you on my starboard side"; and three short blast to mean "I am operating astern propulsion".

(ii) if the responding vessel for any reason doubts the safety of the proposed maneuver, she shall sound the danger signal specified in paragraph (d) of this Rule.

Rule 35

Sound Signals in Restricted Visibility

In or near an area of restricted visibility, whether by day or night, the signals in this Rule shall be used as follows:

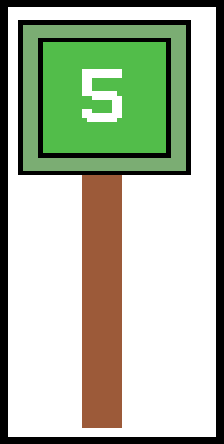
(a) A power-driven vessel making way through the water shall sound at intervals of not more than two minutes one prolonged blast.

(b) A power-driven vessel underway but stopped and making no way through the water shall sound at intervals of not more than two minutes two prolonged blasts in succession with an interval of about two seconds between them.

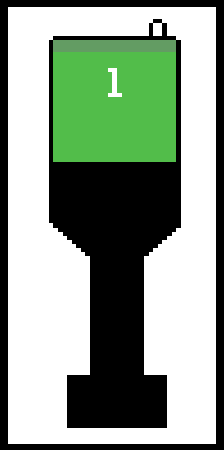
(c) All other vessels shall sound at intervals of not more than two minutes, three blasts in succession; namely one prolonged followed by two short blasts.

Aids to Navigation

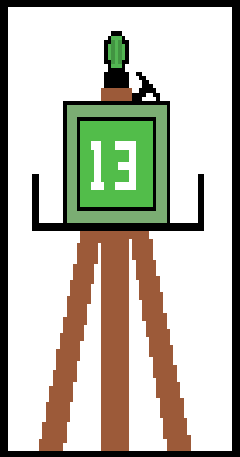
Aids to navigation found on federal waters, commonly known as buoys, are designed, built and maintained by the United States Coast Guard. While some ATONS (Aids to Navigation's) are buoys, many others may be day markers, ranges, or many other types of marks that provide the boating public with a "sense of direction" while on the water. Generally speaking, green markers are kept to the RIGHT when leaving a harbor and red markers are kept to the RIGHT when returning to harbor, thus coining the phrase, "Red, Right, Returning".



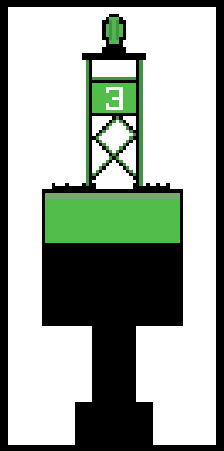
Green Day Beacon



Can Buoy



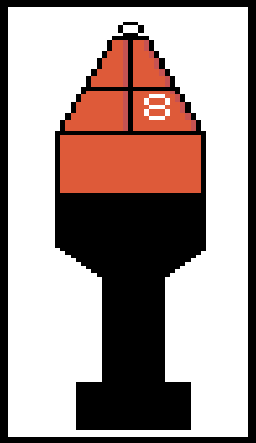
Green Dolphin



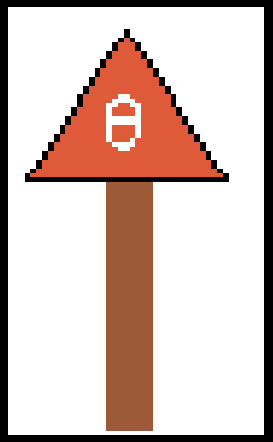
Green Buoy

A Can Buoy marks the RIGHT side of the channel leaving a harbor. It will be GREEN and have odd numbers on it. Green day markers are often used in shallow areas for the same purpose. If the green marker has several pilings supporting it, it will be called a dolphin. Green buoys with lights will usually be found in deeper water. The light will be green. Larger buoys may also have bells or other sound producing devices attached.

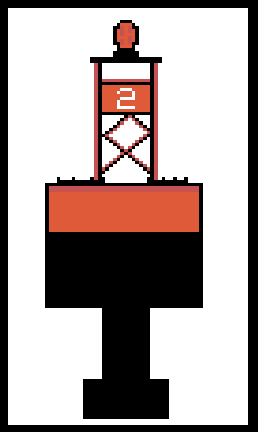

3
TEMPORARY INSANITY II



Nun Buoy



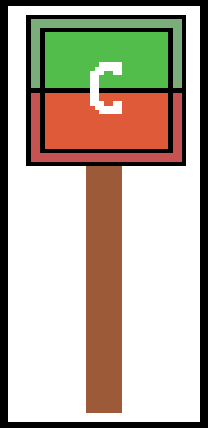
Red Day Beacon

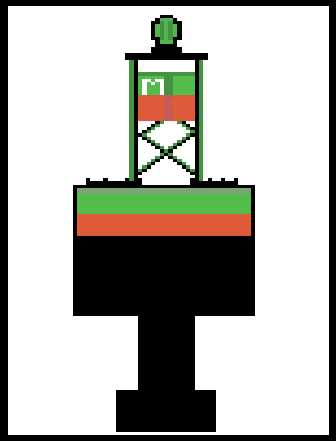


Red Buoy

A Nun Buoy marks the LEFT side of the channel leaving a harbor. It will be RED and have even numbers on it. Red day markers are often used in shallow areas for the same purpose.

If the red marker has several pilings supporting it, it will be called a dolphin. Red buoys with lights will usually be found in deeper water. The light will be red. Larger buoys may also have bells or other sound producing devices attached.

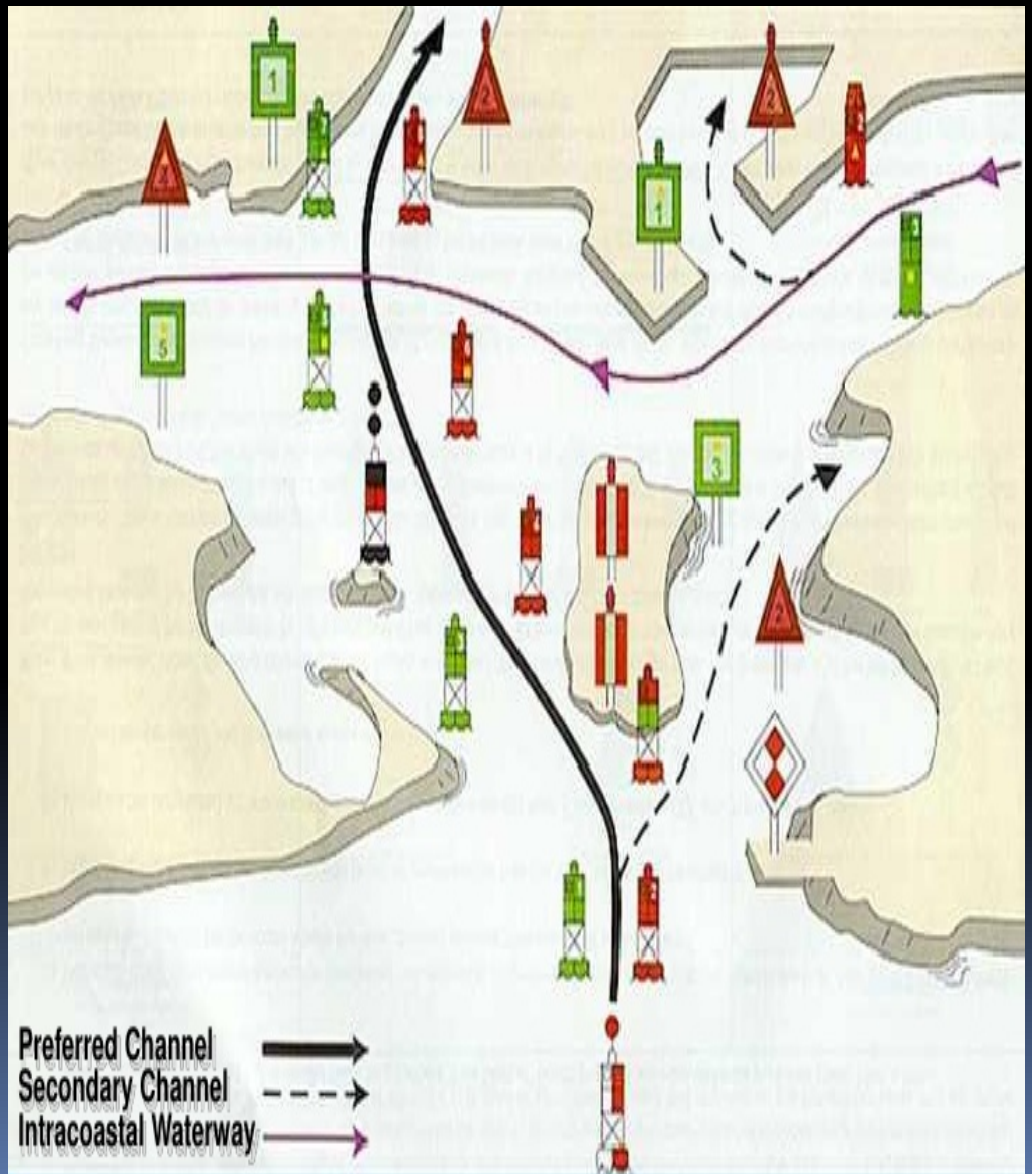


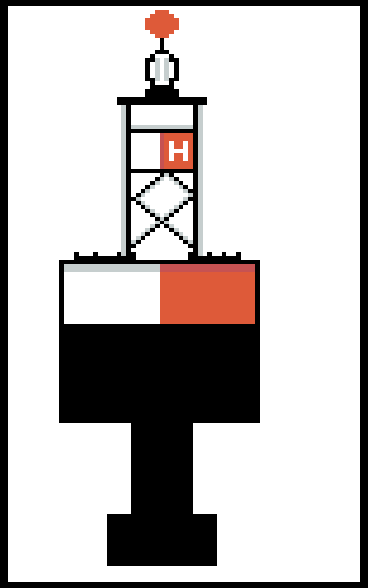


Preferred Channel Day Beacon **Preferred Channel Day Buoy**

Preferred channel markers are a combination of red and green. Years ago, this marker was known as a junction marker. The preferred or better channel is usually marked by having the top color of the marker indicate the way it should be treated. That is, if the top color is red, treat it as a red marker. Just as with red and green markers, they may be found as day marks or floating buoys. They will have the same color light at the top color of the marker and they may have letters but not numbers.

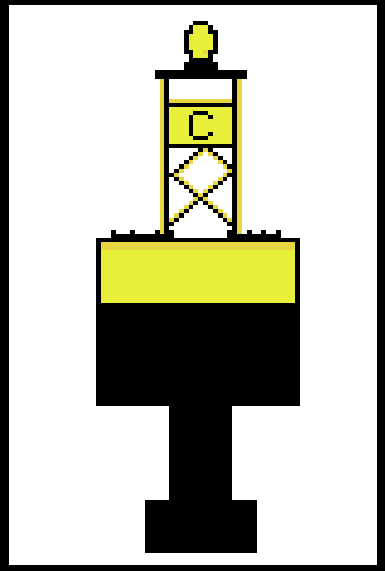
When entering from seaward you may find two channels which separate and go in different directions. A junction marker referred to as **RGN "C"** uses its top color to show you the major or primary channel. This is represented by a **R**ed and Green Nun buoy with (in this case) a **"C"** on it. You use the top color and shape as if it were a stand alone marker if you want to follow the primary channel. In this case leave the Red Nun to the right. Otherwise use the bottom color.





Safe Water Buoy

The Safe Water marker, years ago called the mid channel marker, is red and white. If it has a light, it will be white and it may have a red ball on the top. It may have a letter but not a number displayed on it.

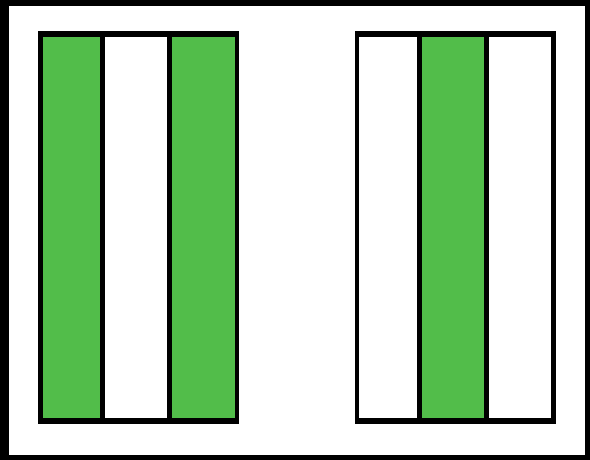


Special Purpose Buoy

Special Purpose markers are yellow and may serve a wide range of uses, including but not limited to things such as dredging, fish trap areas, spoils areas or military exercises.

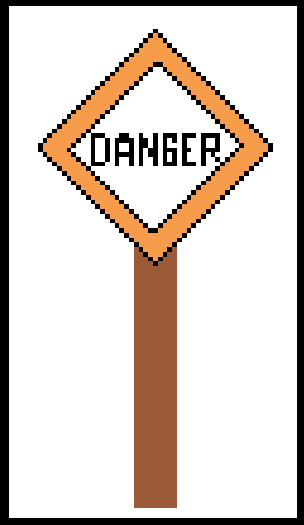






Range Markers

Range markers are found in pairs with one higher than the other. Range markers indicate the center line of a channel by having them lined up as you pass through the channel. They will have vertical colored panels to assist in lining them up.



State Regulatory Marker

White markers and or buoys with an orange boarder, diamond, circle, or square can be used to provide information or regulations such as a no wake zone or a shoal area. As with all other aids to navigation, they should be given a wide berth to avoid possible damage to your vessel.




CATALINA EXPRESS
JET CAT EXPRESS












YAMAHA



Questions?

Vessel Pursuit/Hot Stops

San Diego Harbor Police Department

Sgt's Troy Nicol & Raul Munoz

https://www.youtube.com/watch?v=W4pnTrjEjd0&list=PLGaYIdMehuNKoB6qMinzXRftRti66CeIO

HOTSTOPS?



HOTSTOPS?



Training Purpose

- Why we use Vessel Hopstops?

Answer = Felony/Dangerous Suspects

- What principles guide our procedures during a Hotstop.

Answer = Law, Policy, Training,Tactics, Totality of the Circumstance.

Legal Basis

- United States Constitution
- Tennessee V. Garner
- Graham V. Connor 1989
- Scott V. Harris 2007
- Maritime Zones of Enforcement - State 3 nm, Federal 12nm.
- State Law

Harbors & Navigation Code

- 652.5(d) H&N - Any vessel…being approached, or being overtaken by a moving law enforcement vessel operating with a siren or an illuminated blue light…shall immediately slow to a speed sufficient to maintain steerage only… unless otherwise directed by the operator of the law enforcement vessel.

Harbors & Navigation Code

- 663 H&N - Every Peace Officer…shall have the authority to stop and board any vessel subject to this chapter, where the peace officer has probable cause to believe that a violation of state law or local ordinances exists.

Harbors & Navigation Code

- 663.6 H&N - Every Vessel…if…ordered to stop and lie to by a peace officer or harbor policeman…who is either in a uniform…or in a vessel that is distinctively marked as belonging to…the Harbor Police, shall stop immediately and lie to, or…permit the Harbor Police to come alongside.

Departmental Policy

- **Vessel Pursuit** - An event involving one or more law enforcement officers, attempting to apprehend a suspect operating a vessel, who is trying to avoid arrest by using high speed or other evasive tactics.
- **Slow Speed Pursuit** - Keeping a suspect vessel in view from a reasonable distance and not attempting to overtake it until other assisting units are in position to close off escape routes. The objective of this type of pursuit is to apprehend violators while preventing wake damage to property and injuries to the boating public.

Initiating the Pursuit

- Failure to Yield
- Blue Light and Siren
- Uninvolved Units remain clear unless Supervisor Approval.
- Radio Traffic - Violation, Suspect Info, direction of pursuit, or other info necessary to ensure officer safety and efficient tactics.

Terminating the Pursuit

- Supervisor Order - Must drop blue light and siren and acknowledge immediately on the radio.
- Self Terminate the Pursuit - When deemed by Officer when conditions do not support a safe pursuit, consider;
- 1. Vessel Traffic, Time of Day, Weather/Surface Conditions
- 2. Violation of for which vessel is being pursued.
- 3. Suspect is known to be a Juvenile.
- 4. Suspect(s) have been identified and apprehension can be accomplished later.

Shooting at Pursued Vessels

- Shooting at or from moving vessels is prohibited, except when immediately necessary to protect persons from death or serious bodily injury.

Ramming

- Harbor Police Vessels will not be used to ram or forcefully impact in any pursuit.

Precautions during Pursuit

- Pursuing Officers should remain conscious of suspects attempts to foul propellor, rudder and/or propulsion systems.
- Evidence may also be thrown overboard during a pursuit, Officers should note the location of evidence on a chart or GPS (MOB).

Mutual Aid

- Coordinate with Patrol Units Landside.
- If entering another jurisdiction, including military, Harbor Police will terminate the pursuit upon request from another agency.
- Aircraft - SDPD, SDSO , may also request USCG, CBP (Omaha) and ICE (if DHS related). Some aircraft may be restricted from flying over water due to engine capacity.

Supervisory Considerations

1. The number and type of vessels being pursued
2. The seriousness of the offense reasonably believed to underlie the pursuit
3. The danger which the occupants of the vessel(s) being pursued continue to pose to others

Tactical Considerations

- Your goal is to gain an advantage that is recognizable to the suspect.
- Time is the greatest enemy. Whom ever controls time controls the conflict.

The 6 S's of a Safe Response.

- Superior Numbers
- Superior Tools
- Speed
- Surprise
- Simple Plan
- Superior Tactics

Tactical Principles

- Angles
- Corners
- Maximize Distance to Subject
- Minimize Exposure to Danger
- Always Make the First Move
- Escape Routes are Your Friend
- Make the Subject come to you
- Hands Kill

US Coast Guard Pursuit

- https://www.youtube.com/watch?v=56Ht_EKCkDY

Swedish Police Vessel Pursuit

- https://www.youtube.com/watch?v=Sv3ATXXYmY8

Information Supervisor and Team Needs

- Get Rego #, name, home port...
- Color /type of vessel
- Number and description of those on board
- Reason for pursuit.
- Location and direction of travel.

Boarding Posture

- First Rule: You control the stop, such as the location, timing, everything you can control.
- DO NOT LET THE SUSPECT DICTATE THE NATURE OF THE STOP…
- Take your time to have all your assets ready.
- Second Rule: Once you commit and board the suspect vessel, take control immediately. Do not dilly around on deck. Overcome resistance quickly and decisively.
- When you are on board the suspect vessel, you are on their “home turf”.

Boarding / Search Considerations

- Note - Officers need to be sure to approach every situation in the totality of the circumstances presented to you at the time. Some options are;
- Visual Pat Down.
- Immediately Board
- Terry Pat Down,
- put known suspect in a position of disadvantage then search vessel for other suspects etc…
- Use spotlights to gain an advantage upon approach of the suspect vessel.
- Note - Handcuffing requires a life jacket be placed upon the detained and/or arrested persons.

Simulations Safety Brief

- Live Weapons/Red Box Armory
- Triple Check
- Aggressive Behavior
- No Pyrotechnics
- Real World Situations
- All Participants can call “Safety, Safety, Safety”.
- Life Preservers
- Medical Extraction Point

Towing

Long Tow

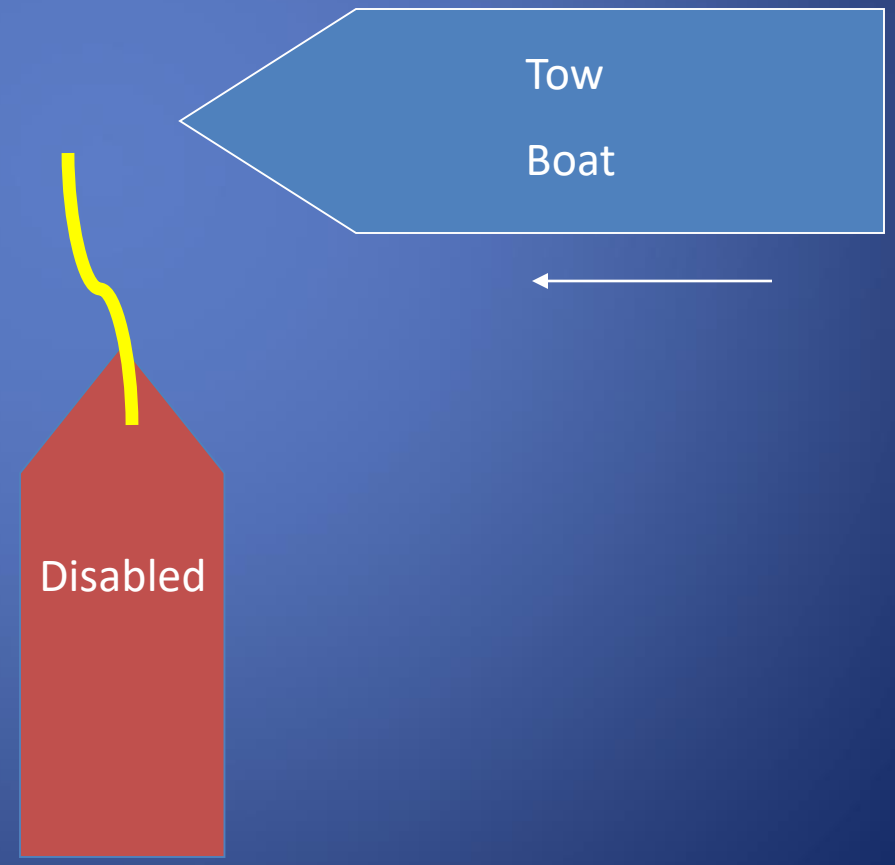
&

Side Tow

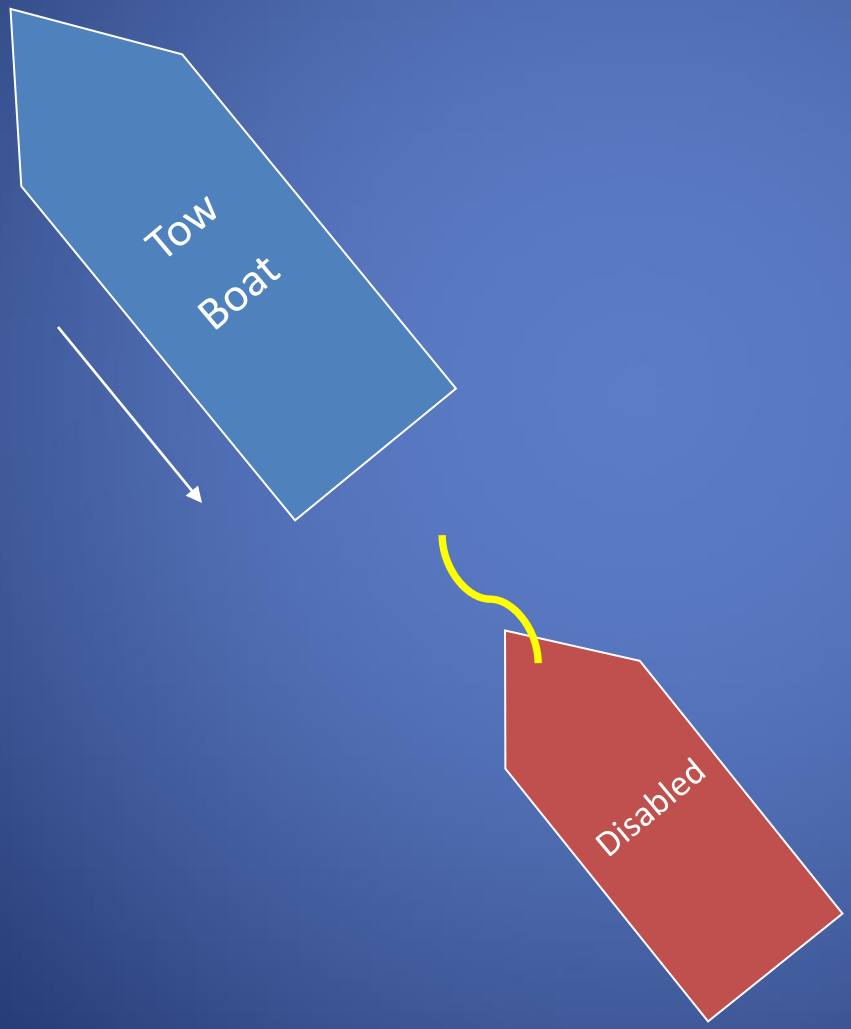


Towing Approaches Crossing the "T"

As you approach the disabled vessel at a 90° angle, prepare your towline to be passed.

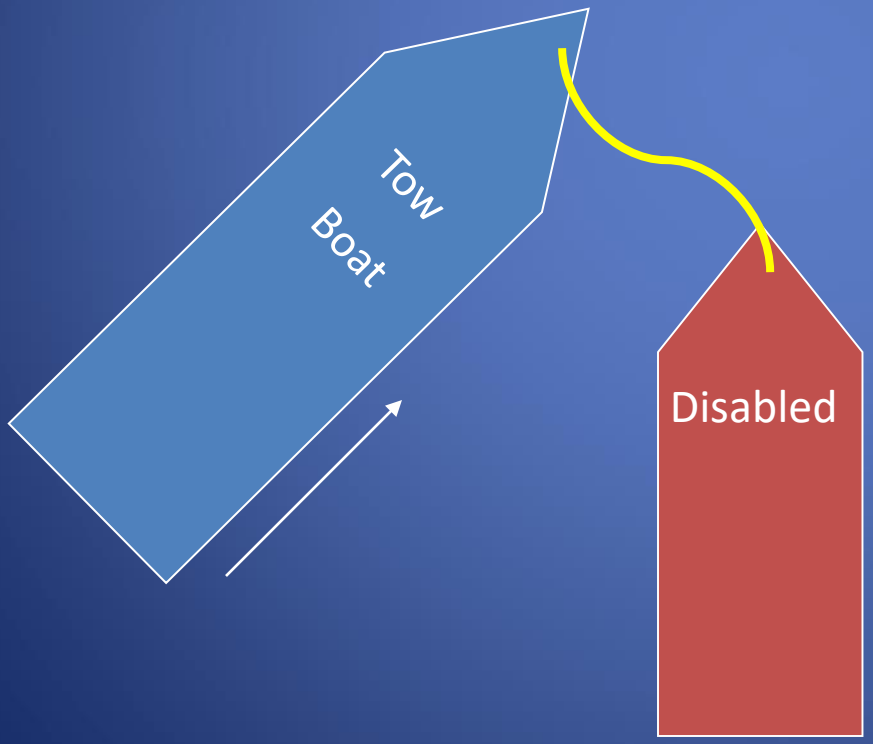


Towing Approaches
Backing Down Approach



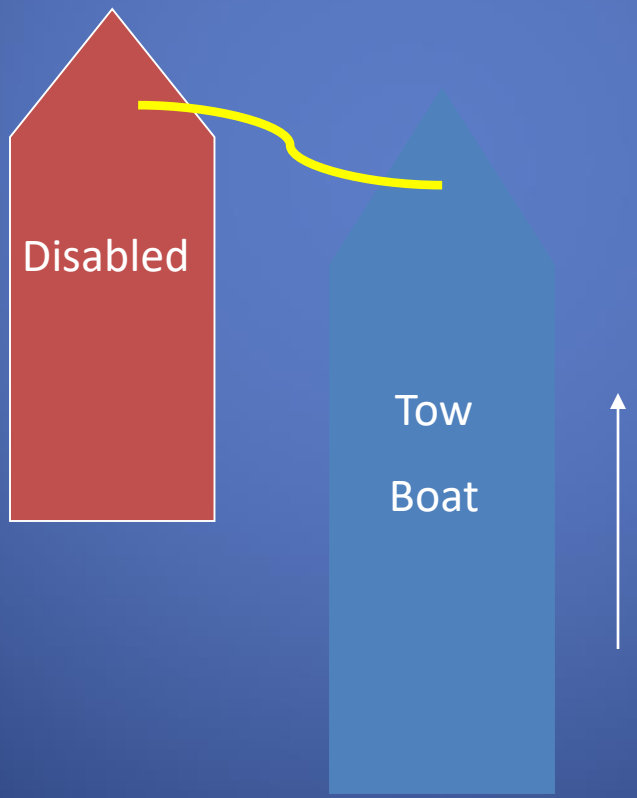
This is one of the more difficult and dangerous approaches due to the potential of backing onto the towline.

Towing Approaches
45° Angle Approach



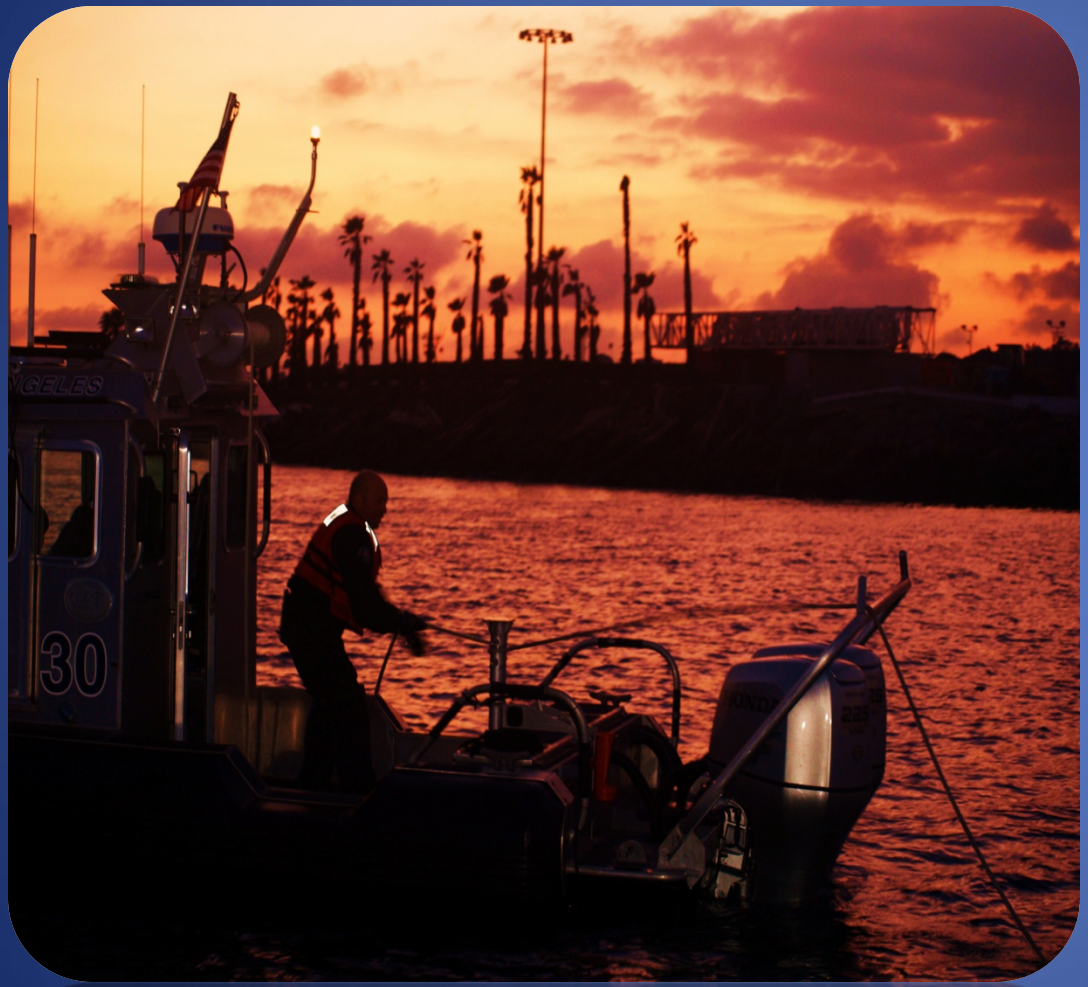
Approach from a 45° angle at a slow speed to the disabled vessel.

Towing Approaches
Parallel Approach



Approach from the side at a slow speed parallel to the disabled vessel.

Basic Towing Commands for a Long Tow



V/C – Let me know when you have a shot

crew- I have a shot

V/C – Take the shot

Crew – Taking the shot

Crew – Lines over or Lines in the water

V/C – Roger

After line is connected:

V/C – Put a working turn on the bitt

Crew – repeat

V/C – Pay out xx feet

Crew – Paying out xx feet

V/C – Make up the bitt

Crew – Making the bitt



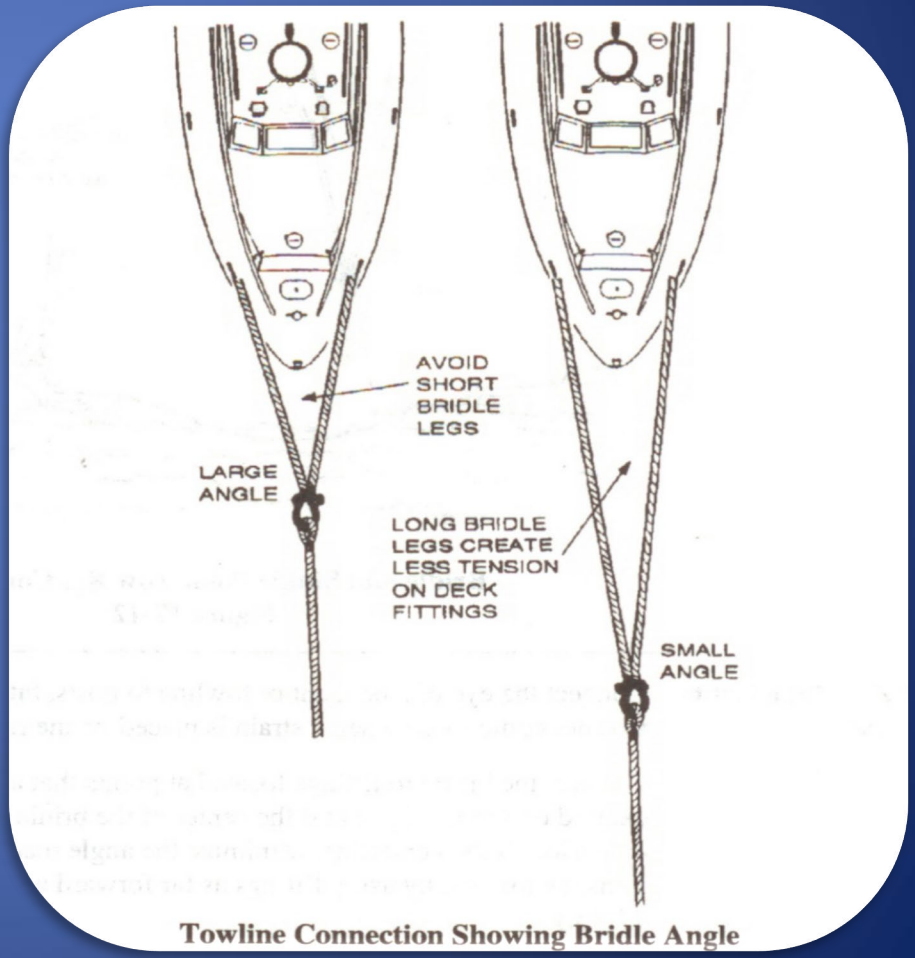
Crossing the “T” approach used by USCG and LBPD in a “training exercise”



Long Tow in progress

Towing Bridles

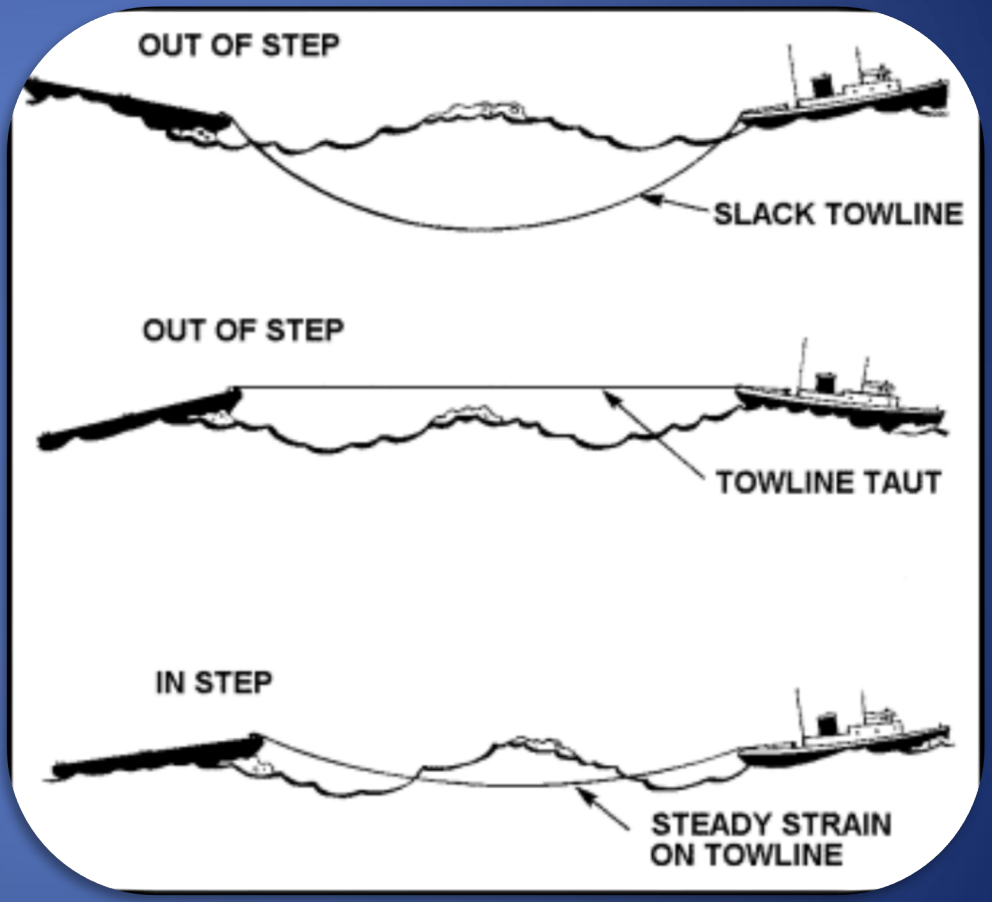




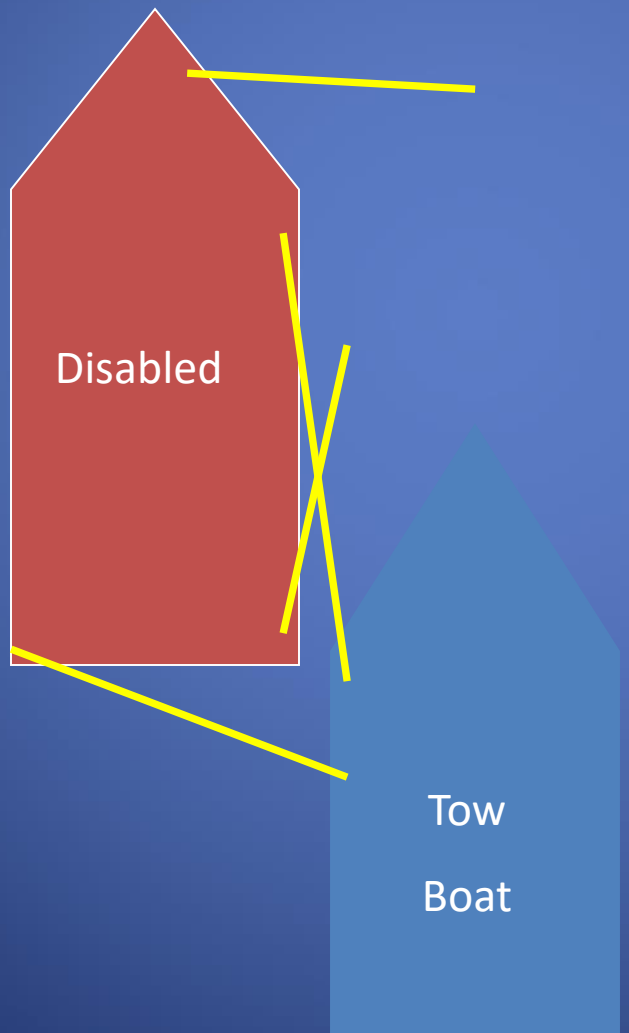
Towline Connection Showing Bridle Angle

Important factors

- Keeping tow in step
  - Pay out enough line
  - Synchronize with crest and trough of waves



Towing Approaches
Side Tow



- Approach Parallel to Disabled vessel at slow speed.
- Tow boat should be offset for optimum control.

Basic Towing Commands for a Side Tow

V/C - will assign specific duties to crew members

V/C - will be specific as to where he/she wants lines and fenders

Crew - will prepare lines and fenders

Crew – will identify useable cleats on disabled vessel for lines to be tied

Disabled vessel will be brought along side and crew will begin to secure disabled vessel for Side Tow

Note: All Commands for any towing operation(long or side) should be loud and repeated by v/c and crew

Side Tow in Progress



Legal Considerations When Towing

- Liability
- Department Policy
- Taking business from towing companies (Seatow, Vessel Assist etc.) and damaging that working relationship



Vessel Assistance
SOP 467

- A Harbor Police vessel shall be dispatched to all calls for marine assistance and evaluate the need for service. Harbor Police officers shall render assistance in all cases where there is a threat of injury to persons on a vessel or in cases where lack of action may present a potential for a serious hazard to navigation. In cases where the circumstances do not merit towing or dewatering, officers should ensure that the safety and welfare of persons on the vessel are attended to.

- TOWING OF VESSELS
- (a) A vessel anchored in San Diego Bay will be towed only if there is an imminent danger of serious injury or loss of life, or the vessel would create a hazard to navigation.
- (b) Vessels suffering equipment failure (or that are otherwise disabled) in any shipping channel, or that are a hazard to navigation, may be towed to the nearest shoreside facility (i.e. launching ramp, public pier, repair facility, or rented slip).
- (c) Vessels that are becalmed (sailboats) or disabled, but do not present a threat of injury or a hazard to navigation shall not be towed. In such instances, the boat crew shall assist the vessel's master in obtaining commercial assistance, if desired.
- (d) In the event that a commercial towing vessel and a Harbor Police vessel arrive at the same time, the commercial towing vessel will take the tow and render assistance as necessary.
- (e) Assistance shall not be rendered to vessels moored in any anchorage, where imminent danger of injury is not present.
- (f) Vessels in marinas or boat yards will not be towed in most circumstances.
- Boat crews who have determined that a vessel should be taken in tow shall obtain permission from their supervisor prior to the taking the vessel under tow, if possible. If safety considerations do not allow for the officer to obtain permission prior to the tow, the supervisor shall be advised as soon as possible by the boat crew.

- 467.4 DEWATERING OF VESSELS

- (a) A vessel anchored in San Diego Bay will be dewatered only if there is imminent danger of serious injury/death, or the sinking vessel would create a hazard to navigation.
- (b) If an anchored vessel is taking on water, and a Harbor Police vessel is not going to dewater it, the Harbor Police dispatcher shall make every attempt to contact the owner to advise of the situation.
- (c) If a vessel begins to take on water while underway, the Harbor Police vessel shall make an effort to dewater the vessel.
- (d) In the event that a Harbor Police vessel and a commercial assistance vessel arrive at a scene simultaneously, the commercial assistance vessel shall conduct the dewatering operations.
- (e) In instances where a Harbor Police vessel has initiated a dewatering operation and a commercial assistance vessel arrives, the commercial assistance vessel will be permitted, if appropriate, to take over the operation, providing they are capable of completing the operation.
- (f) In all instances where a Harbor Police vessel is going to be involved in dewatering operations, the crew shall notify their supervisor prior to dewatering, if possible. If safety considerations do not allow for the officers to obtain prior permission, the supervisor shall be advised as soon as possible by the boat crew.
- (g) In no instance shall a Harbor Police vessel perform dewatering operations at marinas or boat yards.
- (h) During dewatering operations officers should use care to avoid or limit the amount of petroleum products or other hazardous materials being pumped into San Diego Bay.

Questions?

Counter-Terrorism

Lessons of History

San Diego Harbor Police Onboarding Academy

Sergeant Troy Nicol

Officer Michael Bishop

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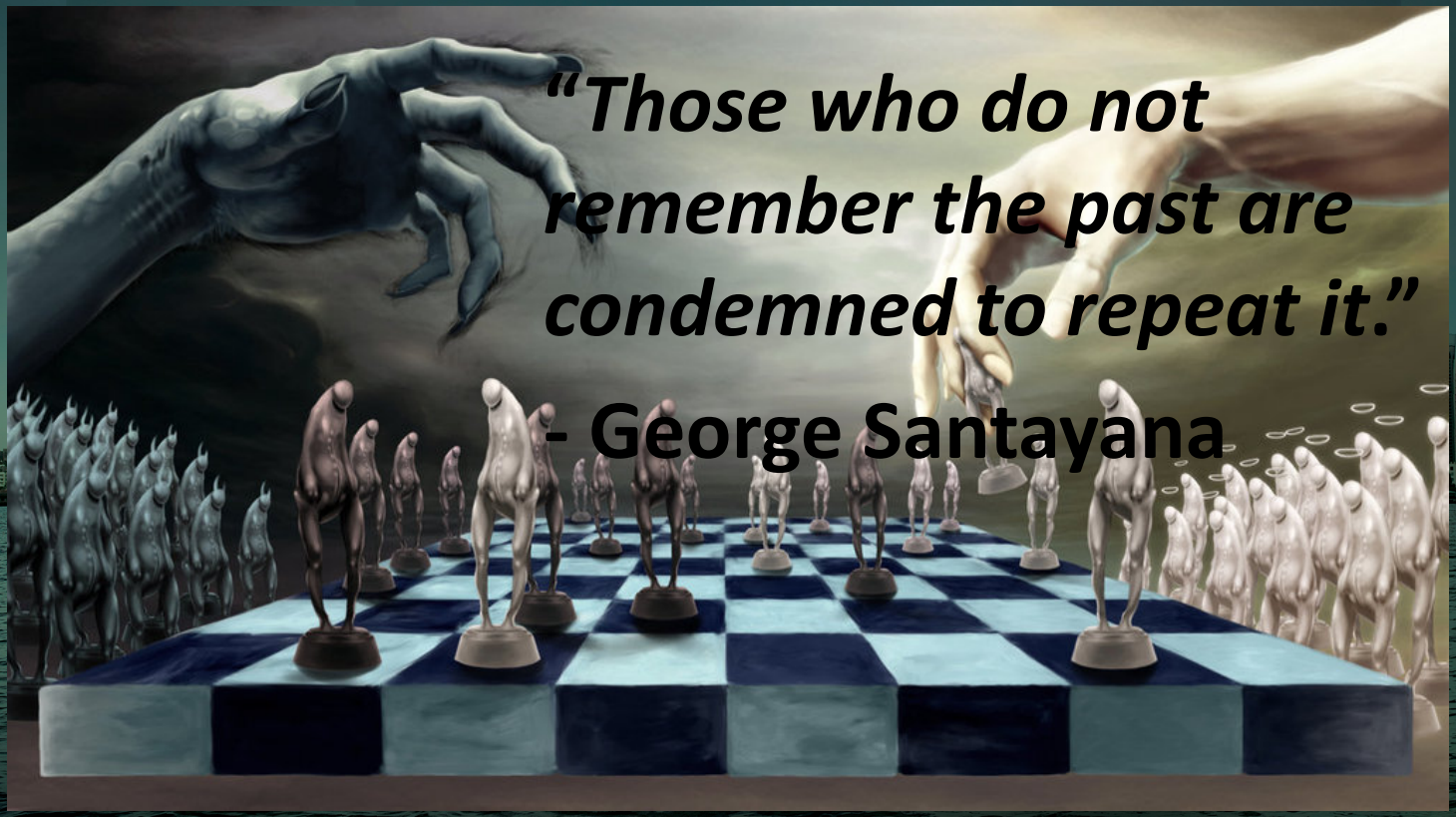
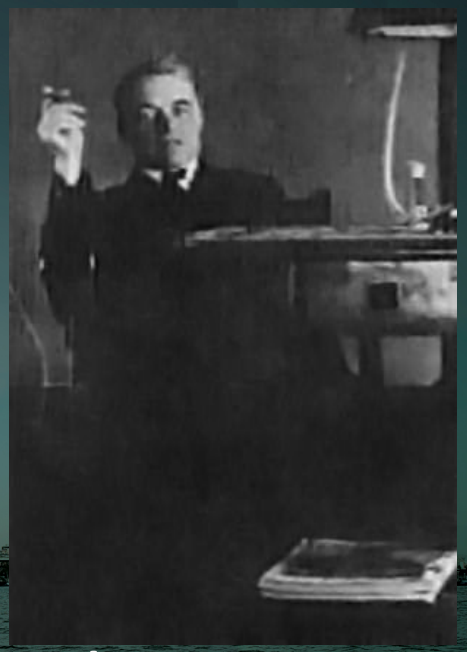
Historical Perspective

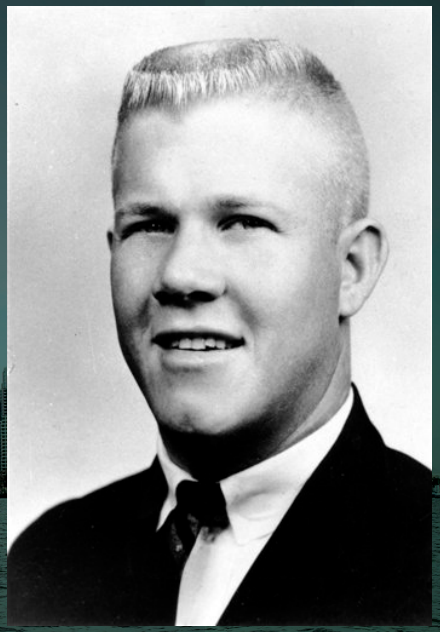


1927 - Bath Michigan Disaster



- Andrew Kehoe
- Township Clerk
- Killed Wife
- Blew up School killing 44 (38 Children)
- Tool: Time Det. Dynamite, Pyrotol.
- Stopped by: Suicide from VBIED.

1966 - Texas Tower Massacre



- Former Eagle Scout and Marine
- Grew up hunting.
- Abusive Father
- Killed Mother and Wife
- Shot 49, killed 18
- Tool: Multiple Long Guns, Shotgun and Pistols with 700 rounds.
- Stopped by: Shot by Police



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1984 - McDonalds Massacre

- James Huberty
- Left from Ohio to Tijuana
- Wife and Children
- Mental Health
- Killed 21, Injured 19
- Tool: Uzi, Pistols
- Stopped by: Police Sniper





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1991 - Luby's Restaurant Massacre

- George Hennard
- US Navy to Merchant Marine
- Fired for drugs
- Learned from Huberty targeted restaurant
- Tool: Vehicle, pistols
- Stopped by: Suicide





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1995 – Oklahoma City Bombing

- Timothy McVeigh & Terry Nichols
- Killed 168, wounded 680
- Fertilizer AMFO Mix
- Tool: VBIED (5k lbs. TNT Eq.)
- Stopped: Captured after Traffic Stop, Investigation. Eventually executed.



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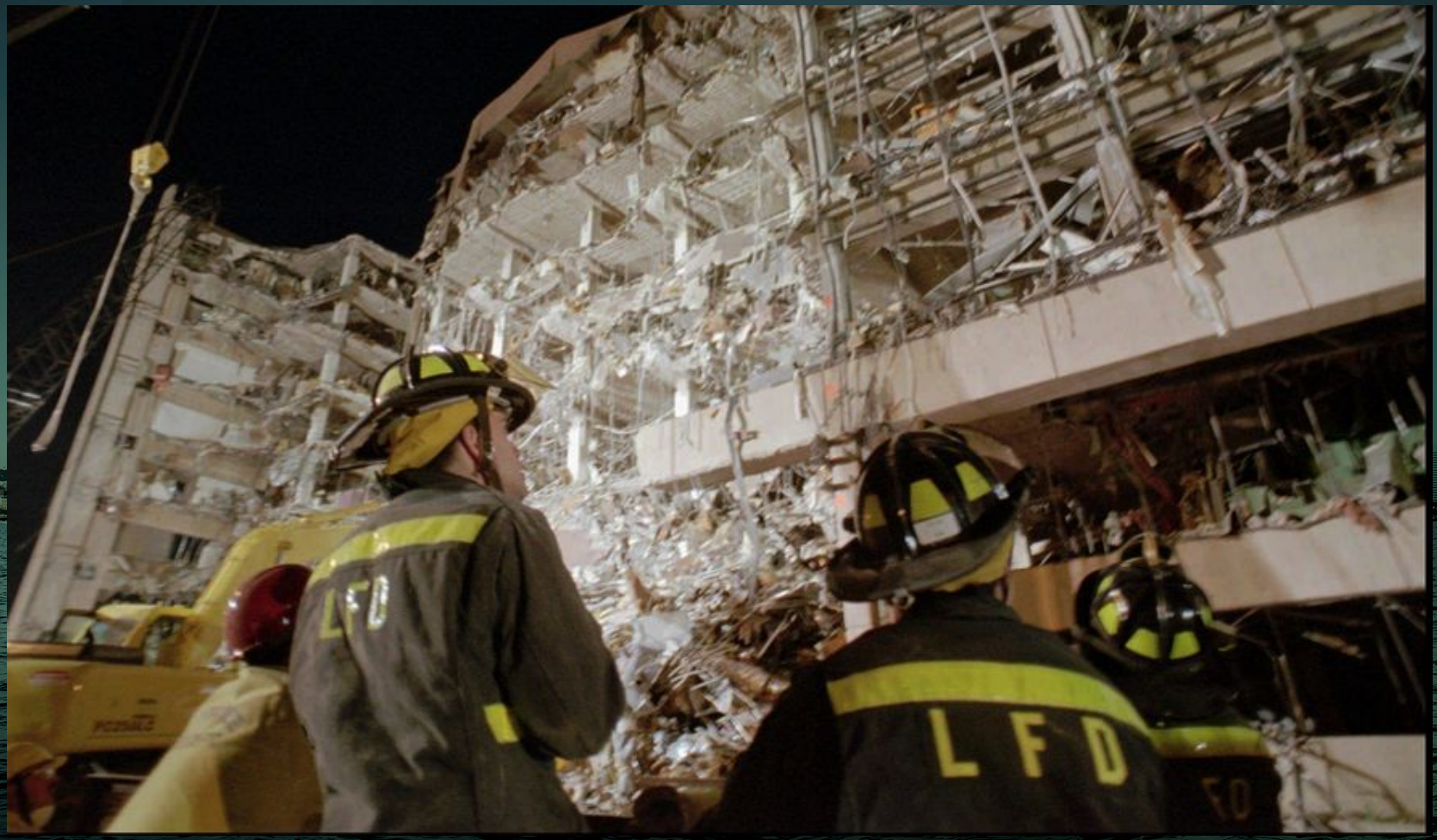

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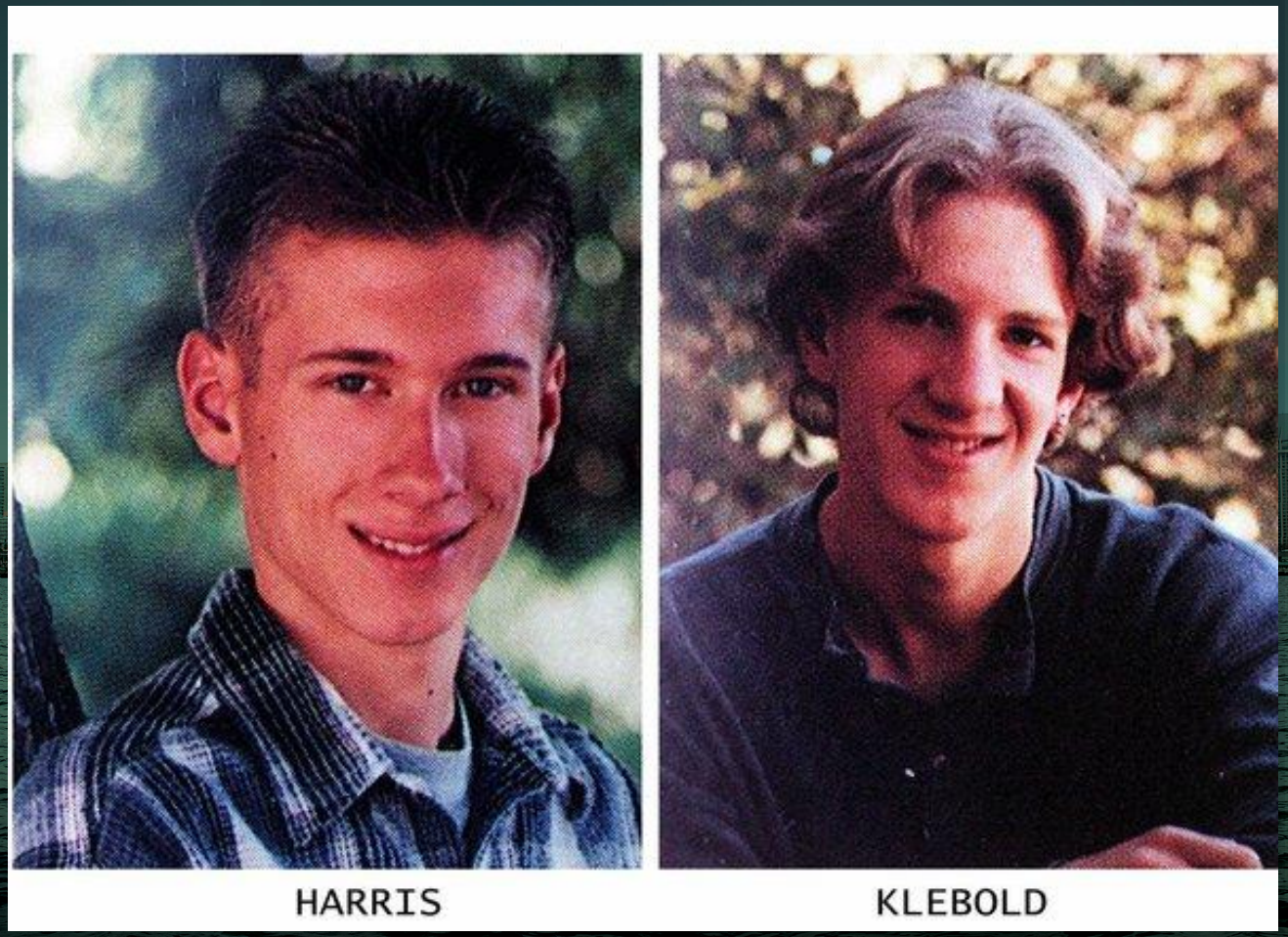
1999 – Columbine H.S.

- Klebold and Harris
- Trench Coat Mafia
- Killed 13 Wound 20
- Tool: Explosives, Rifles
- Stopped by: Suicide



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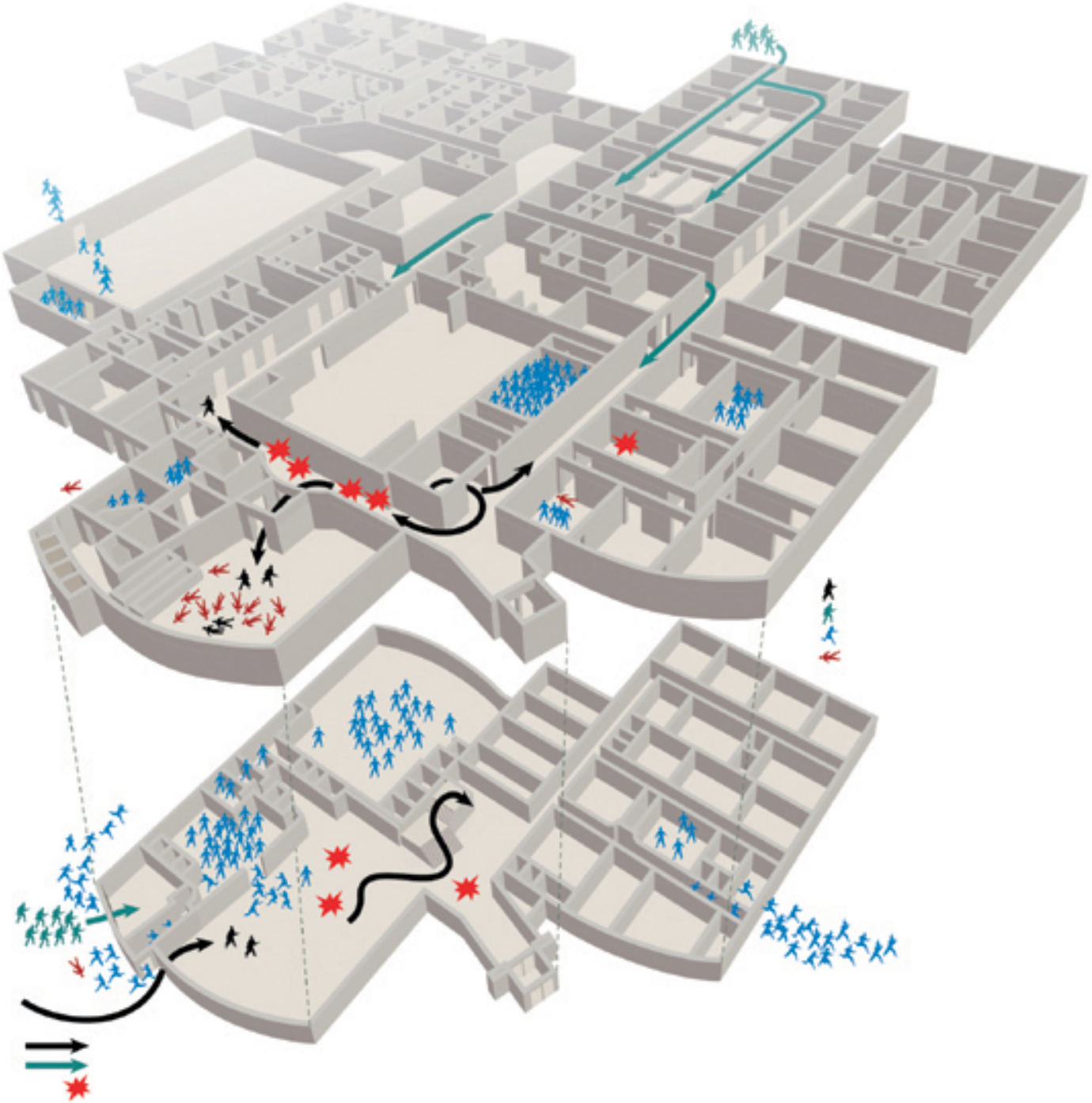

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2001 - Santana H.S.

- Charles Andrew Williams
- 15 years old and Suicidal
- “Do a Columbine.”
- 2 Killed, 13 wounded
- Tool: .22 cal Pistol
- Stopped by: 2 off-duty Officers



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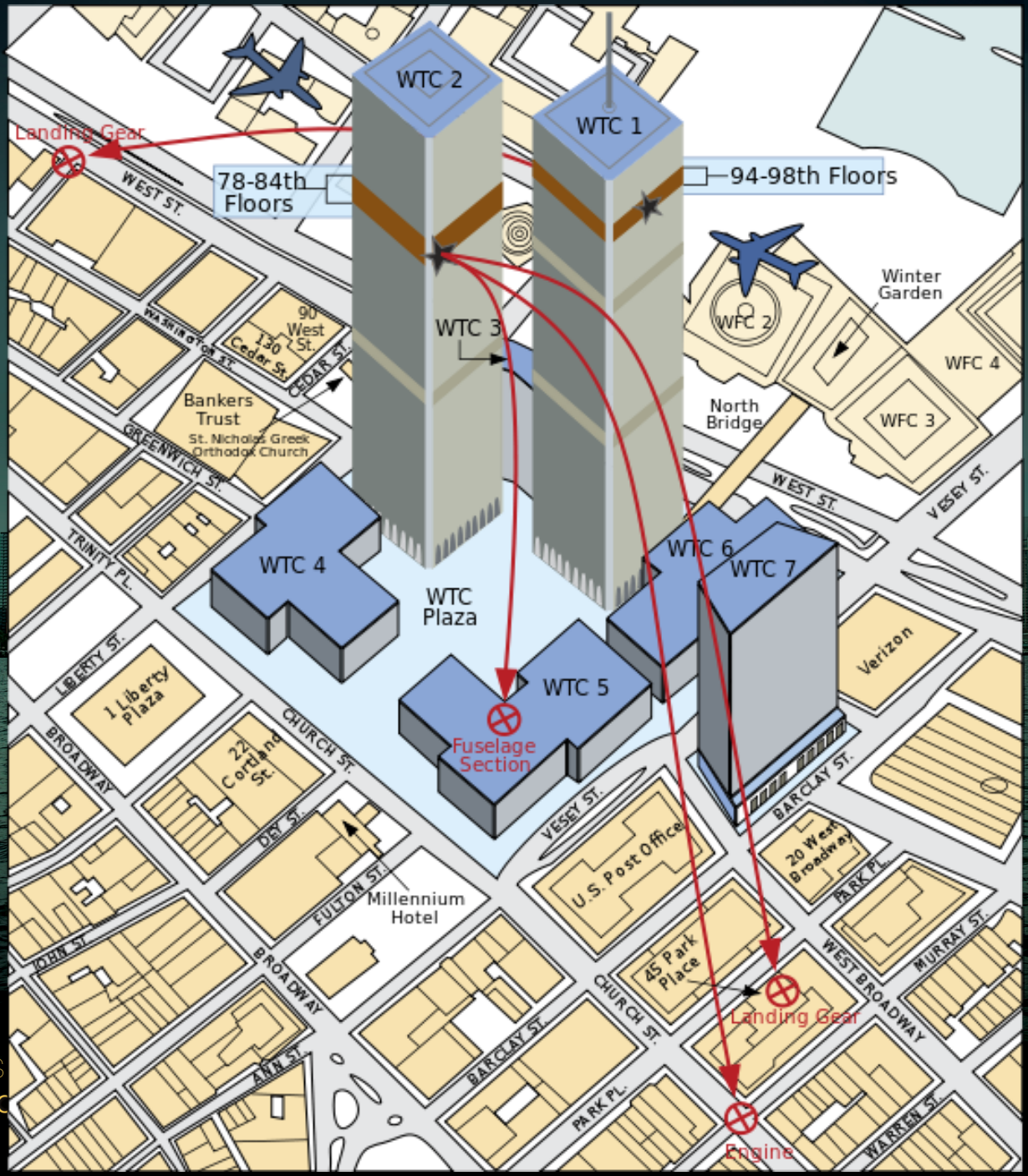
2001 - Granite Hills H.S.

- Jason Hoffman
- 18 years-old
- Wounded 5
- Sentenced to 27 years
- Suicides in Jail
- Tool: Shotgun
- Stopped by: School Police Officer



2001 – New York 9/11

- 19 Hijackers, Al Qaeda (KSM, OBL)
- AA11 and UA175 hit WTC, AA77 hit Pentagon, UA93 failed and crashed in PA
- 2997 Killed, 6000+ Injured.
- Tool: Box Cutter Knives to Hijack 4 Commercial Aircraft.
- Stopped by: Suicide and Passengers.



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WTC RAW FOOTAGE

https://www.youtube.com/watch?v=M1mcCBLU3tY

2002 – Nord-Ost Theater

- 40-50 Chechen Rebels
- 850 Hostages
- 170 Die from Gas
- 40 Chechens Killed
- Tool: Firearms, Explosives.
- Stopped By: ‘Fentanyl type’ Gas and Shot by Government Forces.



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2007 - Virginia Tech

- Seung-Hui Cho
- Created a multiple Scene Incident
- Mental Problems
- Planned Attack in detail
- Killed 32, Wounded 23
- Stopped By: Suicide



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April 16, 2007

The sequence of events

9:50 An e-mail is sent advising students and employees to "Please stay put. A gunman is loose on campus. Stay in buildings until further notice. Stay away from all windows."

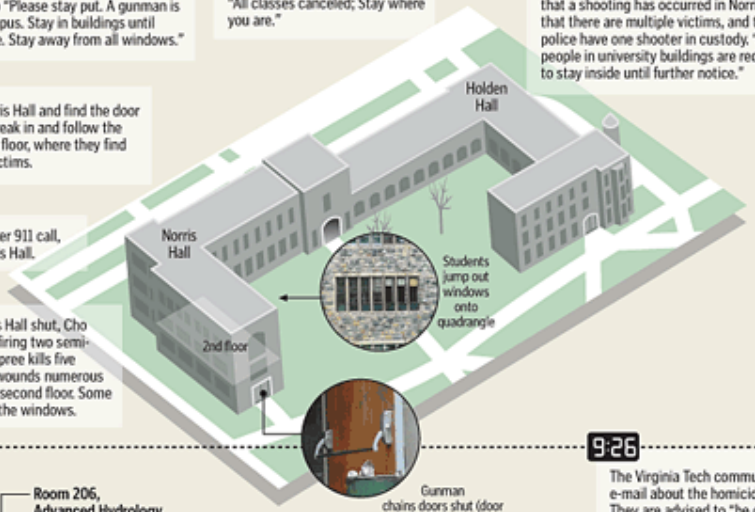
9:46 - 9:50 Virginia Tech police arrive at Norris Hall and find the door chained. Within a minute, they break in and follow the sound of gunshots to the second floor, where they find Cho dead, along with 30 of his victims.

9:45 Virginia Tech police receive another 911 call, this one about a shooting at Norris Hall.

9:40 After chaining the doors of Norris Hall shut, Cho begins entering classrooms and firing two semi-automatic pistols. His shooting spree kills five professors and 25 students and wounds numerous others in four classrooms on the second floor. Some students escape by jumping out the windows.

10:17 A third e-mail is sent, announcing "All classes canceled; Stay where you are."

10:53 A fourth e-mail is sent, informing recipients that a shooting has occurred in Norris Hall, that there are multiple victims, and that police have one shooter in custody. "All people in university buildings are required to stay inside until further notice."





9:26 The Virginia Tech community is sent an e-mail about the homicide investigation. They are advised to "be cautious" and report anything suspicious to Virginia Tech police.

9:01 Cho mails a package to NBC News from the downtown Blacksburg post office. The package contains an 1,800-word manifesto, 43 photos of himself, and a DVD with 27 QuickTime video files of angry statements.


Blacksburg's downtown post office
AP

2nd floor, Norris Hall

From witness accounts reported by The Associated Press



Room 206, Advanced Hydrology
Professor G.V. Loganathan and nine students are killed.

Room 204, Solid Mechanics
Professor Liviu Librescu tries to block the door before being fatally shot. Some students jump out the windows to escape. One of the 23 students is killed.

Room 211, Intermediate French
Eleven of the 22 students and the instructor, Jocelyne Couture-Nowak, are killed.

Room 207, Elementary German
Instructor Jamie Bishop is killed here, along with four out of 15 students.

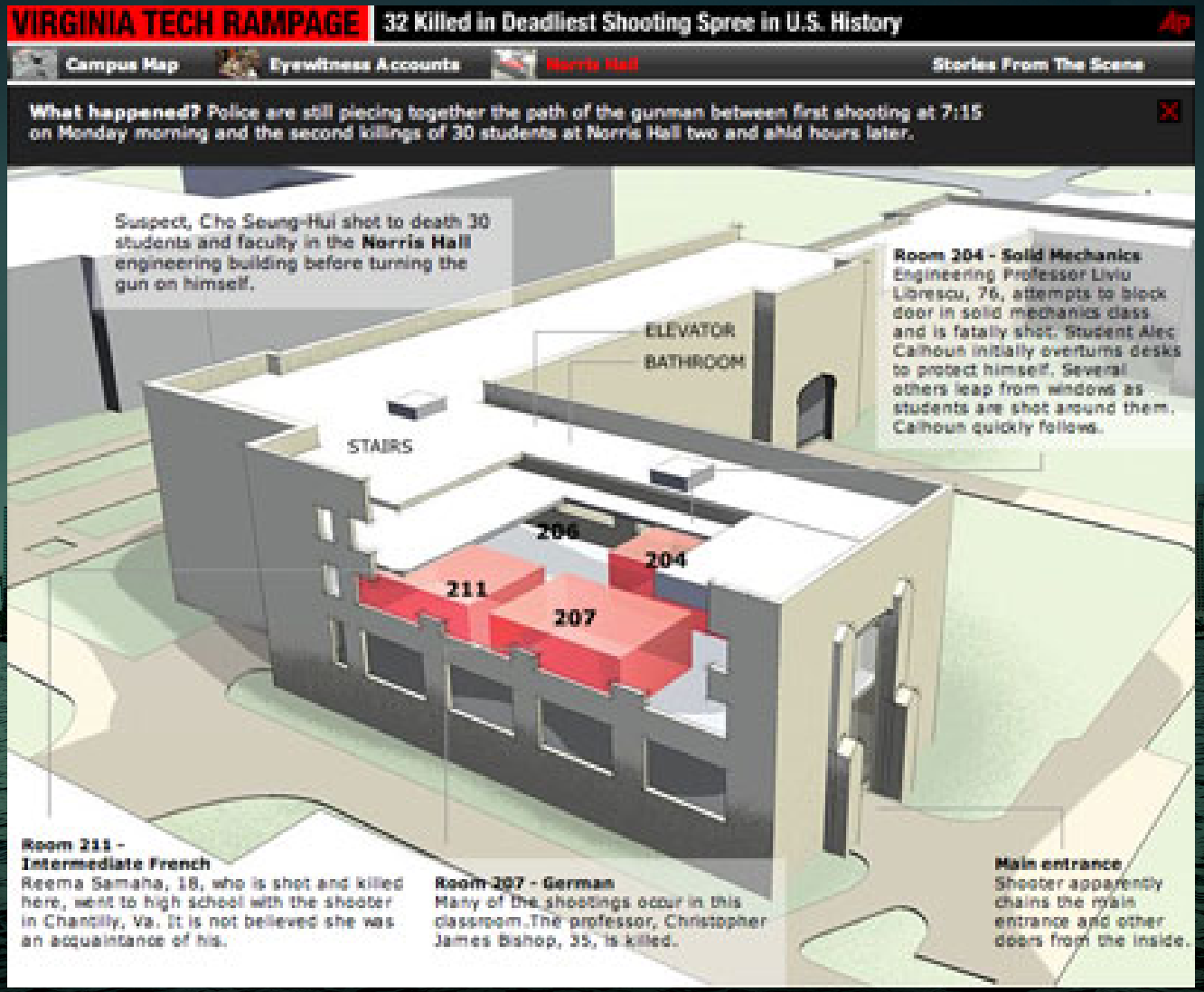
Professor Kevin Granata, who had an office on the third floor, also is killed.

Seung-Hui Cho lived in Room 212L.

7:15 Virginia Tech police receive a 911 call about a shooting at West Ambler Johnston Hall. They find Emily Hilscher and Ryan "Stack" Clark, a resident adviser for the floor.

7:30 Investigators follow a lead on a "person of interest," but don't arrest anyone; they believe the killings are a domestic dispute and the killer has likely fled off campus.

All times are approximate; all times are a.m.



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2008 - Mumbai

- 10 Pakistani Terrorists (Lashkar-e-Taiba) in 4 Teams hitting 12 targets over 4 days.
- Infiltration by Hijacked Fishing Vessel
- Pakistani Handlers via Cell Phone
- Killed 257, Injured 700
- Tool: IED's, Rifles, Pistols, Fire.
- Stopped By; Suicide or Gov't Forces



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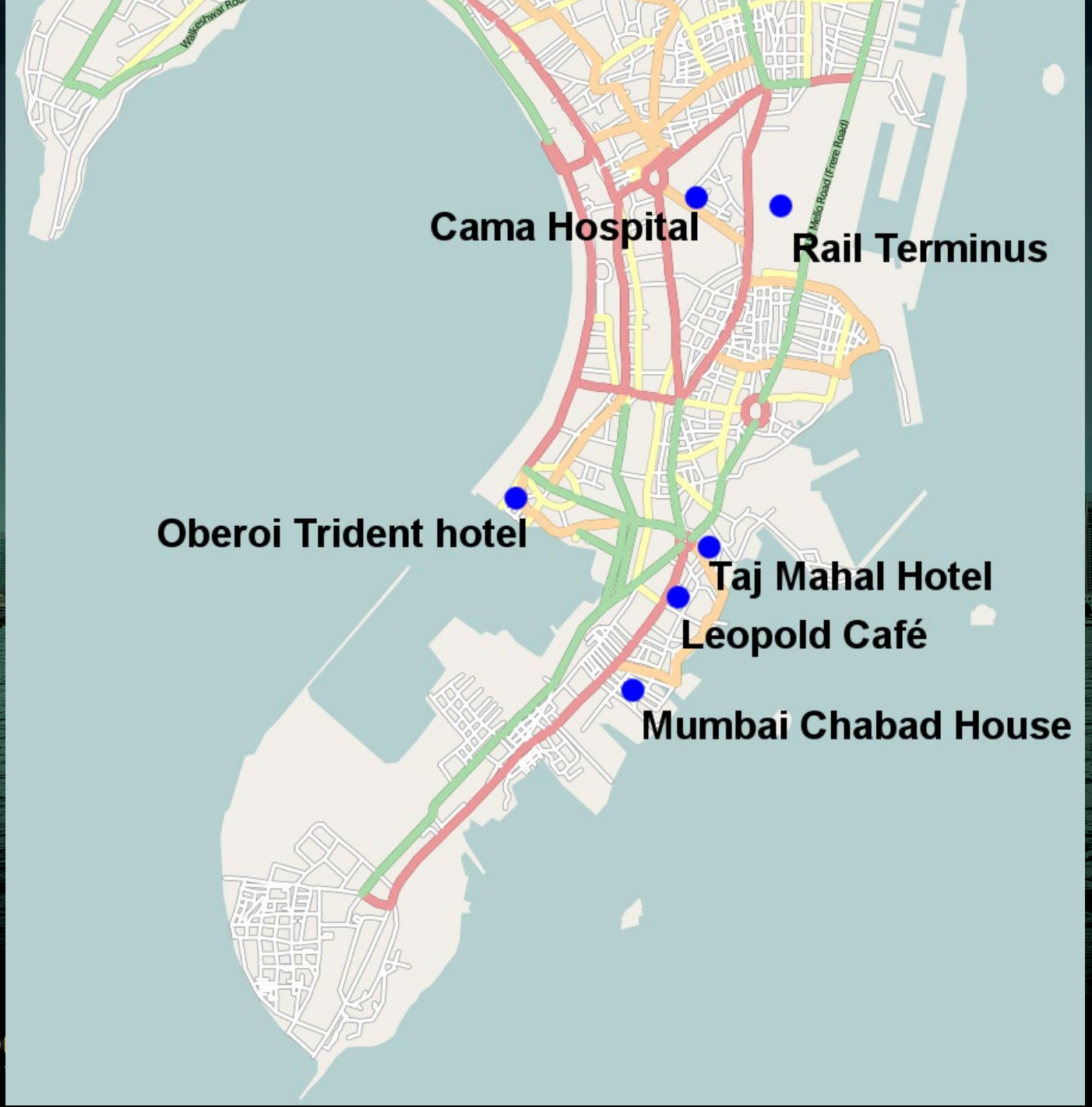
Cama Hospital
Rail Terminus
Oberoi Trident hotel
Taj Mahal Hotel
Leopold Café
Mumbai Chabad House



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2012 - Sandy Hook

- Adam Lanza
- 20 Years Old
- Mental Illness (Asperger's) possible Schizophrenia, Autism, Anorexia.
- Killed 27 (20 children)
- Stopped By: Suicide (5 mins)



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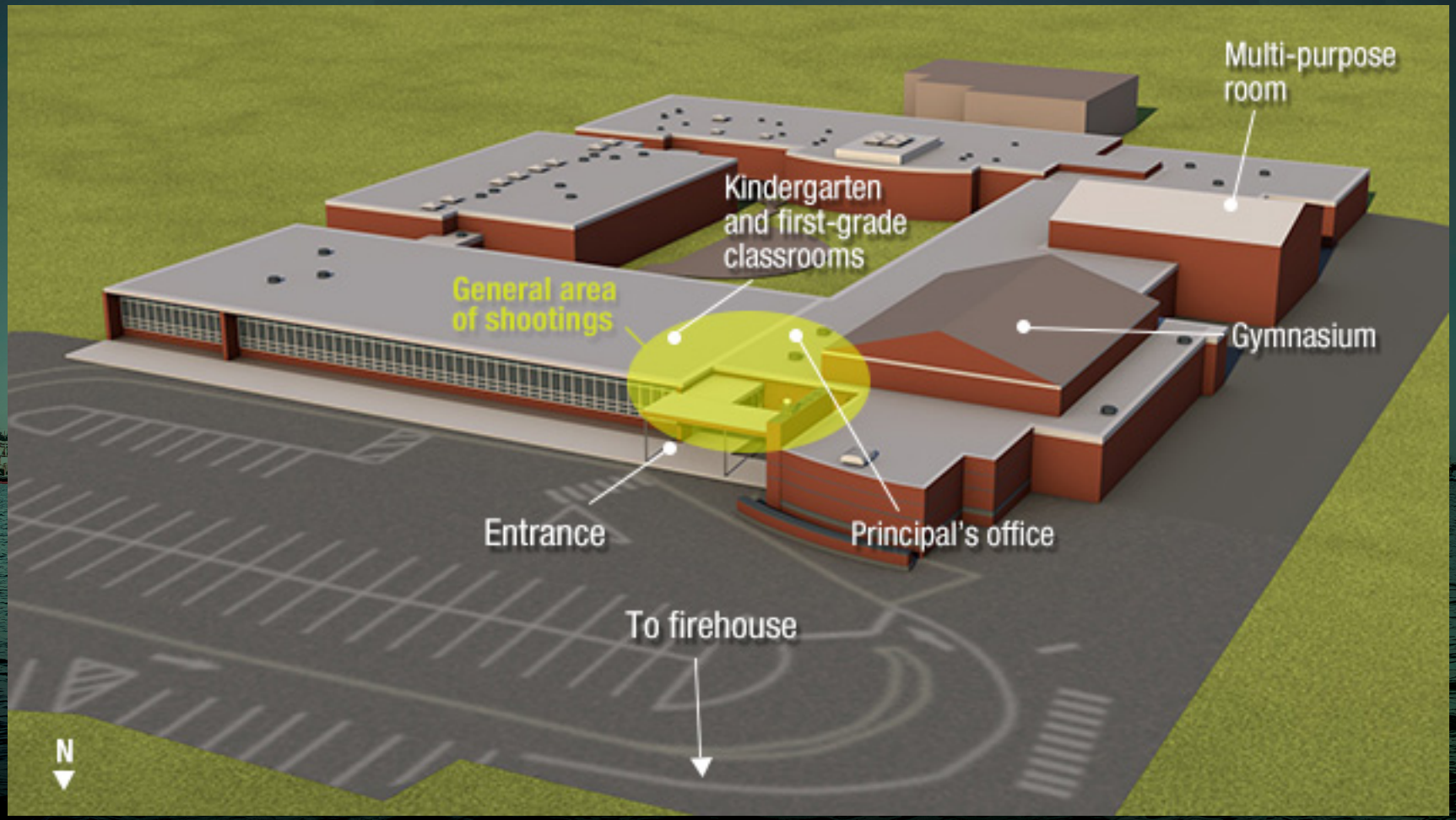

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2011 – Norway Terror Attack

- Anders Breivik
- Two Location Attack
- Attacked Children of Left Wing Politicians.
- 77 Killed, 110 Injured
- Tool: VBIED, Police Uniform, Rifle
- Stopped By: Arrest


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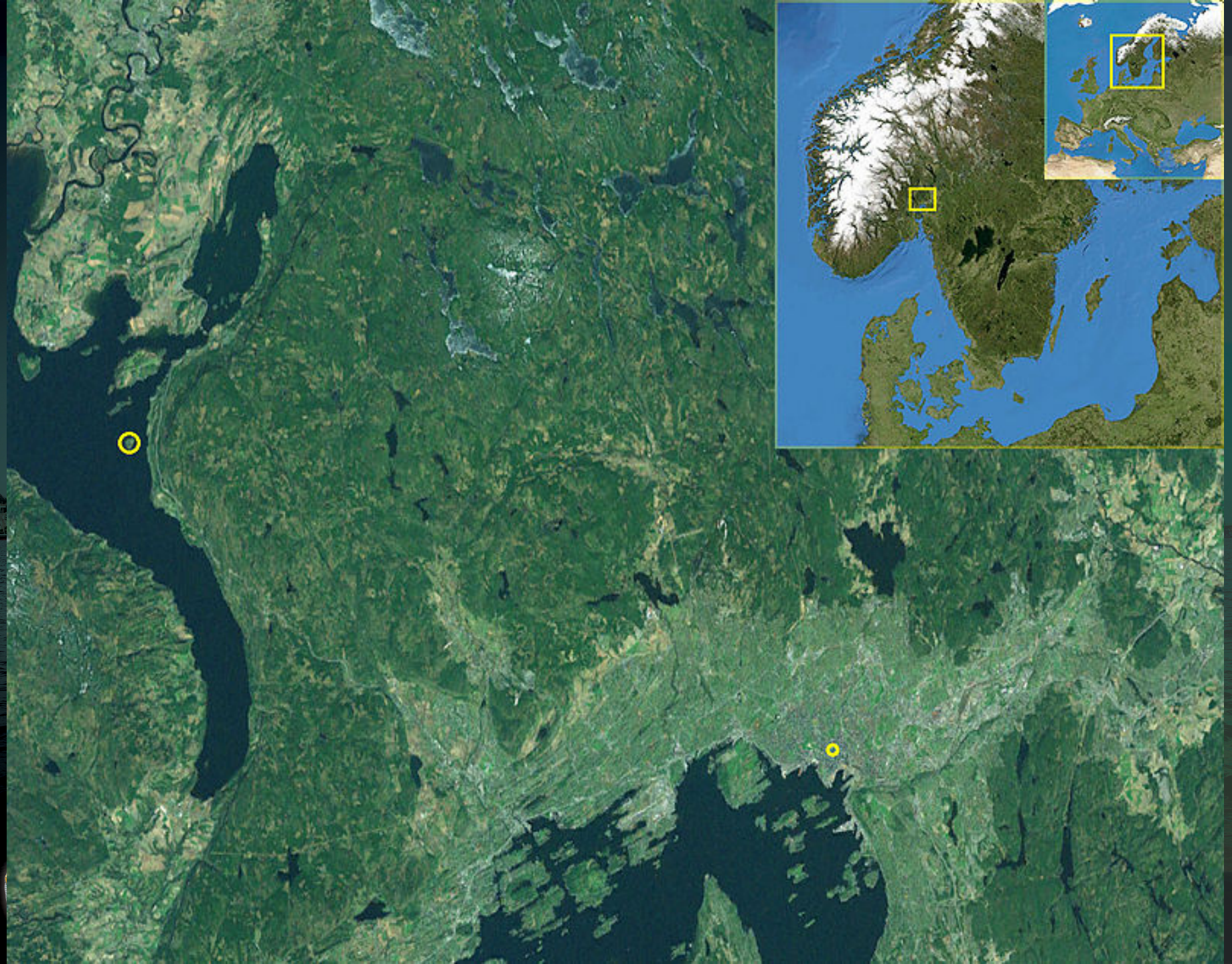



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2012 – Boston Bombings

- Brothers, Tamerlan (26) and Dzhokhar (19) Tsarnaev.(Chechen)
- 2 pressure cooker bombs
- Killed 3, 256 Wounded.
- Tool: IED, Firearms, Improvised Grenades.
- Stopped by: Police

Boston – 60 Minutes Video

https://www.youtube.com/watch?v=bqj51ZlVoqk



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2015 Paris Attack

- 3 Teams of 3 ISIS Fighters
- Attacked 3 locations
- Main Location was Bataclan theater with 1500 people watching Eagles of Death Metal.
- RAID Unit arrives on scene. 89 Hostages killed.
- Tool: Rifles, Pistols, Bomb Vests (TATP)
- Stopped by: Police Forces and Special Units

2016 - Orlando Night Club

- Omar Mateen (Security Guard)
- Pulse Nightclub Orlando FL
- Killed 49, Injured 53
- Triggered by Abu Waheeb killing
- Tool: Rifle and handguns
- Stopped by: Police SWAT Team



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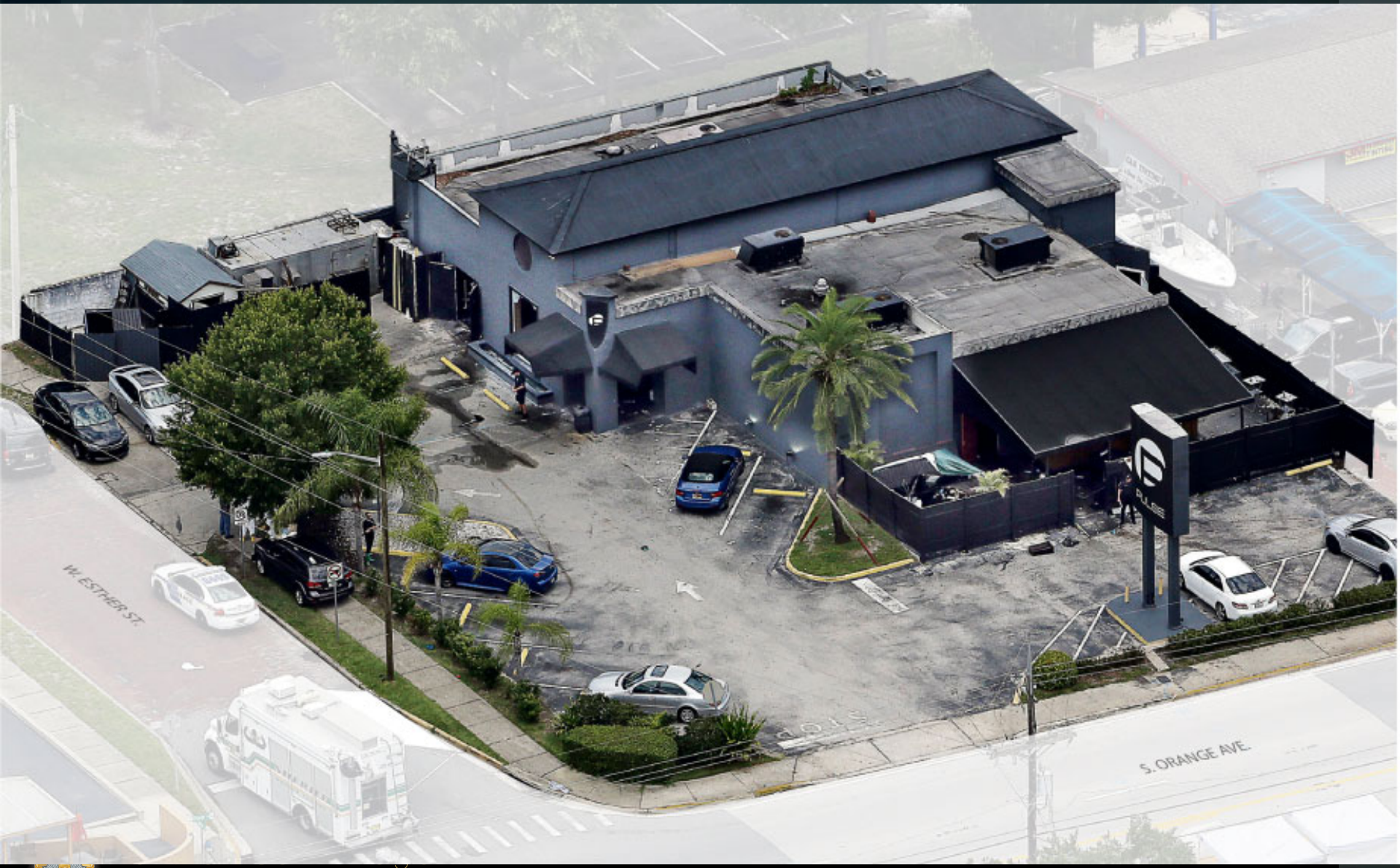

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2016 - Brussels Airport

- 3 ISIS Bombers at the Brussels Airport
- 2 ISIS Bombers at the Metro Station
- 32 Killed, 300 Injured
- Tool: Nail Bombs with Dead-man Switches.
- Stopped By: Suicide (3) or Capture (2)



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2015 - San Bernadino

- Syed Farook and Tashfeen Malik
- Pakistani ISIS Supporters
- Worked at County Health
- Attacked Christmas Party
- Killed 14, wounded 22.
- Tool: Homemade Explosive, Rifles, Pistols
- Stopped By: Killed by Police



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2017 Harvest Music Festival
Las Vegas

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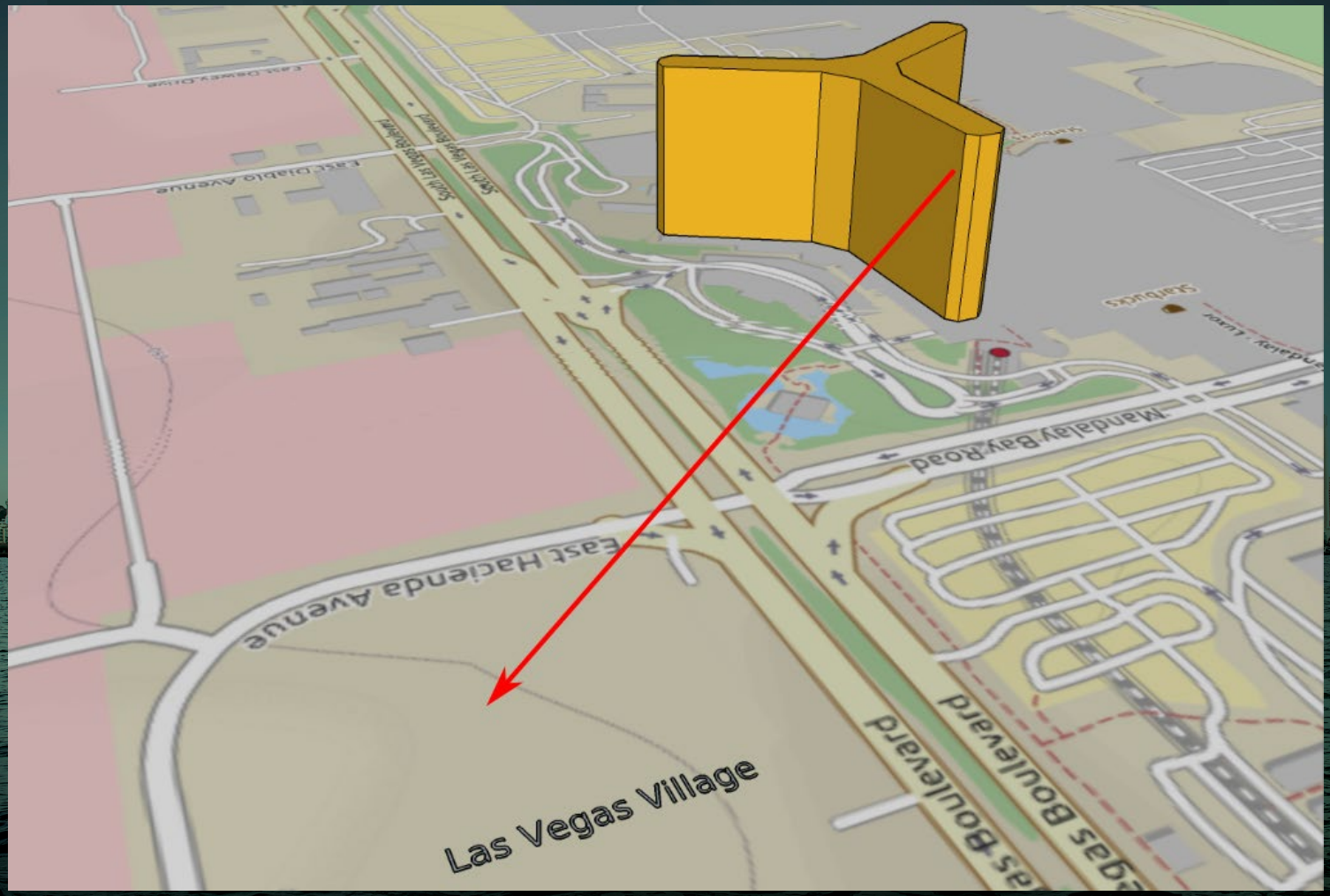
Harvest Music Festival

- Shooter 64 yrs old Stephen Paddock
- Fired 1100 rounds from elevated position.
- 58 killed
- 422 wounded
- Ended: Suicide



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Historical Perspective

- Law Enforcement Outgunned / Untrained.
- Multi-Jurisdictional Response Issues.
- Target Rich Environments
- Coordinate LE, Fire, EMA.
- Tactical Training and Patrol Rifles
- SWAT may not arrive soon enough.
- Expect IED’s
- Multiple Targets

Historical Perspective

- Team Tactics
- Attacks may culminate in Hostage Standoff
- May not have Negotiations
- Plan for obstacle Response i.e. Watercraft
- Terrorists may try to create protracted event.
- Attack designed to cause major casualty rate and property damage

Historical Perspective

- Supervisors need training in Planning and C3 (Command, Control, Communications)
- Tactical Medicine and Task Forcing with RTF.
- Breaching Equipment for Patrol
- Rehearse at Known Target Locations

Historical Perspective

- Leadership
- Visibility
- Preparation



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Basic Marine Operations:

Safety Brief

Basic Marine Operations: The 3 reasons Officers find themselves in the water;

1. Accidental
2. Rescue
3. Felonious Assault

Basic Marine Operations:
Accidental

- Three Points of Contact Rule
- Chin to Chest upon accidental exit
- Trip Hazards on vessels and piers
- Contact Hazards
- Conducting Boarding's

Basic Marine Operations: Rescue

- Human Instinct
- Writing a check your body can't cash.
- Consider other viable non-entry options such as a life ring.

Felonious Assault

- Why would a suspect take you into the water?
- What is “his” advantage over you?
- Dealing with deadly force
- Firearms in the Water Environment
- Other deadly force options

Drowning

- Refer to LE Water Deaths
- Two types of Drowning:
  1. Dry land drowning
  2. Inhalation drowning

Marine Hazards and Threats



Marine Hazards and Threats

- Large Predators
- Barracuda and other large fish
- Jellyfish
- Red Tide
- Tides/wake/currents/waves/storms
- Subsurface objects
- Explosives

Marine Hazards and Threats

- Overheating/Exhaustion
- Dehydration
- Seasickness

Basic Marine Operations:

- Vessel Collision







OVERTURNED VESSEL & AIRCRAFT SAFETY BRIEF



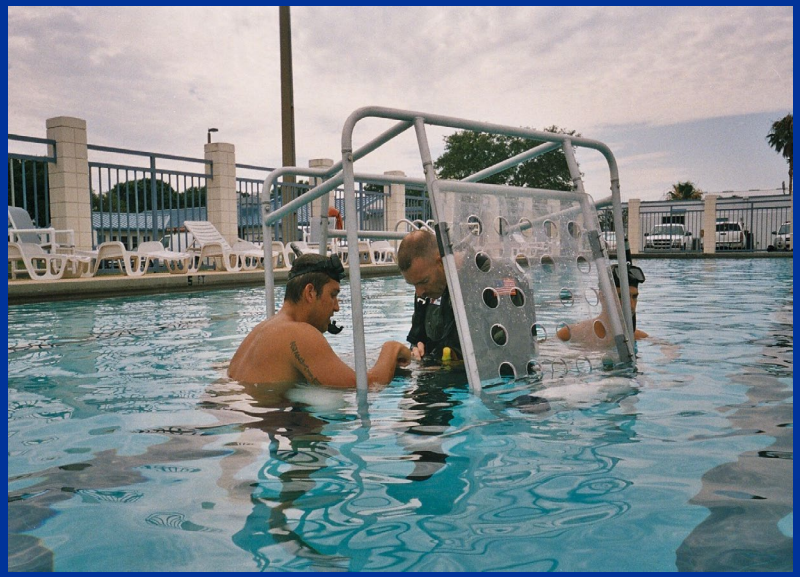
S.W.E.T. TRAINING

- S – SHALLOW
- W – WATER
- E – EGRESS
- T - TRAINING

EMERGENCY EGRESS









EMERGENCY EGRESS

- REFERENCE POINT
- EMERGENCY EXIT
- ICS CORD RELEASE
- RELOCATE REFERENCE POINT
- SEAT BELT RELEASE
- EXIT
- LIFE VEST INFLATE

Dunker Training

Facts

- US Navy Dunker training since 1950's (Dilbert Dunker)
- 20,000-30,000 trained each year since 1950
- US Navy has used the 9D5 since 1978
- Total trained 1,250,000
- At least 100 testimonials attributed to dunker training
- No lives ever lost in training
- Only 5 incidents, no residual or lasting problems

Why Occupants Perish

- Drowning
  - Inability to hold breath
  - Failure to maintain exit reference point
- Environmental hazards- ***murky water, cold water***
- Psychological hazards- ***shock, surprise***
- No training in egress procedures and use of emergency breathing device
- Improperly dressed

Equipment Selection

- Boots
- Vests
- Helmets
- Gun belts and keepers
- Armor
- Clothing
- Life-preservers
- Rescue Apparatus

QUESTIONS?



San Diego Harbor Police Rifle Course

San Diego Harbor Police WTU

Port of San Diego
Harbor Police Department
32-43.715N ■ 117-11.651W

Instructors Introduction



Port of San Diego
Harbor Police Department
32-43.715N ■ 117-11.651W

Course synopsis

- Law and policy
- Safety procedures and range rules
- Rifle characteristics
- Ballistics
- Maintenance
- How to operate the rifle
  - Basic operation
  - Shooting skills

- Tactical considerations and decision making
- Range training

  300 round total with less than 50 handgun rounds

  Gun belt, vest, pistol, rifle, and flashlight or tac light needed

  Qualification

Law Update

Tennessee v. Garner

Officers received a radio message that a certain home was being burglarized. They went to the home and saw a boy or young man, Garner, running from the home. An officer told Garner to stop, but Garner kept fleeing. When it became apparent that Garner was going to escape, the officer shot and killed Garner.

The United States Supreme Court ruled that the officer's shooting Garner was a seizure under the 4th Amendment and that the seizure was unreasonable because Garner did not pose a threat to anyone at the time he was shot.

However:

When an officer has probable cause to believe that the suspect poses a threat of serious physical harm, either to the officer or to others, the Court stated, it is not unreasonable to prevent his escape by using deadly force.

"Thus, if the suspect threatens the officer with a weapon or there is probable cause to believe that he has committed a crime involving the infliction or threatened infliction of serious physical harm, deadly force may be used if necessary to prevent escape, and if, where feasible, some warning has been given."

Note that the Court states that a warning should be given before firing "where feasible." The standard established by this decision does not require that a warning must necessarily be given in each instance before the use of deadly force is constitutionally permissible.

Law Update

Graham v. Connor

Graham was suffering from an insulin problem and was driven to a convenience store by a friend to purchase orange juice. Graham ran into the store, but when he realized that the line was too long he ran out and got into the car. Officers, watching the store, saw Graham run into the convenience store and quickly run out, so the officers thought that he had just committed a robbery. The officers then stopped the car Graham was in. Graham ran around the car and sat on the curb. The officers thought Graham was on drugs, so an officer banged his face on the hood of the car (presumably to clear his head). An officer then checked the convenience store and learned that Graham did not rob the store.

The United States Supreme Court ruled that the suit must be analyzed under the 4th Amendment. That is, was the seizure “unreasonable?” (Obviously, even if the officers had reasonable suspicion to stop, they did not have the power during the detention to bash his face on the hood of the car.)

Law Update

Graham v. Connor

GRAHAM V CONNOR is probably the most important case in the history of excessive / unreasonable force law. GRAHAM suggested three factors that courts and juries should consider in their determination of whether the officer used excessive or unreasonable force. Other courts have said that these factors are not the only factors (e.g. warning the suspect) and need not be recited verbatim as jury instructions, but they are important. Those factors are:

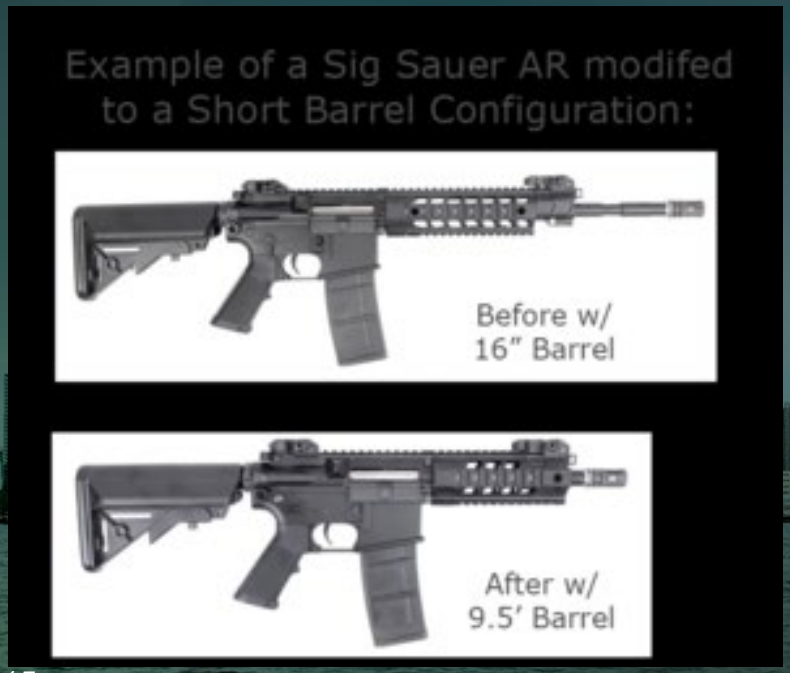
1. The severity of the crime.
2. Whether the person against whom the force was used presented an immediate threat.
3. Whether the person against whom the force was used was resisting arrest or trying to escape.

The question is "whether the totality of the circumstances justifie[s] a particular sort of … seizure."

OBJECTIVELY REASONABLE

Laws and Agency Policy

All San Diego Harbor Police Rifles are either Short Barreled Rifles or Machine Guns



Penal Code 33215

Except as provided in Sections 33220 and 33225 and in Chapter 1 (commencing with Section 17700) of Division 2 of Title 2, any person in this state who manufactures or causes to be manufactured, imports into the state, keeps for sale, or offers or exposes for sale, or who gives, lends, or possesses any short-barreled rifle or short-barreled shotgun is punishable by imprisonment in a county jail not exceeding one year or imprisonment pursuant to subdivision (h) of Section 1170.

Laws and Agency Policy

Penal Code 33220

Section 33215 does not apply to either of the following:

*(a) The sale to, purchase by, or **possession** of short-barreled rifles or short-barreled shotguns by a police department, sheriff's office, marshal's office, the California Highway Patrol, the Department of Justice, the Department of Corrections and Rehabilitation, or the military or naval forces of this state or of the United States, for use in the discharge of their official duties.*

(b) The possession of short-barreled rifles and short-barreled shotguns by peace officer members of a police department, sheriff's office, marshal's office, the California Highway Patrol, the Department of Justice, or the Department of Corrections and Rehabilitation, when on duty and the use is authorized by the agency and is within the course and scope of their duties, and the officers have completed a training course in the use of these weapons certified by the Commission on Peace Officer Standards and Training.

Policies to Review….

300.3 USE OF FORCE

Officers shall use only that amount of force that reasonably appears necessary given the facts and circumstances perceived by the officer at the time of the event to accomplish a legitimate law enforcement purpose.

The reasonableness of force will be judged from the perspective of a reasonable officer on the scene at the time of the incident. Any evaluation of reasonableness must allow for the fact that officers are often forced to make split-second decisions about the amount of force that reasonably appears necessary in a particular situation, with limited information and in circumstances that are tense, uncertain and rapidly evolving.

Given that no policy can realistically predict every possible situation an officer might encounter, officers are entrusted to use well-reasoned discretion in determining the appropriate use of force in each incident.

It is also recognized that circumstances may arise in which officers reasonably believe that it would be impractical or ineffective to use any of the tools, weapons or methods provided by the [Department/Office]. Officers may find it more effective or reasonable to improvise their response to rapidly unfolding conditions that they are confronting. In such circumstances, the use of any improvised device or method must nonetheless be reasonable and utilized only to the degree that reasonably appears necessary to accomplish a legitimate law enforcement purpose.

While the ultimate objective of every law enforcement encounter is to avoid or minimize injury, nothing in this policy requires an officer to retreat or be exposed to possible physical injury before applying reasonable force.

Policies to Review….

300.4 DEADLY FORCE APPLICATIONS

Use of deadly force is justified in the following circumstances:

An officer may use deadly force to protect him/herself or others from what he/she reasonably believes would be an imminent threat of death or serious bodily injury.

An officer may use deadly force to stop a fleeing subject when the officer has probable cause to believe that the person has committed, or intends to commit, a felony involving the infliction or threatened infliction of serious bodily injury or death, and the officer reasonably believes that there is an imminent risk of serious bodily injury or death to any other person if the subject is not immediately apprehended. Under such circumstances, a verbal warning should precede the use of deadly force, where feasible.

Imminent does not mean immediate or instantaneous. An imminent danger may exist even if the suspect is not at that very moment pointing a weapon at someone. For example, an imminent danger may exist if an officer reasonably believes any of the following:

The person has a weapon or is attempting to access one and it is reasonable to believe the person intends to use it against the officer or another.

The person is capable of causing serious bodily injury or death without a weapon and it is reasonable to believe the person intends to do so.

Policies to Review….

312.3.3 PATROL RIFLES

.The authorized department-issued patrol rifle is the Colt M-4 and Colt LE Carbine Only the department issued patrol rifle will be used by sworn staff in the field.

Members may deploy the patrol rifle in any circumstance where the member can articulate a reasonable expectation that the rifle may be needed. Examples of some general guidelines for deploying the patrol rifle may include, but are not limited to:

Situations where the member reasonably anticipates an armed encounter.

When a member is faced with a situation that may require accurate and effective fire at long range.

Situations where a member reasonably expects the need to meet or exceed a suspect's firepower.

When a member reasonably believes that there may be a need to fire on a barricaded person or a person with a hostage.

When a member reasonably believes that a suspect may be wearing body armor.

When authorized or requested by a supervisor.

When needed to euthanize an animal.

When not deployed, the patrol rifle shall be properly secured in a locking weapons rack in the patrol vehicle with the chamber empty, magazine loaded and inserted into the magazine well, the bolt forward with the dust cover closed. The trigger will not be pulled so the hammer remains cocked, and the selector lever will be in the safe position ..

Policies to Review….

312.3.7 AMMUNITION

Members shall carry only San Diego Harbor Police-authorized ammunition. Members shall be issued fresh duty ammunition in the specified quantity for all [department/office]-issued firearms during the member's firearms qualification. Replacements for unserviceable or depleted ammunition issued by the San Diego Harbor Police shall be dispensed by the Weapons Training Unit Supervisor when needed, in accordance with established policy.



Current issued duty ammunition is Speer Gold Dot 62 or 64 gr Soft Point ammunition in .223 Remington

Policies to Review….

312.7 FIREARM DISCHARGE

Except during training or recreational use, any member who discharges a firearm intentionally or unintentionally, on- or off-duty, shall make a verbal report to his/her supervisor as soon as circumstances permit. If the discharge results in injury or death to another person, additional statements and reports shall be made in accordance with the Officer-Involved Shootings and Deaths Policy. If a firearm was discharged as a use of force, the involved member shall adhere to the additional reporting requirements set forth in the Use of Force Policy.

In all other cases, written reports shall be made as follows:

If on-duty at the time of the incident, the member shall file a written report with his/her Captain or provide a recorded statement to investigators prior to the end of shift, unless otherwise directed.

If off-duty at the time of the incident, the member shall file a written report or provide a recorded statement no later than the end of the next regularly scheduled shift, unless otherwise directed by a supervisor.

312.7.3 WARNING AND OTHER SHOTS

Generally, warning shots or shots fired for the purpose of summoning aid are discouraged and may not be discharged unless the member reasonably believes that they appear necessary, effective and reasonably safe.

Policies to Review….

312.7.1 DESTRUCTION OF ANIMALS

Members are authorized to use firearms to stop an animal in circumstances where the animal reasonably appears to pose an imminent threat to human safety and alternative methods are not reasonably available or would likely be ineffective.

In circumstances where there is sufficient advance notice that a potentially dangerous animal may be encountered, [department/office] members should develop reasonable contingency plans for dealing with the animal (e.g., fire extinguisher, TASER® device, oleoresin capsicum (OC) spray, animal control officer). Nothing in this policy shall prohibit any member from shooting a dangerous animal if circumstances reasonably dictate that a contingency plan has failed or becomes impractical.

312.7.2 INJURED ANIMALS

With the approval of a supervisor, a member may euthanize an animal that is so badly injured that human compassion requires its removal from further suffering and where other dispositions are impractical (Penal Code § 597.1(e)).

Injured animals (with the exception of dogs and cats) may only be euthanized after a reasonable search to locate the owner has been made (Penal Code § 597.1(b)). Injured dogs and cats found without their owners shall be taken to an appropriate veterinarian for determination of whether they should be treated or humanely destroyed.

312.5 SAFETY CONSIDERATIONS

Members shall maintain the highest level of safety when handling firearms and shall consider the following:

a*.Members shall not* ***unnecessarily display*** *or* ***handle*** *any firearm.*

b*.Members shall be governed by all rules and regulations pertaining to the use of the range and shall obey all orders issued by the Weapons Training Unit Supervisor. Members* ***shall not dry fire*** *or* ***practice quick draws except when conducted in a safe manner with an unloaded weapon.***

c*.Members* ***shall not clean, repair, load or unload a firearm anywhere in the Department, except where clearing can be done safely. Whenever possible a clearing barrel shall be used.***

d*.Shotguns or rifles removed from vehicles or the equipment storage room shall be loaded and unloaded in the parking lot and outside of the vehicle, using clearing barrels.*

e*.Members* ***shall not place or store any firearm or other weapon on department premises except where the place of storage is locked.*** *No one shall carry firearms into the jail section or any part thereof when securing or processing an arrestee, but shall place all firearms in a secured location. Members providing access to the jail section to persons from outside agencies are responsible for ensuring firearms are not brought into the jail section.*

f.Any firearm authorized by the Department to be carried on- or off-duty that is determined by a member to be malfunctioning or in need of service or repair shall not be carried. It shall be promptly presented to the Department or a Weapons Training Unit Supervisor approved by the Department for inspection and repair. Any firearm deemed in need of repair or service by the Weapons Training Unit Supervisor will be immediately removed from service. If the firearm is the member's primary duty firearm, a replacement firearm will be issued to the member until the duty firearm is serviceable.



- Treat all firearms as if they are loaded

- Be sure of your target and what is beyond it

- Never point a gun at anything you aren't willing to destroy

- Keep you finger off the trigger until your firearm is on target

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Range Rules

1. After weapons have been grounded, and the line has been called safe by an instructor do not touch the weapon until all students are back from their targets, and the instructor has given the okay.
2. If a problem arises on the line, raise your non-gun-hand to summon an instructor.
3. Everyone has the authority to call a “Cease Fire” if they recognize anything unsafe.
4. No ammunition in the cleaning room.

Range Rules

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2. If a problem arises on the line, raise your non-gun-hand to summon an instructor.
3. Everyone has the authority to call a “Cease Fire” if they recognize anything unsafe.
4. No ammunition in the cleaning room.

History and development of the AR-15



Video “History of the AR-15” (5 min)



Early reliability problems in 1960's were primarily caused by US Army "sole source" switch to "ball powder" which the M16 was not designed around. This created a dirtier burning powder and created more fowling. This was solved through switching to slightly better burning ball powder, adding a forward assist and chrome lining the chamber and barrel.

How the rifle operates



Video “AR-15 Cycle of Operation” (5 min)

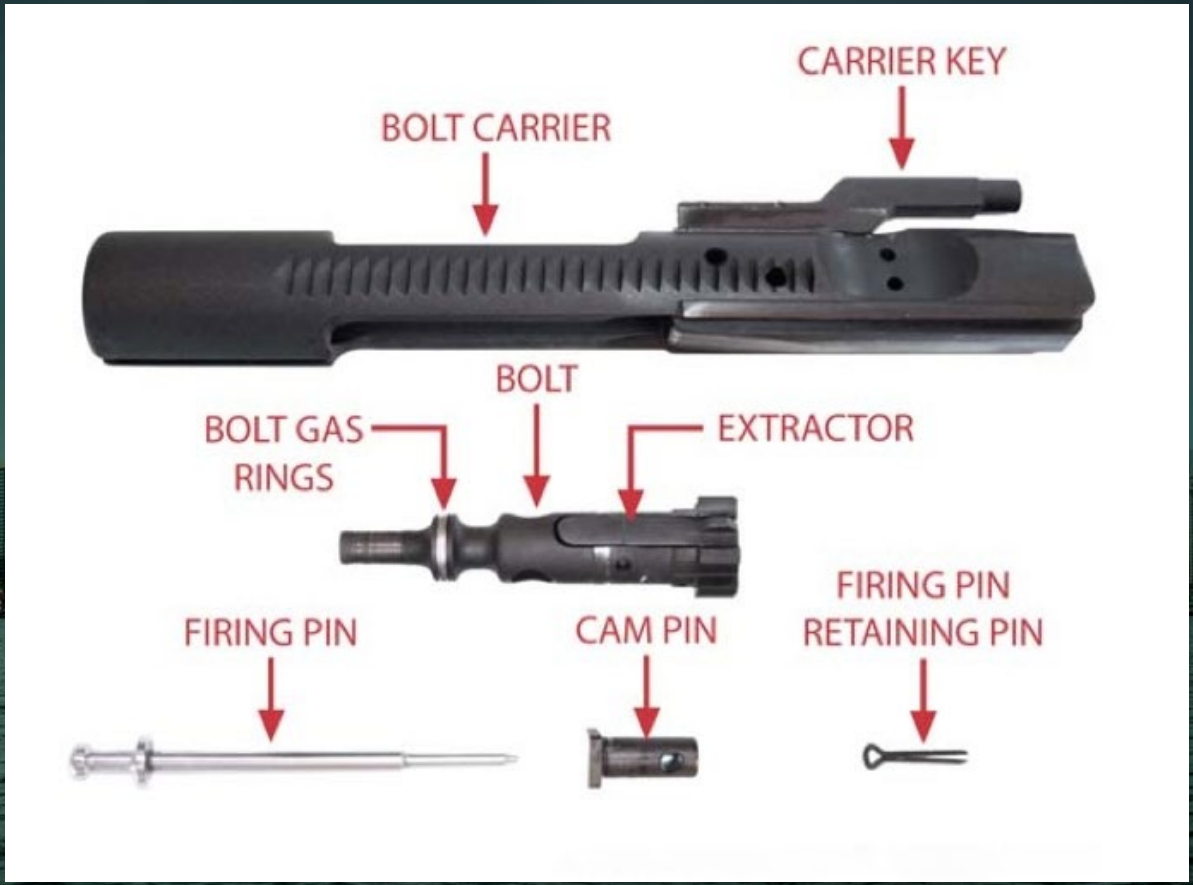
Nomenclature



Nomenclature

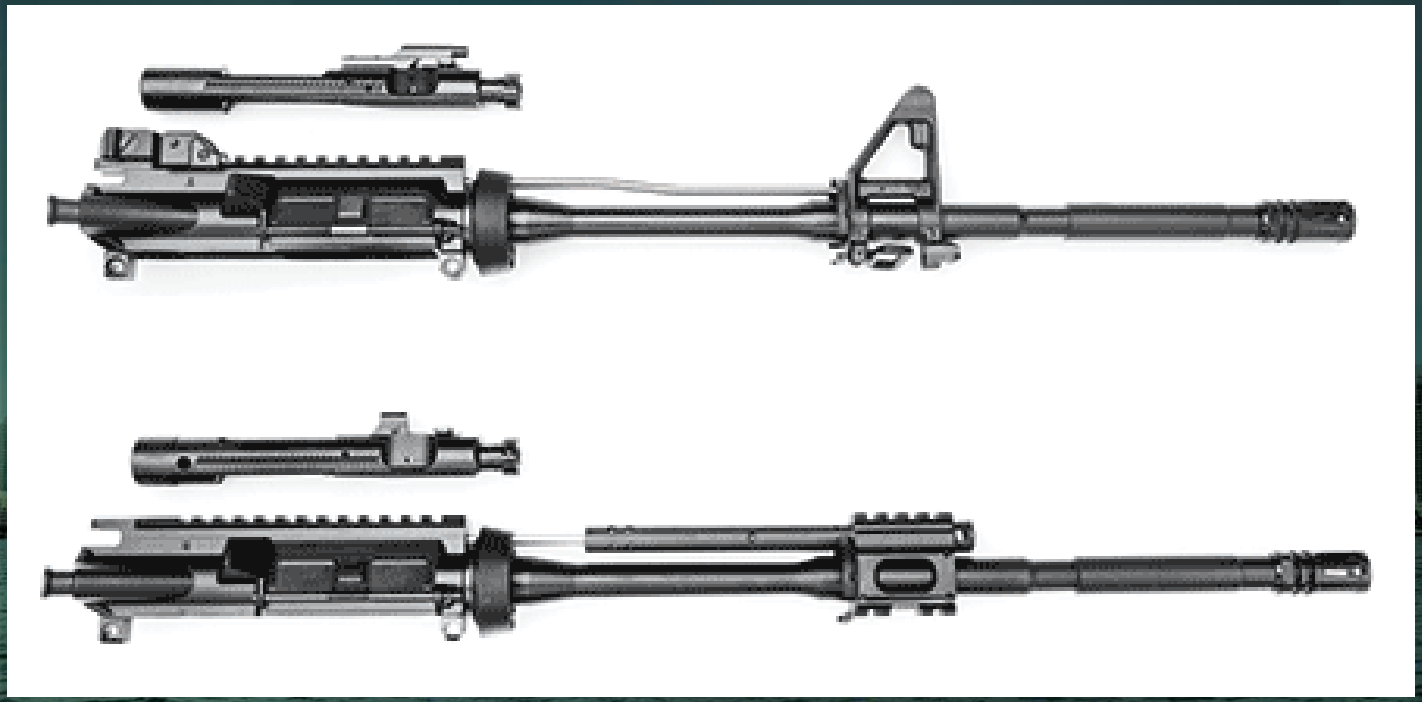


Nomenclature



Bolt carrier assembly

Nomenclature



Gas Tube “Direct Impingment” (Top) vs. Piston (Bottom)

Nomenclature

Slings and Sling Attachment Points



Viking Tactics Two Point



Magpul MS3



Haley Strategic D3 Sling

Nomenclature

Rails and accessories









Specifications



Colt AR-15 (Model 6940)

Barrel Length: 14.5 inch
Overall Length: 35” extended/ 32” collapsed (6 position CAR stock)
Caliber: 5.56x45 mm (also .223 caliber)
Magazine Capacity: 30 round – detachable magazine
Weight (empty): 6.67 pounds
Type of Sights: A2 front post, Adjustable dual aperture rear sight (picatinny rail)
Optic: Aimpoint PRO (Patrol Rifle Optic) 30,000 hour battery life
Approximate Muzzle Velocity: 2588 feet per second (Duty ammunition from 14.5in barrel)

Capabilities

Maximum Range: About 4000 yards (2 ¼ miles)

Maximum Effective Range: About 550 yards (velocity down to about 1300 feet per second)

14.5" 64gr Speer Gold Dot								
Range (yd)	Drop (in)	Drop (MOA)	Windage (in)	Windage (MOA)	Velocity (ft/s)	Mach (none)	Energy (ft•lbs)	Time (s)
0	-1.5	***	0	***	2601.4	2.297	961.5	0
25	-0.6	-2.2	0.1	0.3	2524.3	2.229	905.4	0.029
50	0	0	0.3	0.6	2448.6	2.162	851.9	0.059
75	0.2	0.3	0.7	0.9	2374.1	2.096	800.8	0.091
100	0	0	1.3	1.2	2300.9	2.032	752.2	0.123
125	-0.5	-0.4	2	1.6	2228.9	1.968	705.9	0.156
150	-1.5	-1	3	1.9	2158.2	1.906	661.8	0.19
175	-3	-1.7	4.1	2.3	2088.7	1.844	619.9	0.225
200	-5	-2.4	5.5	2.6	2020.6	1.784	580.1	0.262
225	-7.5	-3.2	7	3	1953.9	1.725	542.4	0.3
250	-10.6	-4.1	8.8	3.4	1888.5	1.668	506.7	0.339
275	-14.3	-5	10.9	3.8	1824.6	1.611	473	0.379
300	-18.6	-5.9	13.2	4.2	1762.3	1.556	441.3	0.421
325	-23.7	-7	15.7	4.6	1701.6	1.503	411.4	0.464
350	-29.5	-8	18.5	5.1	1642.6	1.45	383.4	0.509
375	-36.1	-9.2	21.6	5.5	1585.4	1.4	357.1	0.555
400	-43.5	-10.4	25	6	1530.2	1.351	332.7	0.604
425	-51.9	-11.7	28.8	6.5	1477	1.304	310	0.654
450	-61.3	-13	32.8	7	1426	1.259	288.9	0.705
475	-71.8	-14.4	37.1	7.5	1377.4	1.216	269.6	0.759
500	-83.4	-15.9	41.8	8	1331.2	1.175	251.8	0.814

Capabilities

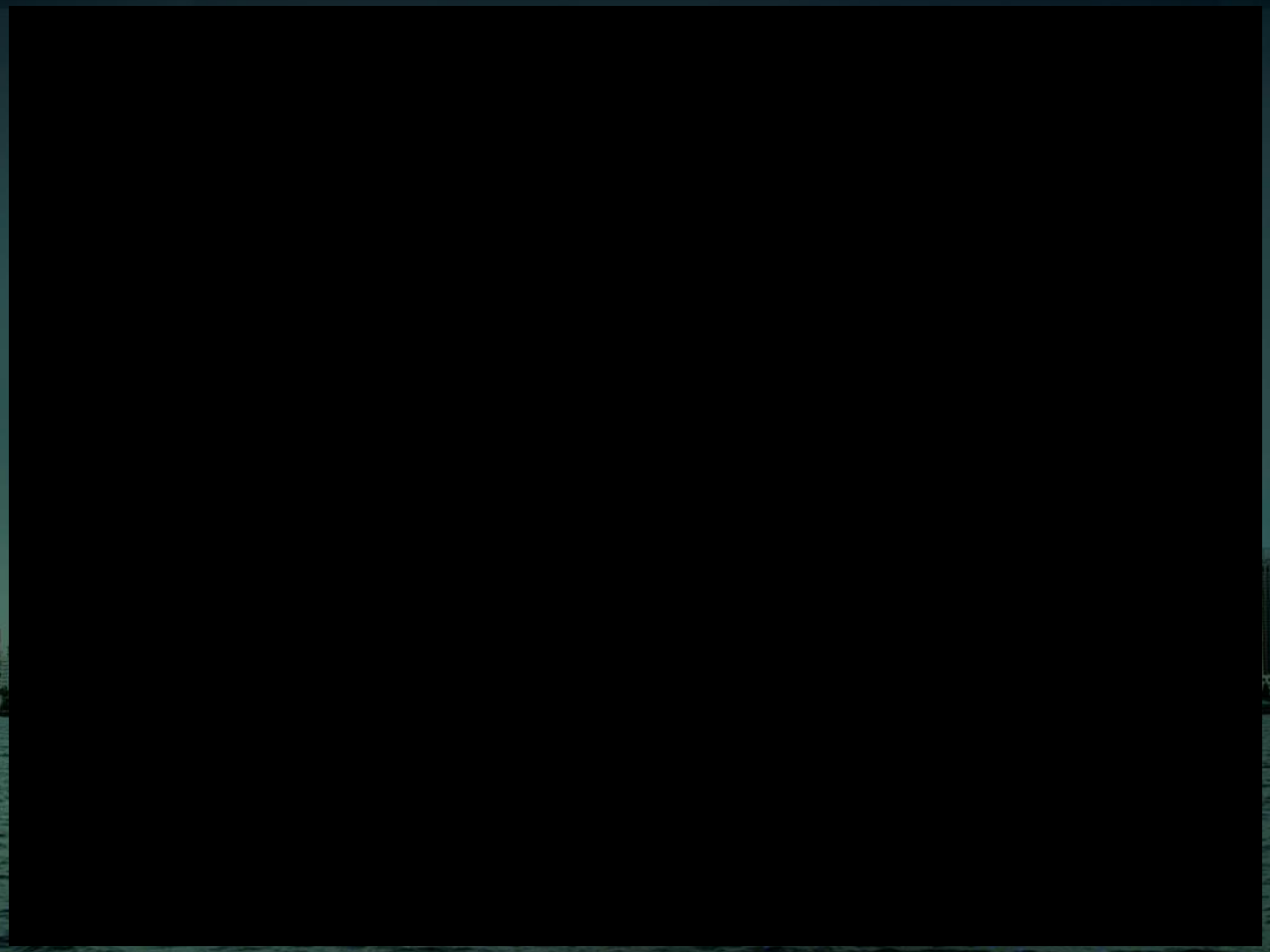


Penetration of Soft Body Armor: Level 2 armor through 3a
Will not penetrate level 3 or 4 (rifle plates)

Capabilities

Full/Semi-Automatic
- Full auto is beneficial for area fire (military application)
- Full auto is good to suppress adversaries (pin down)
- Full auto is beneficial for very close targets
- Without training Full auto can be difficult to account for every round fired/ every round on one target

Capabilities



Video “Lena miculek-Afentul Full-Auto” (17 secs)

Limitations

- Two hands required.
- Harder to “Go Hands-On”.
- Cumbersome (can’t holster it).
- Potentially more cumbersome to carry magazines on the body in patrol.
- Limited penetration of intermediate barriers (vehicles, buildings).

Ballistics



Video “Firearm Science” Bullet Trajetory (3mins)

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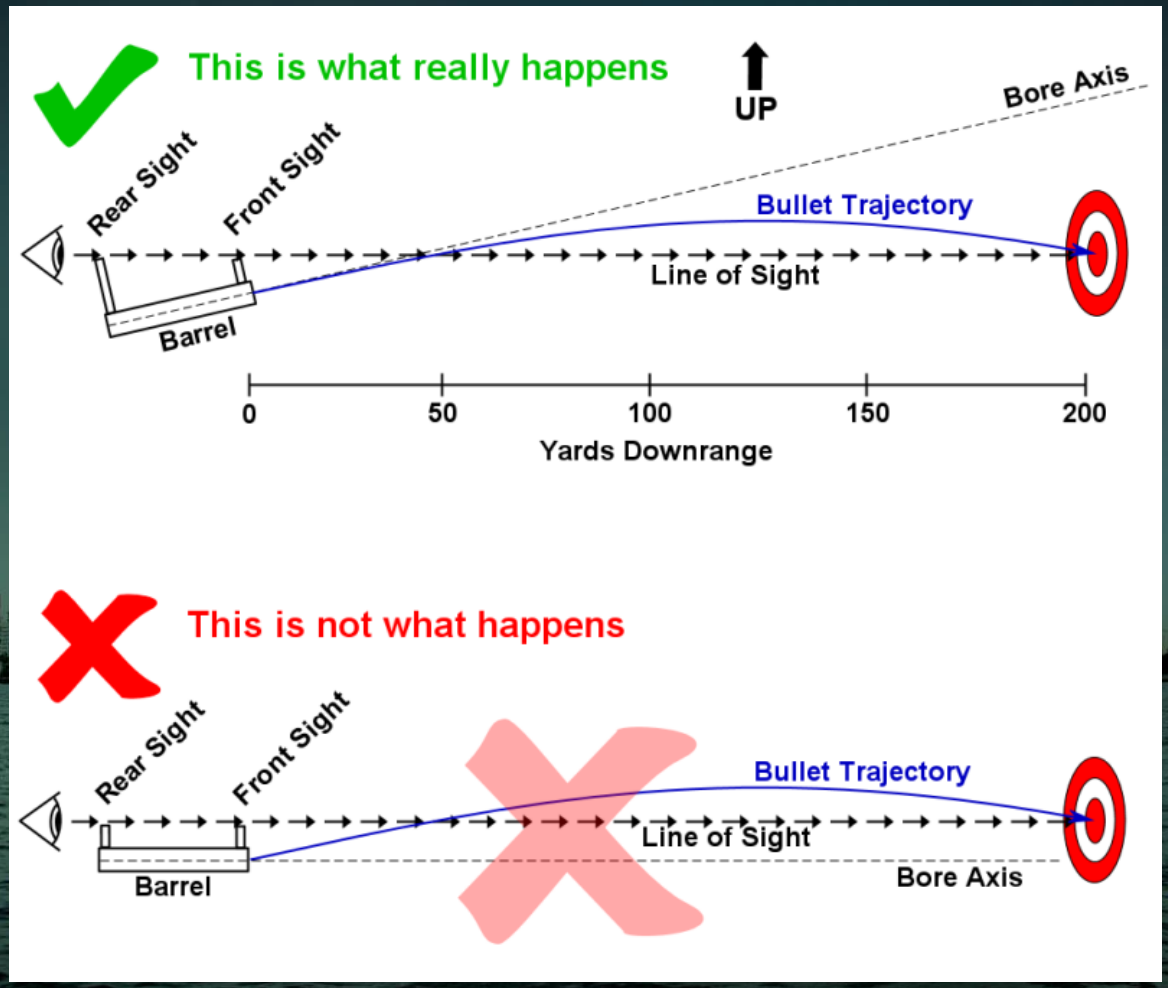
External Ballistics



Varies with ammunition used and barrel length

50 yard zero – why do we zero at 50 yards?

Terminal ballistics



62gr Speer Gold Dot 19inches of penetration

What are preferred terminal ballistics for law enforcement rifle?

- Significant energy/ range increase compared to pistol
- Rapid incapacitation
- Will not over penetrate target
- Varies with caliber (.40 cal vs .223 vs .308)
- Varies with ammunition used (FMJ vs soft nose)

Terminal ballistics



Significantly affected by intermediate barriers

- Structures (wood, metal, concrete, glass)
- Vehicles (Sheet metal, frame metal, windshield, tempered glass)

Terminal ballistics



Effects on tissue

- FMJ vs soft nose rounds
- Soft nose generally does not over penetrate
- Soft nose creates “Snow Storm” appearance on X-ray
- Impact to head may be explosive due to High Velocity shock wave
- Tangential impact to head less likely (than pistol) to ricochet

Hands On

Disassembly
- Take down pin
- Remove bolt carrier assembly
- Disassemble bolt carrier assembly

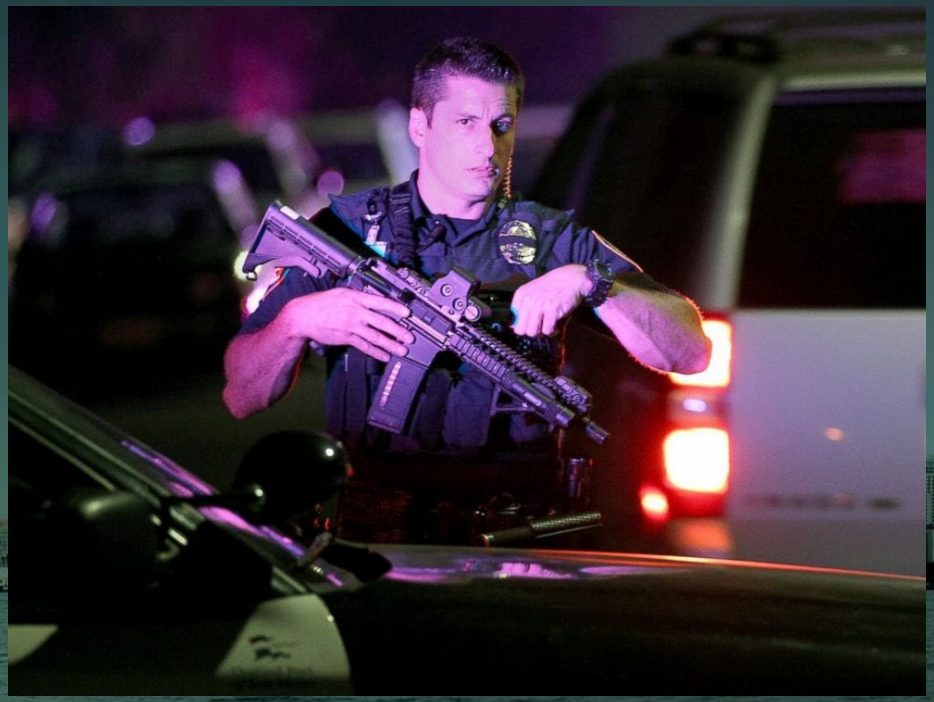
Cleaning- remove carbon, don't over-clean
- Bolt carrier assembly
- Receiver
- Chamber/ lugs
- Barrel

Lubrication- identify wear points
- Bolt carrier assembly
- Receiver

Protection- understand what can corrode
- Know your environment (coastal vs desert)
- Do not over lubricate (can attract dirt)
- Thin coat



Tactical Considerations



- Based on agency guidelines and training
- Must pass qualification
- Only deploy when authorized per policy

Tactical Considerations





Physical environment

- Be aware of cover and concealment

Tactical Considerations



The Rifle is a useful resource in a team environment (arrest team, long rifle)

Tactical Considerations





Rifle caliber rounds will penetrate soft body armor…(yours or theirs!).

- Consider a plate carrier
- The Patrol Rifle affords the opportunity to maintain safe distances to adversaries.
- Deploy at distances where you have the advantage
- The Patrol Rifle affords an increased effective range over the service shotgun and handgun.

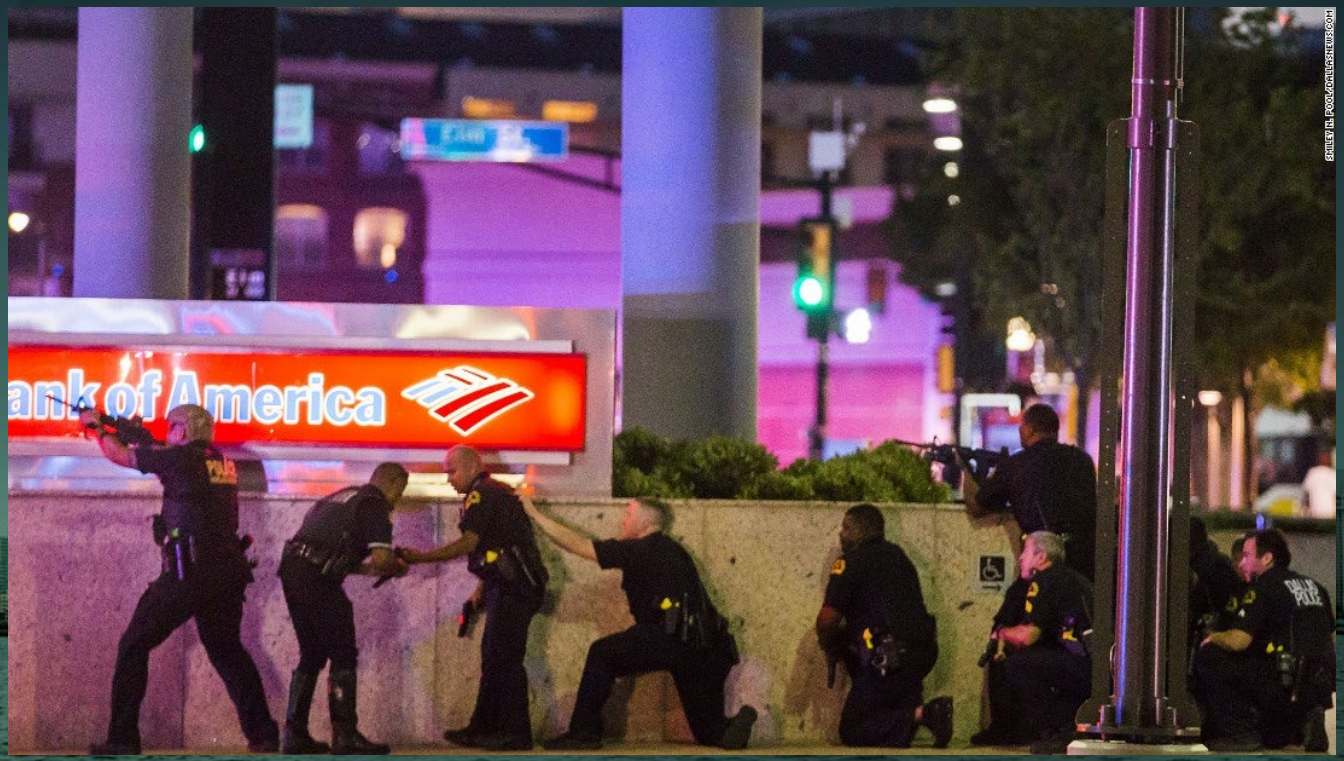
Tactical Considerations



Patrol Rifle vs Shotgun

- Rifle has greater accuracy.
- The Patrol Rifle is easier to load and re-load than a service shotgun.
- The Patrol Rifle has a larger ammunition capacity than a service shotgun.

Shooting Decision



- Know your abilities and limitations, and those of your weapon.
- Exercise fire discipline within agency guidelines and the parameters of applicable State and Federal laws.
- We are accountable for every shot fired
- Just because you CAN shoot does not always mean you SHOULD



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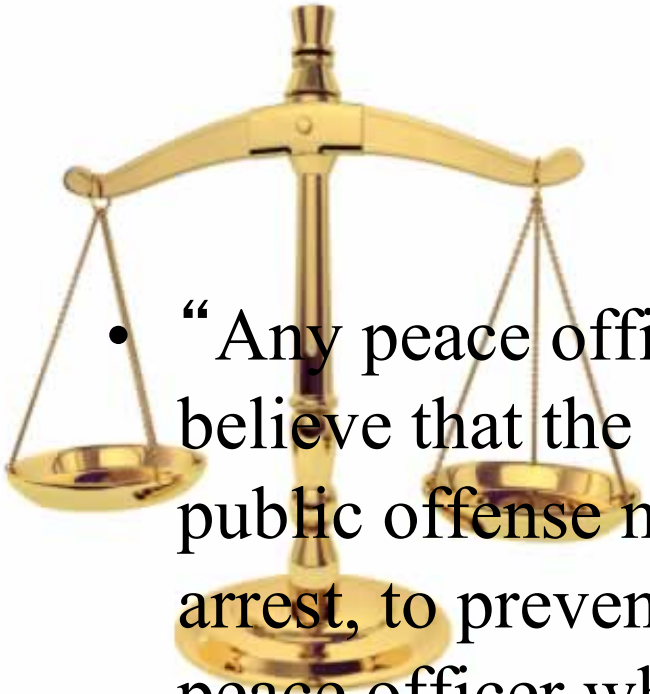
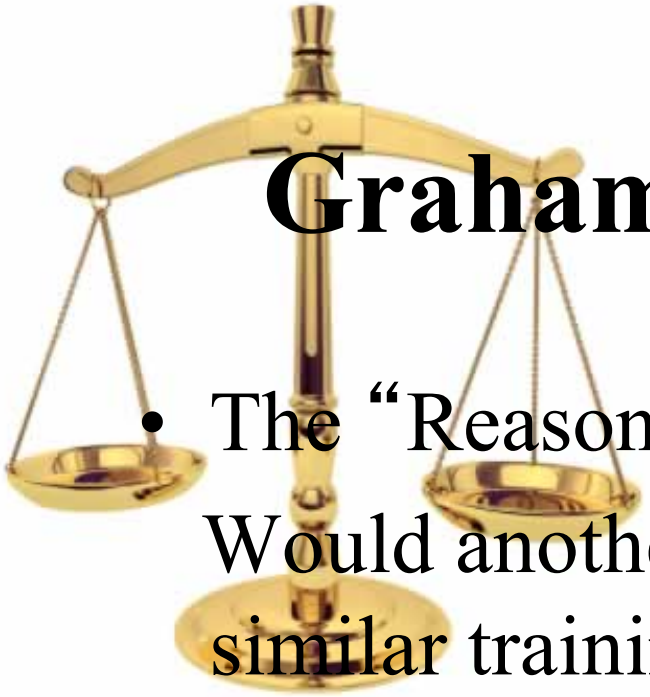
Use of Force Law



835(a) P.C.

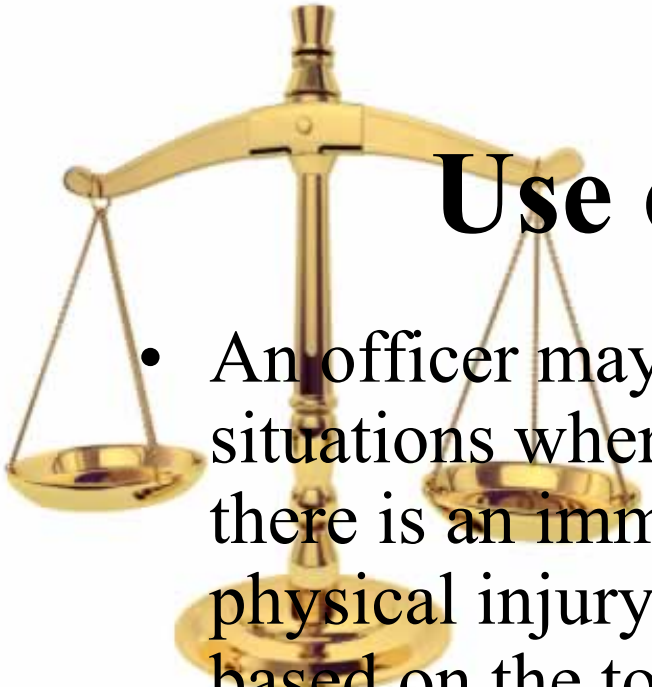
- “Any peace officer who has reasonable cause to believe that the person to be arrested has committed a public offense may use reasonable force to effect the arrest, to prevent escape or to overcome resistance. A peace officer who makes or attempts to make an arrest need not retreat or desist from his efforts by reason of the resistance or threatened resistance of the person being arrested; Nor shall such officer be deamed an aggressor or lose his right to self-defense by use of reasonable force to effect the arrest or to prevent escape or to overcome resistance.”



Graham vs. Connor (1989)

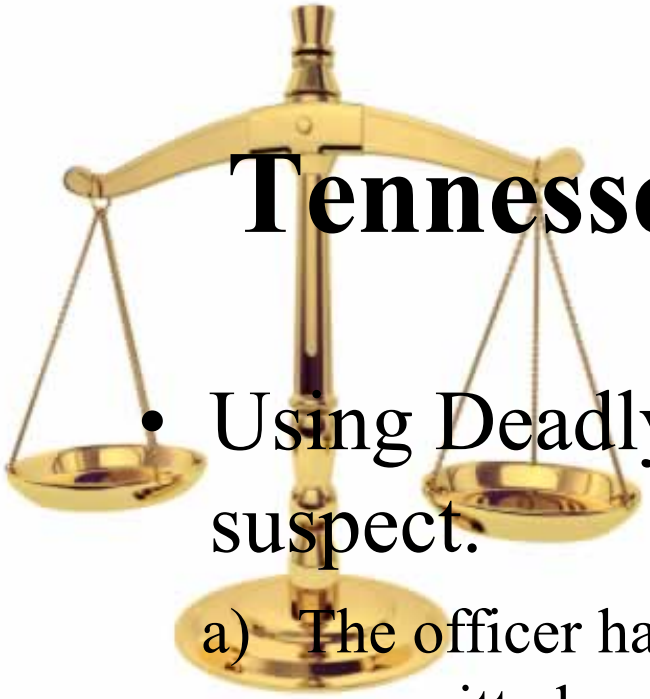
- The "Reasonable Officer Standard."

  Would another officer with the same or similar training and experience facing like or similar circumstances act in the same way or use similar judgment. Does not require the best decision, only a reasonable decision.



Use of Deadly Force

- An officer may employ deadly force only in those situations where the officer reasonably believes there is an imminent threat of death or serious physical injury to the officer or another person, based on the totality of the circumstances known to the officer at the time. An officer need not wait for an actual threat by another person in order to resort to deadly force. Rather, the officer's decision to employ deadly force will be based on the reasonableness of the officer's action based on the totality of circumstances known to the officer at the time.



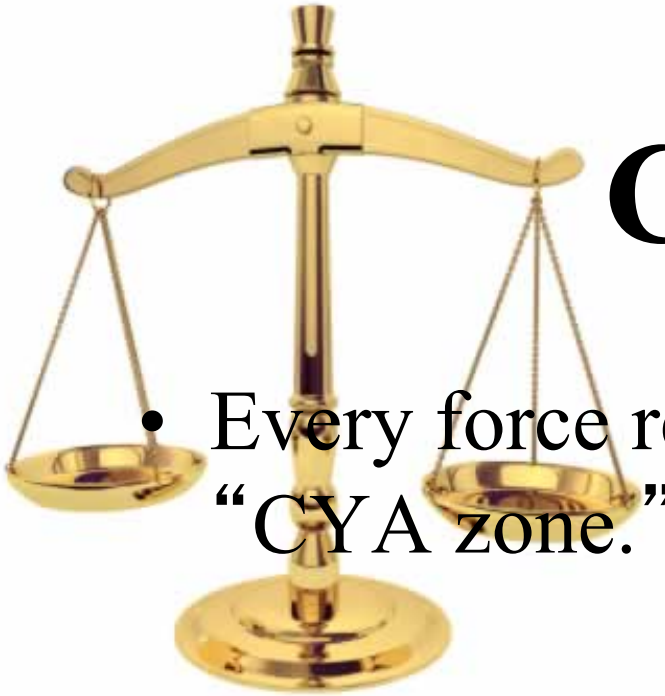
Tennessee vs. Garner (1985)

- Using Deadly force in the case of a fleeing suspect.

a) The officer had probable cause to believe the suspect committed a crime of violence or threatened violence **AND**,

b) The suspect was armed, **OR** presented an extreme danger to arresting officers, future arresting officers, or to the public should the arrest be delayed **AND**,

c) A WARNING is given prior to the use of deadly force, if feasible.



CYA Zone

- Every force response puts an officer into the "CYA zone."
- CYA for law enforcement, means;

"Can you articulate?"