

# **“Boat Crew Coordination and Risk Management”**

Provided for:

## **MOTORBOAT OPERATOR TRAINING COURSE**



## **Professional Boat Crew Standards and Guidelines**

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These operational guidelines were developed using excerpts from the USCG Boat Crew Seamanship and Team Coordination Training Manual. This information is solely available for non-profit re-production distribution and education.

## **Crew Coordination and Risk Management**

**Introduction:** This section addresses human error and risk based decision-making. Both greatly affect the safety of boat operations. Human error has been and continues to be a significant cause of boat mishaps. Ineffective risk management has placed many boats and crews at greater risk than necessary.

Technical knowledge and skill alone cannot prevent mishaps. It also takes teamwork that recognizes, minimizes, and corrects human errors and a systematic process to continuously assess and manage safety risks. Prudent seamen have exhibited and human performance researchers have described critical skills that reduce the potential for human error-induced mishaps.

These skills are important processes that serve to;

- Mitigate Safety Hazards
- Maintain Situational Awareness
- Manage Risks
- Improve TEAM Performance and Effectiveness.

**These critical skills are collectively titled “Crew Coordination”.**

The processes are:

- Risk Management Planning
- Crew / Mission Briefing.
- Mission Performance
- Crew / Mission Debriefing.

This section discusses the use of team coordination, risk management, crew briefing, and crew debriefing as part of standard boat operations. It describes the skills, human performance standards, operator responsibilities and training requirements for each. It also describes the risk management, crew briefing and crew debriefing processes.

To promote these skills and processes, performance in team coordination shall be assessed as part of crew debriefings, for team readiness assessments.

**In this Section:**

- A. Team Coordination**
- B. Team Coordination Standards**
- C. Risk Management Process**
- D. Crew Briefing and Debriefing**

**Section A. Team Coordination:** A team is a collection of people that uses the technical abilities of its members to achieve a common mission. This section discusses how team coordination can:

- **Manage Human Error.**
- **Manage Safety Risks.**
- **Process for on going TEAM Performance Improvements.**

#### **A.1. Members of the Team:**

The boat crew consists of the operator and crewmembers as a team. But it also is a part of a larger team. Boat crews seldom perform missions without interacting with other people.

**Members of this larger team are:**

- Unit Director
- Project Manager
- Supervisors
- Colleagues
- Support Staff
- Government Agencies
- General Public

The **Mission** is the reason for getting the boat underway!

#### **A.2. Operator:**

The operator wears two hats as:

- The person in charge of the boat team.
- A member of the larger team.

**NOTE:** Because the majority of boat missions have inherent safety risks, effective coordination of the boat team and the larger team is a cornerstone for mishap prevention.

#### **A.3. Team Coordination Skills:**

Proper use of team coordination tools requires team members, operator, and boat crew to routinely use all crew coordination skills all the time. The skills are the good habits of exemplary leaders.

They have been tested within complex missions, under ever changing conditions, and when crew stress and safety risks were high. When crew coordination and risk management tools are properly used, an adequate safety margin for mission operations can be maintained.

## **Crew Coordination Skills Description:**

### **Leadership:**

- Directing and guiding the activities on the boat.
- Stimulating the crew to work together as a team.
- Providing effective performance feedback to the crew.

### **Mission Analysis:**

- Making Plans.
- Mitigating Risks.
- Organizing Materials and Briefing the Crew.
- Assigning- Roles and Tasks.
- Monitoring- Mission Effectiveness.
- Adaptability and Flexibility
  - Altering a course or action to meet changing demands.
  - Managing stress, workload and fatigue
  - Maintaining nutrition and fitness for optimal performance levels.
  - Respecting others roles to work effectively within a TEAM.

### **Situation Awareness:**

Knowing at all times what is happening to:

- Boat
- Crew
- Environment
- Mission

### **Decision-Making:**

Applying, ALL the available information needed to make informed sound judgments' for Safe, Legal, Effective operations.

- Experience
- Training
- SOP's
- Local Knowledge

### **Communication:**

Clearly and accurately sending and acknowledging information, instructions and commands, as well as providing useful feedback.

### **Assertiveness:**

Actively and respectfully participating in problem-solving, by stating and maintaining a position unless convinced by the facts that there is a better position.

- Asking Questions
- Speaking Up
- Taking Action when it is appropriate.

## **Section B. Team Coordination Standards:**

**Introduction:** Team coordination standards identify expected behaviors among the mission coordinator, coxswain, and crew. They are necessary to affect safe mission performance. These standards represent the expected performance in all missions.

Operator responsibilities represent the minimum required actions of a boat Operator to achieve crew coordination and risk management.

### **In this Section: Effective Mission Skills**

- Leadership
- Mission Analysis
- Adaptability and Flexibility
- Situation Awareness
- Decision-Making
- Communication Standard
- Assertiveness

### **Leadership Skill:**

**1) Boat Crew Responsibilities:** The following outline the skill of leadership for a boat crew.

- The boat crew respects each other.
- The climate is an open one, where the crew is free to talk and ask questions about the mission.
- Regardless of title, the individual with the most information about the situation-at-hand is allowed to participate in mission decisions.
- When disagreements arise, the crew respectfully and directly confronts the issues.
- The primary focus is on solutions to problems.
- The process and solutions are reasonable.
- Problem resolution ends on a positive note.

**2) Operator Responsibilities:** The following outline the operator's supervisory responsibilities to the crew.

- Be in charge and give clear and understandable direction to the boat crew.
- Monitor crew safety and progress.
  - If unable to monitor safety, a designated safety observer should be appointed.
- Balance and monitor crew workload to manage crew stress.
- Remain approachable and open to ideas and suggestions.
- Update the crew on significant mission changes.
- Provide to the crew with timely, specific and constructive performance feedback.
- Provide to the Project Manager / Float Plan Holder with timely updates.

### **Mission Analysis Skill:**

**Boat Crew Responsibilities:** The following procedures outline the crew responsibility to mission analysis:

- Understand the mission objective.
- Discuss a plan for the mission.
- I.D. Potential Hazards.
- Take the Time to:
  - Assess risks.
  - Eliminate unnecessary risks.
  - Mitigate specific risks.
- Listen to Suggestions
- Know mission specific tasking and specific roles.
- Emergency management planning is communicated by operator.

**Operator Responsibilities:** The following procedures outline the operators' responsibility to mission analysis.

- Discuss mission objectives and hazards with the supervisor and crew.
- Understand level of risk that the mission has, limitations level of risk the operator is willing/authorized to take.
- Take no unnecessary risks and emergency management strategies in place.
- Brief the crew on mission objectives and the plan.
- Promote open discussion amongst the crew.
- Update plans based on changes in the situation and/or mission objectives.
- Debrief the crew on mission performance; identify areas for improvement.

### **Adaptability and Flexibility Skill:**

**Boat Crew Responsibilities:** The following points outline the standards of adaptability and flexibility for a boat crew.

- Distractions are avoided, the crew checks each other for;
  - Fixation
  - Tunnel Vision
  - It takes positive action to regain situation awareness.
- Decide what information and activities are mission essential.
  - Non-essential information is set aside.
- Crew tasks are prioritized to ensure safe performance.
- The boat crew is aware of each other's workload.
- When a crewmember appears overloaded, the workload is redistributed.
- The crew is alert to possible fatigue, complacency, or high stress moments.

**Operator Responsibilities:** The following points outline the standards of adaptability and flexibility for the operator.

- Remain aware of own stress and own hazardous thought patterns.
- Take positive action to counter subconscious tendencies to react to the excitement of the moment or arbitrarily discard information that conflicts with own perceptions.
- Implement cross-checks of operator and crew actions to combat the affects of fatigue.
- Remain alert to the effects of complacency and high stress on the crew.
- Take positive action to manage crew stress.
- Remain alert to work overload within the crew, and redistribute work as necessary.
- Notify the Supervisor if the physiological condition of the crew becomes a safety concern.

### **Situation Awareness Skills:**

**Boat Crew Responsibilities:** The following procedures outline the standards of situation awareness for a boat crew.

- The crew is aware of the mission status and maintains an effective lookout.
  - Current operations
  - Perceived location
- Changes to situation awareness are verbalized.
- Recognizing that a risk decision or action must be made.
- Offers suggestions or information to the operator / crew.
- If the crew perceives the boat operator or crew is taking unacceptable risks, positive action is taken to control the situation.
  - Stopping or slowing boat activities
  - Providing additional assets
- The boat crew checks each other's task performance for errors.
- Anyone who makes a mistake is informed and makes needed corrections.

**Operator Responsibilities:** The following procedures outline the standards of situation awareness for the operator.

- Not get underway without an understanding of the mission objective, the known risks, and a plan of action.
- Ensure that the crew understands the mission plan and assigned tasks.
- Remain alert to mistakes in planning and crew errors, empower the crew to double-check the operator's decisions and actions.
- Remain vigilant to changes in the situation.
- Remain alert for conflicting or ambiguous information that may indicate that the perceived situation is different than the actual one.
- Periodically update the supervisor and the crew; ask for big picture perspective.

## **Decision-Making Skills:**

**Boat Crew Responsibilities:** The following points outline the standards of decision-making for a boat crew.

- Crew decisions reflect a willingness to use available information from all sources.
- Decisions are timely, steps are taken to minimize stress.
- Decisions are appropriate for the situation; a crew may overlook options or discount risk.
- The boat crew does not exhibit hazardous thought patterns.
  - Anti-authority
  - Invincibility
  - Impulsiveness
  - Machismo
  - Resignation
- Before the operator implements a change in the objective, the situation may worsen; however, mission accomplishment is not affected and no loss occurs.

**Operator Responsibilities:** The following points outline the standards of decision-making for the operator.

- Assess current situation and available information to determine ability to meet mission objectives.
- Make use of available time to develop contingencies or alternative courses of actions.
- Consciously weigh the risks versus the gains.
- Implement the best contingency or action to address the situation.
- Monitor the situation to ensure the decision produces the desired outcome.

## **Communication Skills:**

**Boat Crew Responsibilities:** The following points outline the standards of communication for a boat crew.

- The boat crew and supervisor communicate about the mission as necessary.
- Standard terminology is used.
- Receivers acknowledge messages.
- Receivers ask questions when they do not understand.
- Senders pursue confirmation when there is no response.
- When changes to crew tasks occur, all hands are aware.
- The operator states risk decisions to the supervisor and crew.
- Time permitting, operator informs the crew of the reasons and any adjustments they have to make.
- Anyone may ask mission-related questions to clarify information.



## **Communication Skills: cont.**

**Operator Responsibilities:** The following points outline the standards of communication for the operator.

- Use standard terminology in giving commands to the crew.
- Ensure that information and instructions conveyed to the crew are acknowledged by the intended receiver.
- Communicate intentions associated with risks to the supervisor and the crew.

## **Assertiveness Skills:**

**Boat Crew and Operator Responsibilities:** The following points outline the standards of assertiveness for the operator and boat crew.

- The operator and crew occasionally raise questions about the plan or actions when they are either in doubt, or when they believe the boat is standing in danger.
- The questions are relevant to risk decision-making.
- The operator alerts the crew and/or supervisor coordinator when input is needed to make risk decisions.
- The crew or supervisor responds to the operator's request with pertinent, brief, and timely information.
- Entire crew remains open to questions about the mission.
- Recommendations and suggestions are listened to critically with an open mind.
- Make requests for task assistance when crew is overloaded.
- Speak up when an error or poor judgment is perceived, or the level of risk has changed.
- Mission is beyond the capabilities of the boat.
- Crew has become fatigued.
- Encourage input and feedback from the crew.
- Treat questions and concerns of the crew with respect.

## **Section C. Risk Management Process:**

**Introduction:** Risk management shall be performed during the planning and execution of missions. Risk management is an element of the mission analysis skill and is a process to identify and control unacceptable safety risks. Every mission event (getting underway, transit, on-scene operations, and mooring) has some level of risk and not all of the risks are known.

Every event requires that risks are kept within controls (safeguards) that have been designed to handle them. Examples of these controls include the proper use of installed communications and navigation systems and proper execution of operating procedures. Effective risk management is highly dependent upon technical knowledge and experience.

**Four Rules of Risk Management:** To use the risk management process correctly, the team should follow the four rules.

**Rule #1: Integrate risk management into all mission planning and execution.**

- Risk management is a repetitive and continuous process.
- Risk management is most effective when it is proactive.
- It requires that when new information on risks is received, the ability to control those risks is reviewed.
- It requires the operator and crew to remain vigilant and think safely until the boat is secured and the mission is over.

**Rule #2: Accept no unnecessary risks.**

- Unnecessary risk does not contribute to the safe accomplishment of the mission.
  - Operating beyond the known capabilities of the crew and/or boat.
- Unnecessary risks are often taken when decision-makers rationalize that the boat is the only alternative or that urgency is more important than safety.
- Unnecessary risk taking constitutes gambling with lives and government/private property.

**Rule #3: Make risk decisions at the appropriate level.**

- Many times mishaps occur because the level of risk is not perceived by an individual.
- Understanding of risk is highly dependent upon technical knowledge and experience and expertise.
- Risk decisions must be made by clear-thinking, technically competent people with an understanding of the situation.
- The supervisor, operator and crew should work as a team in making risk decisions.

**Rule #4: Accept risks if benefits outweigh costs.**

- Eliminating unnecessary risk.
- Understand acceptable risks for mission accomplishment.
- He/she who owns the mission owns the risk.
- Some cases, mission directives outline what is acceptable (risking personnel injury and equipment damage to save lives).
- High stress situations, the line between acceptable and unacceptable may become fuzzy.
- Clear-thinking, technically competent people with an understanding of the situation must be involved in the risk decision.

**Risk Management Process:** Continuous risk management during the course of boat operations requires cycling through the following seven steps.

**Step 1:** Define the mission objective and tasks.

**Step 2:** Identify possible hazards to the boat and the crew, hazards include anything that could go wrong with the equipment, the environment, or the team.

- **Equipment:** Is the equipment functioning properly and can it be expected to function properly throughout the mission?
- **Environment:** How will the weather, sea conditions, proximity to shoals, vessel traffic, and available light affect the mission?
- **People:** Is the team properly trained and capable of handling the demands of the mission? Are they fatigued, complacent, or suffering from physical or mental stress?

**Risk Category Description:** The following risk categories should be used to facilitate discussion.

- **Planning:** Is there adequate time and information to develop a good plan? As the planning time increases and more information is available, the risk is reduced. As mission complexity increases, the time for planning should also increase.
- **Event Complexity:** The mission is made up of a chain of events. How complex are these events? Do they require significant know-how to perform? Many routine events are complex. As the event requires more know-how and attention to perform correctly, the possibility that something could go wrong increases. Event complexity can be greatly increased by darkness, and frequency of repetition which in turn increases risk.
- **Asset Selection:** Is the boat and this coxswain and crew best suited to perform this mission? Is the ready boat the right boat? The capability and readiness condition of the boat along with the qualifications, experience, and physiological condition (health and alertness) of the operator and crew must be compared to the event complexity and environmental conditions.
- **Communications and Supervision:**
  - *External communications and supervision* - Will the boat be able to maintain good communications with the supervisor or project manager? Will they be able to provide real-time oversight of boat activities to double-check for safety?

- **Communications and Supervision: cont.**
  - The less capable the communications, the higher the possibility that relevant information will not reach decision-makers.
  - Risk control may be less effective, double-checks will be more difficult.
- *Communications within the boat* - Can the crew hear orders over the ambient noise? Are they assertively communicating through accurate, bold, and concise statements?
  - Supervision of the boat crew, even if the boat crew is qualified to perform tasks, supervision by the operator can act as a control to further minimize risk.
  - The higher the safety risk, the more the operator needs to be focused on observing and checking. When operators are actively involved in doing tasks, they can be easily distracted and should not be considered effective safety observers in moderate to high risk conditions.
- *Environmental Conditions* - Are the current and forecasted conditions, in transit and on-scene, within the capability of the boat and the crew?
  - As the environment changes, risk controls need to be updated.

**Step 3: Risk Analyses:** It is a function of severity, probability and exposure.

- *Severity* describes the potential loss. Should something go wrong, what would be the injury to personnel or damage to equipment.
- *Probability* is the likelihood that the consequences described above will happen.
- *Exposure* is the amount of time people or equipment will be exposed to the hazard.

**NOTE:** Each risk category must be examined in terms of severity, probability, and exposure to arrive at a subjective rating of risk. Again, it is useful to discuss individual perceptions of risk among the crew and between the operator, supervisor and project manager.

### **Risk Category Description:**

**High Risk** - Risks cannot be managed with constant control.

- Loss in terms of personnel injury or equipment damage is expected.
- The boat and/or crew is operating beyond their capability.
- If the risk is acceptable or not is dependent upon the mission objective.
- High risk must be communicated to the supervisor or higher up.

**Medium Risk**- Risks are manageable with constant control.

- Loss is not expected if the situation remains stable, the crew adheres to all standard operating procedures, and boat systems respond as designed.
- The boat and/or crew are operating at their capability.

## **Risk Category Description: cont**

**Low Risk-** Risks are manageable with control as required.

- Loss is not expected because the mission has established margins of safety in place and the objective will be modified if the margins are reduced.
- The boat and/or crew are operating within their capability.
- Complacency is constant hazard for low risk operations.

**Unnecessary Risk-** Risks must be eliminated. What changes can be made to reduce risks to an acceptable level without changing the mission objective? This may be done by examining:

- Changes to the plan and operations tempo (ex. slowing the timeline).
- Command and control (ex. more guidance and/or supervision).
- Mission tasks (ex. simplifying).
- Timing of tasks (ex. sequential vice concurrent or daylight vice nighttime).
- Boat requirements or crew qualifications (ex. more capable or experienced).
- Number of assigned boats and/or crew (ex. additional boats, members).
- Required equipment and/or protective equipment.

**NOTE:** If the discussion of options is limited to those that can be provided by the boat, few are available. This step needs to evaluate the options the larger team can recommend to reduce risk. The larger team may have additional resources. The larger team may be able to spread out the risk among responders or transfer the risk to more capable assets.

**Step 5: Validation-** Did the project manager or supervisors validate that the risk assumed by the operator and crew is worth the mission objective? If risks seem unacceptable, can the mission objective be modified to reduce the risk to an acceptable level.

**Step 6: Go / No-Go Decision-** This decision implements the best option given the risks and gains. In executing the decision, the crew is made aware of what the expected outcome should be, or decides that the risk is still unacceptable.

**Step 7: Evaluate Effectiveness-** The outcome of the decision is measure;

- Did the action achieve the desired outcome?
- Are the risks within the mission changing?
- What lessons were learned, what resources are needed?
- How would we do it differently to achieve a better outcome?

## Section D. Crew Briefing and Debriefing

**Introduction:** Crew briefings should be required before the boat gets underway. Briefings for the operator and the crew help create a shared mental picture of what is expected to happen and strives to set rules for the mission.

Crew debriefings should be performed after missions. The debriefing is the best opportunity to evaluate performance and recognize individual and team accomplishment. When correctly performed, the debriefing can serve as a valuable tool for continuous performance improvement. It can show the way from just ‘doing things to knowing how to do “the right things right way”’.

**NOTE:** The GAR Model serves as an excellent template for “Crew Briefings.”

**Crew Briefing:** The crew briefing should be comprised of the following topics:

- **Supervision-** Leadership and Communications Goals
- **Planning-** Resources and Mission Objective.
- **TEAM Selection-** Duties, Roles and Responsibilities.
- **TEAM Fitness-** Personality, Attitude and Conditioning
- **Environment-** Natural and Human Hazards, Positive Climate for Teamwork.
- **Event & Evolution Complexity-** Duration, Frequency, Standards and Sequences.

**Crew Debriefing:** The informal crew debriefing should cover the following topics:

- Major Events.
- Level of Performance.
- Outcome of Events.
- Evaluation of Goals and Standards.
- Establishment of New Goals and Standards.

**Suggested Debriefing Content:**

- What was my experience from my perspective?
- What did others do that had an effect on my role and responsibilities?
- What did I do well that contributed the TEAM?
- What could I do differently in a similar situation?
- What lessons were learned, what resources are needed the next time?

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## National Department of Response

### Surface Operations Risk Calculation Worksheet

#### Calculating Risk Using the GAR Model

(**GREEN-AMBER-RED**)

This Worksheet should be used for all surface operations unless other GAR forms have been mandated by local OIAs.

**GAR IS BASED ON A TEAM DISCUSSION TO UNDERSTAND AND EVALUATE THE RISKS ATTENDANT TO A MISSION AND HOW THEY WILL BE MANAGED.**

**RISK MANAGEMENT IS WHAT IS IMPORTANT; NOT THE ABILITY TO ASSIGN NUMERICAL VALUES OR COLORS TO RISK ELEMENTS.**

Assign a risk code of 0 (For No Risk) through 10 (For Maximum Risk) to each of the six elements below. The discussion should start with the junior (least experienced) members first on each category.

<b>Supervision</b> - qualifications / experience / communications	
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<b>Planning</b> - details / clarity / vessel selection and condition	
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<b>Team Selection</b> - qualifications / experience	
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<b>Team Fitness</b> - physical / mental state	
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<b>Environment</b> - seas / visibility / wind / current / temperatures	
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<b>Event/Evolution Complexity</b> - details / tasks	
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<b>Total Risk Score</b>	
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GAR Evaluation Scale - Color Coding the Level Of Risk		
0	23	44
10	20	30
GREEN (Low Risk)	AMBER (Caution)	RED (High Risk)

If the total falls in the green zone, risk is at a minimum. If the total falls in the amber zone, risk is moderate and you should consider adopting procedures to minimize risk.

**IF THE TOTAL FALLS IN THE RED ZONE, YOU NEED TO IMPLEMENT MEASURES TO REDUCE THE RISK PRIOR TO STARTING THE EVENT/EVOLUTION.**

**THE GAR MODEL SHOULD BE USED AS PART OF PLANNING OPERATIONS, AND SHOULD BE CONTINUALLY REASSESSED AS WE REACH MILESTONES WITHIN OUR PLANS, OR AS ELEMENTS CHANGE.**

## Afloat Risk Assessment and Management Instructions

It is vital to the safety of the crew and to the success of the mission that the coxswain and crew understand and evaluate the full impact of risk versus gain for each tasking. This must be a continuous, systematic process of identifying and detecting hazards, assessing risk, and implementing and monitoring risk controls.

1. Using the worksheet on the opposite side, review each of the Risk Factors and assign a numerical score as indicated. Score each element according to currently available information. Score items according to the examples given and your instincts. Absence of data automatically sets the score to maximum point value. To identify hazards, consider:

**P**lanning

**E**vent Complexity

**A**sset Selection (including Personnel and Equipment)

**C**ommunications (and Supervision)

**E**nvironmental Conditions

2. Consider the effects of environment on the ability to maintain communications throughout mission, both internal w/crew and external w/unit. Consider the condition of the vessel and associated equipment as factors in the mission environment.
3. If Risk Assessment is determined to be excessive, review the *Control Options* and determine if the risks can be reduced or controlled.

Below are *Control Options* to assist in risk control or reduction.  
Review the options and reassess the risks as appropriate.

**S**pread-out – Disperse the risk by increasing the time between events or using additional assets.

**T**ransfer – If practical, locate a better-suited asset to conduct the mission (i.e. different type of asset or crew).

**A**void – Circumvent hazard: Wait for risk to subside (i.e. wait until daylight or weather passes).

**A**ccept – In some cases the benefit might justify the assumption of risk. In these cases a decision to accept risk may be made with the stipulation that risk is reevaluated as the mission progress. (No adjustment to Risk Assessment)

**R**educe – Reduce or limit risk exposure, use of PPE, additional training or rest, stress reduction.

4. Although one could selectively evaluate Risk Factors with a mind toward achieving an acceptable Risk Factor score, doing that would subvert the intent of this tool. This is intended to help everyone on the crew shift their thinking from a land based mindset, to the hazards of the maritime environment. All members of the crew should participate in the Risk Assessment scoring. This Risk Assessment process should continue throughout the mission as conditions evolve.