

GROUND WARRIOR



Winter 1998



Friendly Fire Isn't

CRRC, The Amputator

Please Don't Eat the Explosives

GROUND WARRIOR



Winter 1998

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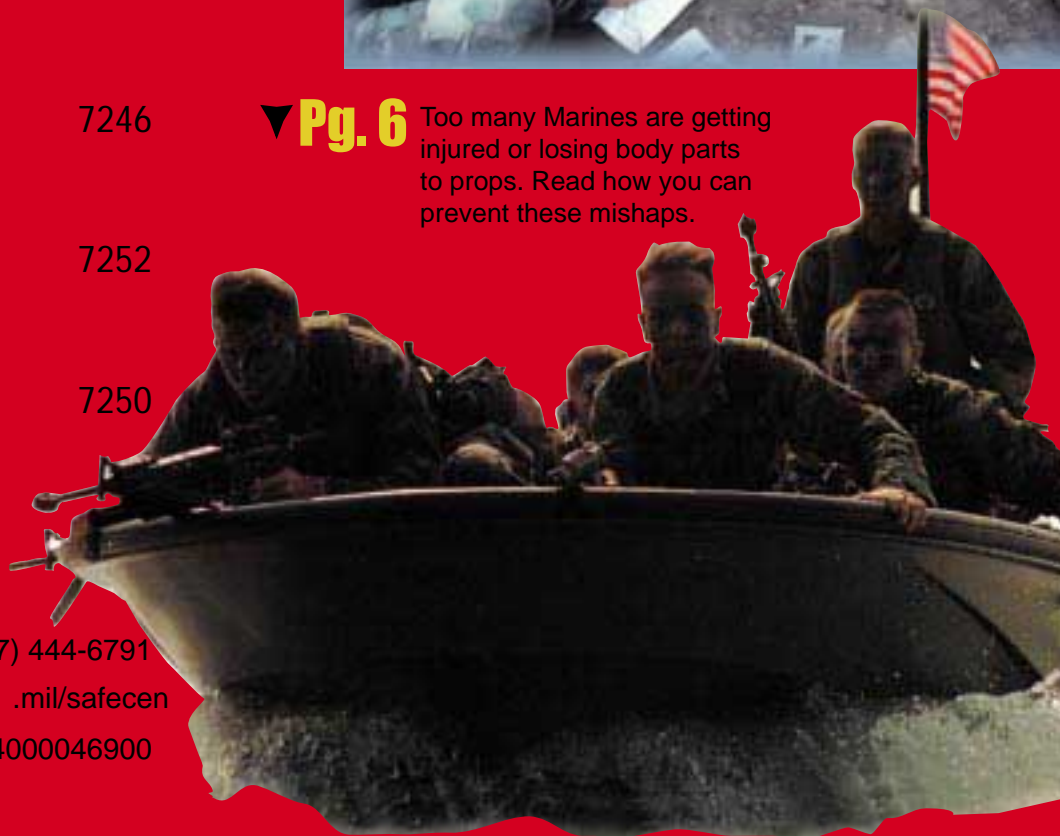
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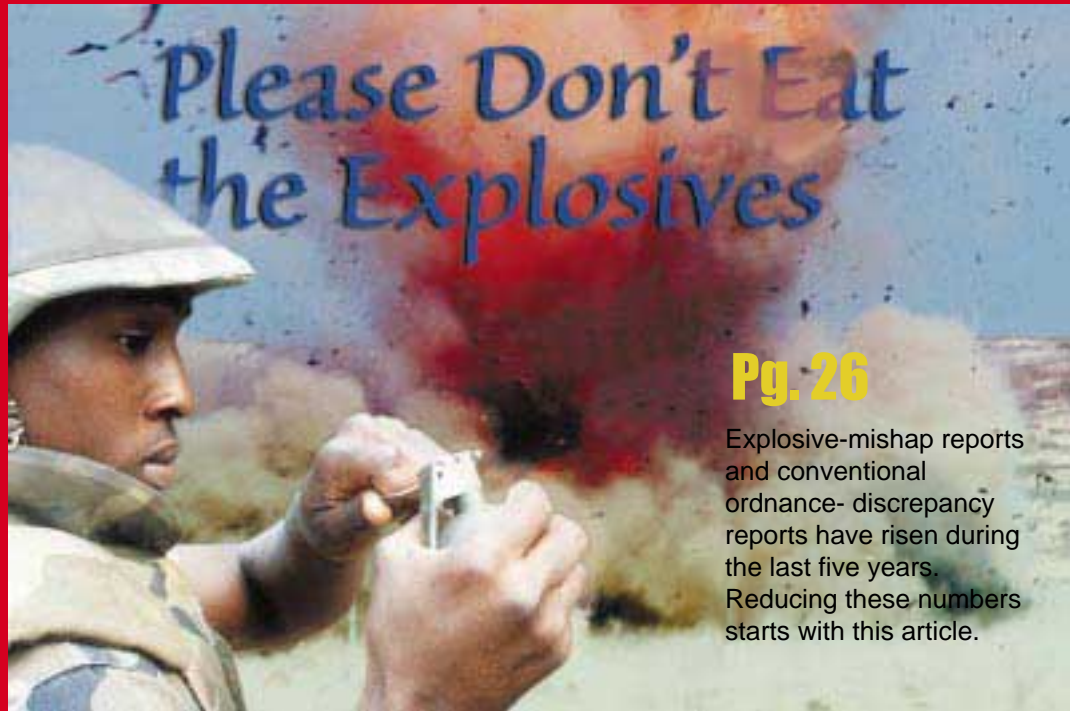


▼ **Pg. 6** Too many Marines are getting injured or losing body parts to props. Read how you can prevent these mishaps.



▼ Pg. 2

When conducting a night live fire exercise, Marines changed positions without telling other units. One man was killed.



Pg. 26

Explosive-mishap reports and conventional ordnance-discrepancy reports have risen during the last five years. Reducing these numbers starts with this article.

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IBC Marine Corps Program Personnel



Friendly Fire Isn't

By Capt. Mike Scarff

“Communicating.” Every Marine is taught this skill from day one, and it is an essential element of combat training. However, if you change a plan, failing to communicate with other Marines can result in confusion and death. This was the case in a night-defensive, live-fire exercise in which a Marine was shot and killed.

This tragedy happened on a clear night, with 7 miles visibility and illumination at 13 percent. The plan called for three platoons on line. Because of hills and the large number of trees, though, the center platoon had to be moved 550 meters forward to form flank platoons. Dragon teams and M60s directly supported each platoon. Meanwhile, .50-caliber machine guns and 60mm mortars directly supported the company. A black BMP mock-up was used to designate the left platoon's right lateral limit.

Immediately after firing mortar-illumination rounds, the company opened fire. The forward platoon, noticing rounds hitting in their position, radioed the left platoon to cease fire and shift their position to the left. A PFC with the Dragon team attached to the center platoon's left flank had been hit by a 5.56mm round that went through the collar of his flak jacket and ripped through his neck and lower face. Another Marine left his

position of safety to drag the PFC to his fighting hole while rounds were still falling around them. A corpsman gave the victim first aid and CPR, but he died that night.

The investigation into this mishap revealed several problems:

The sketch of the company's fire plan did not show that the center platoon had moved 550 meters forward of the other two. Nor was the left platoon's right lateral limit adjusted.

The platoons had not coordinated during the previous 24 hours. Also, the adjacent squads that formed the intersection of the left and center platoons had not coordinated their fields of fire.

Machine gunners did not walk their FPF to the 700-meter limit of grazing fire to determine dead space. The left platoon's machine-gun range cards showed that the Dragon position was located inside their right lateral limit of fire. If Marines had walked the length of the FPF to identify the dead space, the gunners would have discovered that the Dragon's position was in their sector of fire.

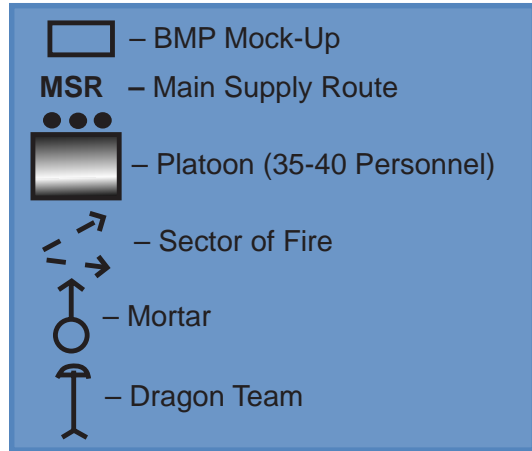
During daylight, the black BMP mock-up was used to mark the left platoon's right lateral limit. Even under 60mm-mortar illumination, however, the BMP mock-up could not be seen at night.



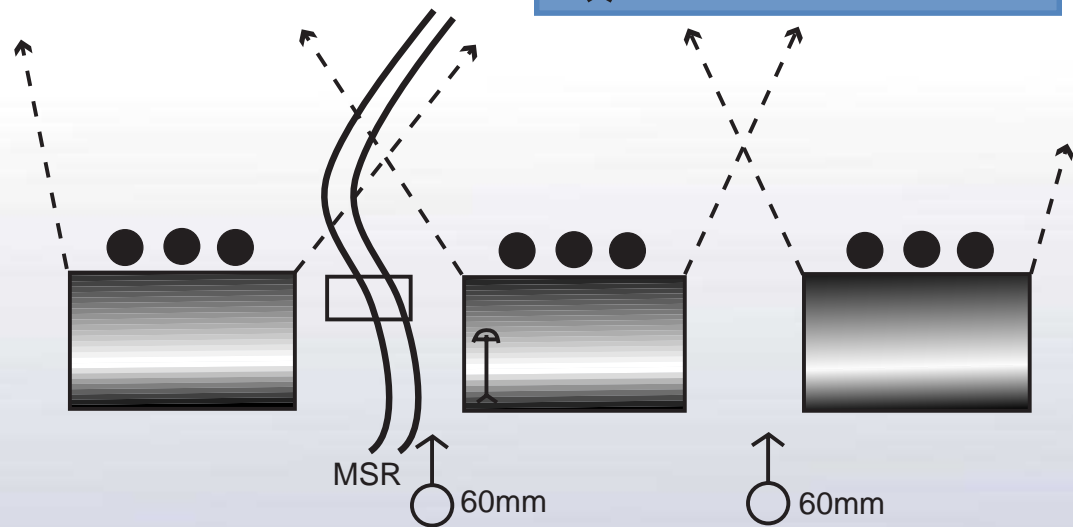
Marines conduct a brief prior to an exercise.

The root cause of this mishap was a breakdown in tactical leadership. One of the platoon commanders should have realized that the change in defensive position warranted a reevaluation of the tactical scenario. Whether the lack of communication stemmed from a belief that the exercise was already briefed properly, the high tempo of the operations, or assumptions that the unit leaders were on top of the new situation, this fact remains: leadership failed. The chain of command knew the tactical scenario had changed but chose not to intervene. Change is unavoidable, effective leaders manage risks and think through problems to prevent “friendly fire.” ▼

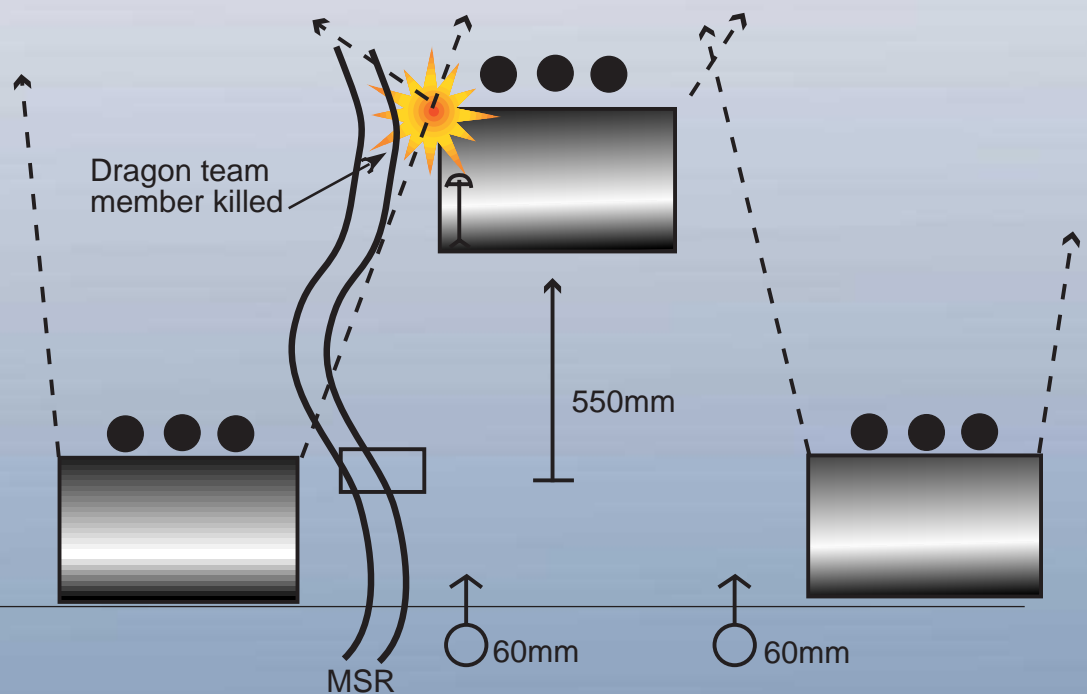
Capt. Scarff was head of the tactical-operations division in the Shore Safety Programs Directorate at the Naval Safety Center. He is attending the advance officer’s artillery course at Fort Sill, Okla.



Original Plan



Adjusted plan:
Marines inside
firing range



W

hen Marine student officers and staff members picked a bivouac site for their four-day field-training exercise known as Defense Week, they didn't know that other Marine units had left many blank cartridges in the area. Those cartridges, buried just below the surface, would send a second lieutenant home minus an eye and in need of a job in civilian life.

On the first morning of the exercise, the student officers were transported to a mess area, where they received blank ammunition. A series of platoon attacks followed in the designated training area. At the end of the day, the student officers returned to the mess area, accounted for their equipment, and turned in those items not needed for the next exercise.

The lieutenants kept all unexpended blank ammunition for use during the next three days of training. That ammunition was with them as they boarded buses for an area where they planned to bivouac. When they arrived, they grabbed their ALICE packs and moved about 1 kilometer north to the vicinity of the east-west tank trail, the designated bivouac site. The officers chose a site south of the trail and moved 10-20 meters inside the tree line. This area appeared to have been used by another unit some time ago, although they didn't see any trash or debris.

Upon entering the tree line, student billet-holders directed their units to establish an administrative bivouac since it was getting dark. The cold, wet weather motivated several groups of Marines to start small warming fires in their squad areas—an accepted habit on several earlier field exercises.

The victim in this story and the rest of his squad also started a small fire, using dead limbs and dry leaves. Before they started it, they swept away a wet layer of leaves to expose topsoil.

Using their ponchos, the lieutenants built small, individual shelters to sleep in. They staged their weapons in two groups nearby. Seven students in this particular squad gathered in a close circle around the fire—talking, changing some of their clothes, and preparing to sleep. All were seated about 2 or 3 feet from the edge of the fire.

At about 2100, several individuals heard a loud pop—similar to an exploding blank cartridge—come

Blank Cartridge Ending Cartridge

By GySgt. Bob



nk idge ds eer

by Blackwell

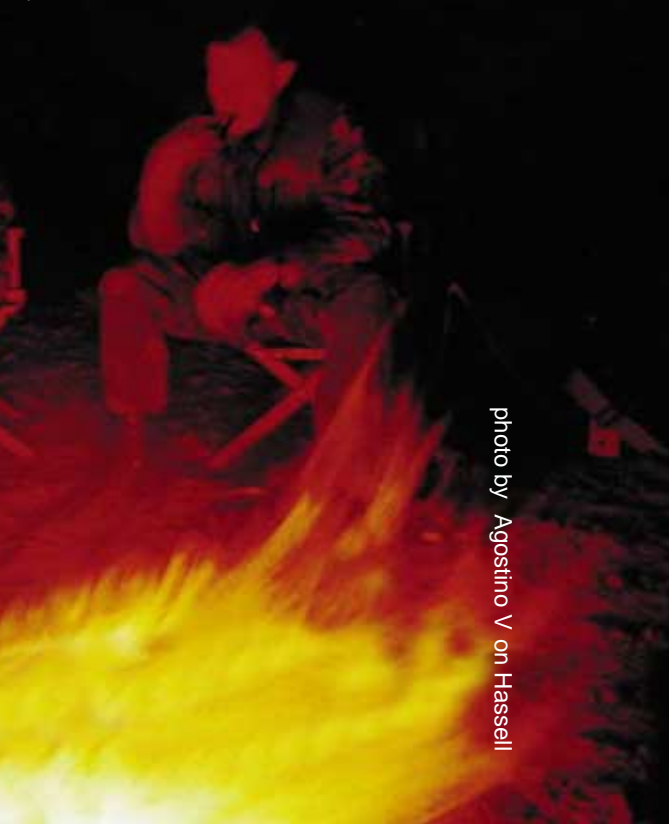


photo by Agostino V on Hassell

from the fire. At least two lieutenants also saw debris, including ashes and embers, spew from the fire and land on two other officers. One of those officers was seated close to the fire drying his feet and changing his socks. When the pop went off, a jagged piece of metal about the size of a sewing needle pierced one of his eyes (surgeons later had to remove that eye).

Nine days after this mishap, investigators surveyed the bivouac site with a metal detector and found dozens of blank cartridges within one inch of the topsoil. About a quarter of them were unexpended. None of the student officers or staff members recalled loading, changing magazines, or otherwise handling any ammunition that could have dropped on the ground before this mishap. They also didn't remember anyone throwing blank cartridges in the fire.

Here are some things that led to this mishap:

Location of the bivouac area. The chosen site contained a large number of blank cartridges buried within an inch of the surface.

Darkness was a factor. Building the bivouac during daylight hours could have allowed the lieutenants to notice cartridges in the topsoil when they scraped away the leaves.

No fire pit. The amount of dirt cleared for the fire was inadequate to reveal hidden hazards (e.g., blank cartridges). A deeper pit probably would have removed most of the buried cartridges from the area.

Lack of accountability for blank cartridges. Earlier units training at the bivouac site deliberately or inadvertently had dropped unexpended blank cartridges. Their lack of accountability was directly linked to this mishap.

Safety procedures don't end with the completion of the day's exercises. You should always remember that the training fields are used continuously, whether with training or live ammunition, and precautions should be made accordingly. You don't want to end your career before it even begins. ▼

GySgt. Blackwell is a weapons analyst in the Shore Safety Programs Directorate at the Naval Safety Center.

As coxswain of a combat rubber raiding craft (CRRC), a Marine corporal maneuvered his boat into formation for a raid. Everything went OK until he stood up to avoid getting wet from the wake of a nearby CRRC. He lost his balance and stumbled backward, until his left foot stepped overboard, where it got tangled in the propeller on the boat's outboard motor. As his body twisted, his hand opened the throttle even more, which increased the damage to his partly amputated foot.

You can't discount this incident as an isolated case. Commands have reported 16 CRRC mishaps (14 involving passengers—all Marines) since 1989. Here are some examples:

☛ Three Marines were thrown overboard when a coxswain made a hard turn. A lance corporal was swept under the boat, and his ankle got caught between the propeller and propeller guard, causing severe damage to his ankle. Doctors amputated his leg below the knee.

☛ CRRC crewmen were pulling a corporal from the water at the stern while the propeller was turning. The corporal cut his left hip and bruised one of his hands.

☛ A corporal riding in a CRRC fell on a bag of gear and broke his arm.

☛ During surf operations, a CRRC flipped and threw a sergeant in the water. The boat hit him and cut his arm, broke his wrist, and bruised his kidneys.

☛ A CRRC ran over a sergeant during a helo-casting exercise. Injuries included a split skull and cuts on his face.

☛ A lance corporal was coxswain of a CRRC when he lost his balance and tried to regain it by pulling on the throttle. This action caused the boat to turn hard and threw him into the water. As the CRRC circled, its propeller hit the Marine, cutting his arm in several places.

☛ A wave hit a CRRC while it was turning and threw a lance corporal overboard. The propeller hit the Marine's foot and amputated half of it.

☛ A first lieutenant suffered a deep cut to his chest when he fell out of a CRRC while it was making a hard turn. The boat's propeller caused his injury.

In six of the 14 CRRC-passenger mishaps, Marines fell out of the boats in the surf zone. In five cases, they fell overboard when the boats turned. In three cases, mishaps occurred as Marines were being rescued by a CRRC. The most common injuries included cuts, amputations (leg, foot or toe) and broken bones caused by hitting the engine or propeller.

To avoid injuries while operating or riding in a CRRC, everyone, including the coxswain, should remain seated while the craft is moving. The coxswain should tell the passengers before any high-speed maneuvers.

The CRRC

The most common injuries included cuts, amputations and broken bones caused by hitting the engine or propeller.



The coxswain is just in charge of the CRRC and it is his responsibility to get the boat safely ashore.

If any sign of a hazardous situation develops, the coxswain should release the throttle and cut off the engine until the situation is resolved.

Ensure the engine's safety cut-off key is inserted and attached to the coxswain's wrist. As a precaution, tie a second key to the console for use should the coxswain fall out of the CRRC.

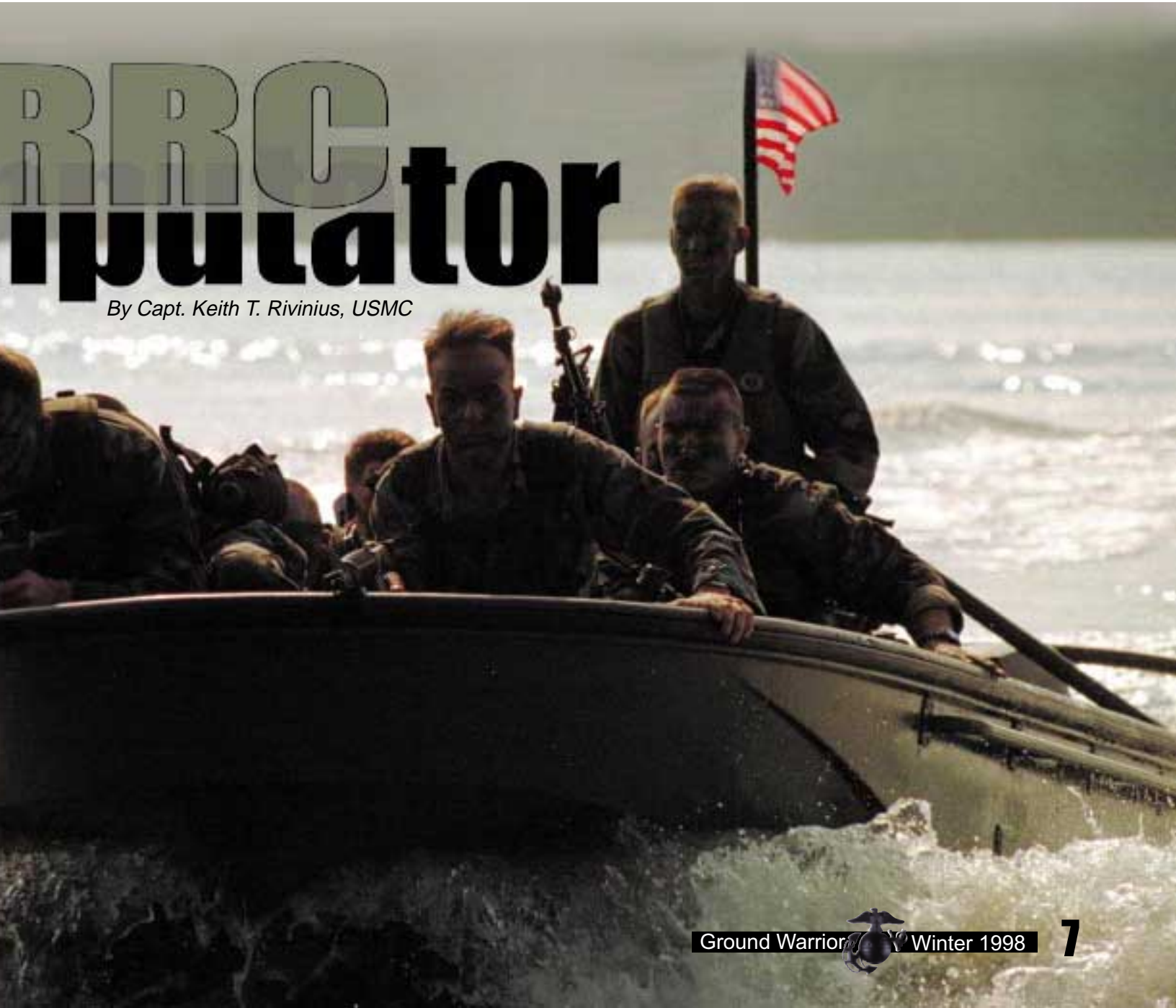
Always retrieve personnel from the gunwales, never the stern. ▼

Capt. Rivinius teaches at the Amphibious Warfare School.

Note: A CRRC is a Zodiac-style inflatable boat, approximately 15 feet long, that is propelled by one of three outboard-engine configurations: single 35-horsepower, dual 35-horsepower, or single 55-horsepower. The boat's maximum speed while carrying eight combat-loaded Marines is about 20 knots. The boat is used by a Marine Expeditionary Unit (Special Operations Capable) for amphibious raids. These raids may include night and over-the-horizon operations. During raids, up to 18 boats may be in the water at the same time. This large number makes it hard to coordinate operations and increases the potential for mishaps.

CRRC Inflator

By Capt. Keith T. Rivinius, USMC



Boat Ride Turns I Bo

When a mission commander embarked on a night operation involving two riverine assault craft (RAC) and five rigid raider craft (RRC), he failed to take an important element of the exercise with him—operational risk management (ORM). He returned with three Marines needing hospitalization and an RAC that was nearly destroyed.

This mishap happened as the Marines were heading to a beach to extract another unit and move them to “friendly” territory. During the transit, an unidentified civilian boat, approximately 40 feet long, hit the lead RAC on its starboard side.

The column of seven boats—an RAC in the lead, with five RRCs following and the other RAC at the end—had been doing about 20 knots. No one was using night-vision goggles, and the only visible lighting was chemical lights displayed on the RRC. The RACs had no working radar. The mission commander decided to go tactical and turned off all navigation lights en route to the beach. No wonder the civilian boater didn’t see the column. The commander also used only two ICS helmets on each RAC instead of the four required by SOP.

If the commander had used ORM, here’s how he would have assessed this mission and changed it to ensure success:

- ◆ Identify hazard: No navigation lights are displayed.
- ◆ Assess risks: The likelihood of collision is high, especially considering that waterway traffic is fairly heavy all times.
- ◆ Make risk decisions: Continue with the mission, but turn on navigation lights.
- ◆ Implement controls: Make sure all craft have navigation lights that work and crew members know they are to leave the lights on during the exercise.
- ◆ Supervise: Check to ensure lights are on before and during transit.

Here is another point that should have been considered before starting this mission:

- ◆ Identify hazard: None of the raider craft have working radar.
- ◆ Assess risks: The likelihood of collision is extremely high because the boats have no warning system. Given the planned speed and lack of

nto at Wreck

By GySgt. Brian McGeorge

lights, the reaction time to a hazard is slow. Damage or injury could be severe if boats collide.

- ◆ Make risk decisions: If radar is down, can navigation lights provide adequate warning to other vessels? Perhaps, but speed must be reduced

- ◆ Implement controls: Place chemical lights on RAC to warn other vessels. Lights on RRC may not be visible because they are so close to the surface. Provide night-vision goggles to crew members to warn the column of approaching vessels or obstructions.

- ◆ Supervise: Inspect the RAC to ensure chemical lights are visible and designated crew members have night-vision goggles that work.

Just because previous missions have been done without problems is never a valid excuse for blowing off ORM. Use this five-step, problem-solving tool to keep from making the same painful and costly mistakes made by others.

GySgt. McGeorge is a combat-vehicle analyst in the Shore Safety Programs Directorate at the Naval Safety Center.

Small Craft in Commercial Waterways: A Hazardous Combination

During training exercises in small boats, the greatest hazards to Marines in CRRCs are the many commercial boats that may be in the area. For example, the coast off Camp Pendleton, Calif. often has fishing boats, tugs with barges en route to Los Angeles, and commercial tankers operating around the clock.

The larger an object, the slower it appears to move. For example, a commercial airliner seems to almost float on its approach—actually it is traveling at close to 150 mph.

Large vessels must maintain speed to steer and will not be able to slow down in time to avoid you. Because of their draft, they must stay in the channel; it's the only place deep enough for them to operate.

The pilot in the larger vessel may not be able to see you. His "blind spot" can extend for hundreds of feet in front of deep-draft ships, tugboats, and towboats pushing barges.

A ship's or towboat's engine causes a strong undercurrent called "wheel wash," which can result in severe turbulence hundreds of yards behind a large vessel.

A tug without barges in front could be towing a log raft, barge or other objects on a long submerged line behind it. This line lies low in the water and is difficult to see. Never pass between the tug and what it is towing.

Finally, have you checked your craft's horn? The rules of the road require vessels to sound their horns when operating craft in fog and the visibility is decreased to such an extent that you cannot see more than a mile around you. Operating in bad weather or conditions with low visibility is extremely dangerous, and if there is no immediate operational commitment, a postponement may be the most practical course of action. ▼



What Small-Craft Commanders Can Do in High-Traffic Waterways

Stay out of the paths of towboats and barges approaching bridges and locks. They must be lined up and committed to their approach well ahead of time, and it's dangerous and difficult for them to change course.

Designate a lookout. Assign one person in the craft to watch for commercial traffic.

Understand whistle signals. At least five or more short blasts on the whistle signals "danger." Stay clear of vessels sounding the danger signal.

Stay clear of tows. It's not worth the risk. A small boat can be sucked into the towboat's large propellers when jumping wakes or riding close alongside a tow, or while cutting under the bow or stern of a tug or tow.

Always wear a life jacket; 82 percent of people killed in boating accidents in recent years were not wearing them.

Don't rely on being able to hear a vessel approaching at night. Look for the sidelights of tugs and tows, not the masthead lights. Pusher

...82 percent of people killed in boating accidents in recent years were not wearing life jackets.

towboats on western rivers do not display masthead lights, making it even more critical to keep a sharp lookout. If you see both sidelights (red and green), you're dead ahead and in the path of danger.

Use safe anchorages. It's not only dangerous, it's illegal to tie up to Coast Guard navigation aids (such as buoys, which mark channels for shipping).

Be thoroughly familiar with the rules of the waterways for the area of operation. Test everyone's knowledge of these rules, and make them part of your unit's standard operating procedures. ▼



Care and Feeding of Rappel Towers, Confidence and Obstacle Courses

by Carl Frank



Recruits get their first taste of rappelling.



Have you ever used the obstacle or confidence courses? It's fairly safe to say that if you are a Marine, you have come across these two items in your time in the Marine Corps. While you know how to use one, do you know how to inspect it? It's obviously broken if the rope is lying in the sawdust pit, but do you know what signs indicate the link is about to fail before it does? A proper checklist is the best way to start.

Rappel masters, where is your inspection checklist for the tower?

"I travel throughout the Marine Corps doing safety surveys at various commands, and although I find many rappel masters who are well-trained and expert in the art of rappelling, I have yet to find one trained to properly inspect a rappel tower," says Carl Frank, one of the Safety Center's surveyors.

To solve this problem, we've developed inspection checklists for rappel towers, confidence and obstacle courses. These checklists will serve as excellent starting points to develop your own comprehensive inspection checklists. To get copies, send an e-mail request to: cfrank@safecen.navy.mil. Please specify which checklist and the format desired (MS Word, Lotus, etc.). ▼

Mr. Carl Frank is a retired Marine in the Marine Corps Branch of the Training Safety Division.

Mortar Miscue



Mangles Marine

By GySgt. Bobby Blackwell

What will maim a Marine's hand faster than a speeding bullet? A fast-moving mortar round.

A Marine lance corporal injured his hand while acting as an a-gunner during a routine firing exercise by a light armored reconnaissance battalion (LARBN). The original plan called for one mortar position to fire 81mm practice rounds. However, the platoon sergeant changed the plan and manned two mortar positions—one from the LAV mortar variant, and one in the mortar pit. Having two positions instead of one severely limited his ability to oversee the event.

The LAV variant was manned by a crew of three Marines: a gunner, an a-gunner, and an ammo man. All three were lance corporals. The gunner had been cross-trained as a mortarman only one month earlier, and had passed the gunner's exam. The a-gunner had never participated in a firing exercise with live mortars and had never been trained in mortar gunnery.

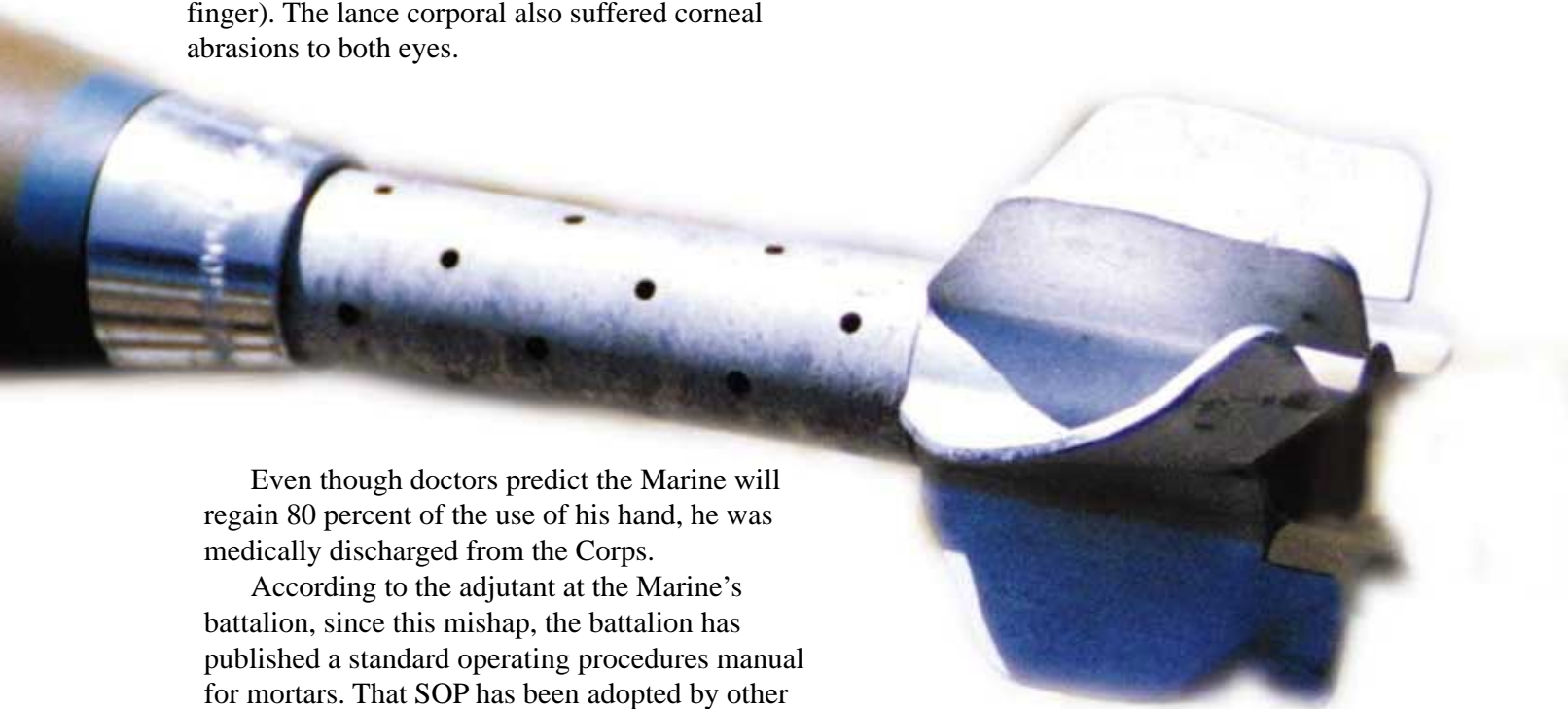
While the ammo man held the billet and MOS of a mortarman, his only job was to prepare the rounds and hand them to the a-gunner. Meanwhile, the section leader, a sergeant, manned the fire-direction center 20 meters to the rear of the gun line, certainly not in a position to supervise three junior people—one of whom had never fired a mortar.

When the command was given for a five-round "fire for effect," the mortar crew prepared their weapon for firing. The ammo man readied the rounds and passed them to the a-gunner, who placed them on top of the LAV's hatch. Because of the mortar's extreme angle, the a-gunner decided to move the rounds from atop the hatch behind him to the bussel rack. This shift put the rounds within easy reach of both the gunner and a-gunner.

Upon hearing the command to fire, the a-gunner dropped the first round down the tube. After the round fired, the gunner dropped a round down the tube, even

though the a-gunner is the only person who should be dropping the rounds. Meanwhile, the a-gunner reached for his second round and was preparing to drop it in the tube when the round loaded by the gunner fired. That round hit the round the a-gunner was holding and mangled the a-gunner's left hand. The round severed his little finger (later, surgeons had to amputate his ring finger). The lance corporal also suffered corneal abrasions to both eyes.

This is the actual mortar round involved in the mishap. Note the damaged fins where the outgoing round hit it.



Even though doctors predict the Marine will regain 80 percent of the use of his hand, he was medically discharged from the Corps.

According to the adjutant at the Marine's battalion, since this mishap, the battalion has published a standard operating procedures manual for mortars. That SOP has been adopted by other LARBNS. ▼

GySgt. Blackwell is a weapons analyst in the Shore Safety Programs Directorate at the Naval Safety Center.



Weapons Cleaning Made Easy

By Steve Perez



Rae Mack

Even with IT-48WC, a new cleaning system, you still need to remove the excess solvent with a swab or patch, as the Marine is doing in this photo.

Materials designed to remove built up lubricants and gunpowder on weapons are extremely corrosive and toxic. These attributes are a vital quality in cleaning, but make handling and disposing them a long and drawn out procedure.

The Army, Marine Corps and Navy have all faced the challenge of effectively cleaning small arms while protecting the operator and reducing hazardous waste. Many units have achieved this by adopting the IT-48WC, a weapons-cleaning system listed in the Defense Logistics Agency (DLA) Environmental Products Catalog, which reduces time spent cleaning the weapon, limits time spent in contact with the solvent and assists in clean-up.

The Army 1st Special Forces Group (Airborne) at Fort Lewis, WA, tested the IT-48WC cleaning system on 12 different weapons, including the M16A2, 5.56mm rifle, the M9, 9mm pistol, and the M224 60mm mortar. They rated the inspection results as excellent, with more than 95 percent of the cleaned weapons passing inspection by the unit armorer the first time. Also, the environmental engineer at Fort Lewis Public Works recommended adopting the IT-48WC system, based on reduced operating cost, decreased worker exposure to the solvent, and a decrease in pollution-prevention concerns.

The USMC School of Infantry at Camp Lejeune, N.C., tested the IT-48WC with Skysol solvent under controlled conditions and rated it superior to a rented parts washer with Stoddard solvent used previously. Benefits included two-thirds less time spent cleaning and no noticeable harm to rubber and synthetic parts, which had been problems associated with the old system.

The Naval Surface Warfare Center at Crane, Ind., approved Naval Amphibious Base, Little Creek's request to use Skysol solvents to clean small arms. This solvent is used in the IT-48WC system.

Army technical bulletin (TB) 43-0135, Navy technical report CarDivNSWC-TR-94/03, and Air Force ASC Hazmat Alternatives Guide (September 1993) have all approved Breakthrough solvent another brand, Skysol, as substitutes for P-D-680m 1,1,1-Trichloroethane, Perchloroethane. Using Breakthrough or Skysol in the IT-48WC weapons-cleaning system can reduce the amount of solvent waste, decrease turnaround time, and still effectively clean.

Continued on page 19





Without Risk

You're up

This Cool

By GySgt. Bobby C. Blackwell

The M249 Machine Gun Squad Automatic Weapon (SAW) has to cool down after two minutes of continuous firing of 200 rounds. If the weapon doesn't have this cool-down period, it stays hot and can cook off or fire a round on its own.

The M249 is a fire-team automatic weapon that gives suppressive fire at extended ranges. Its intent is to injure the enemy, not U.S. Marines. However, six Marines have been injured during the last two years. Fortunately, none have been killed. And the Naval Safety Center continues to receive reports of cook-offs during training with the M249 as a result of Marines not following procedures.

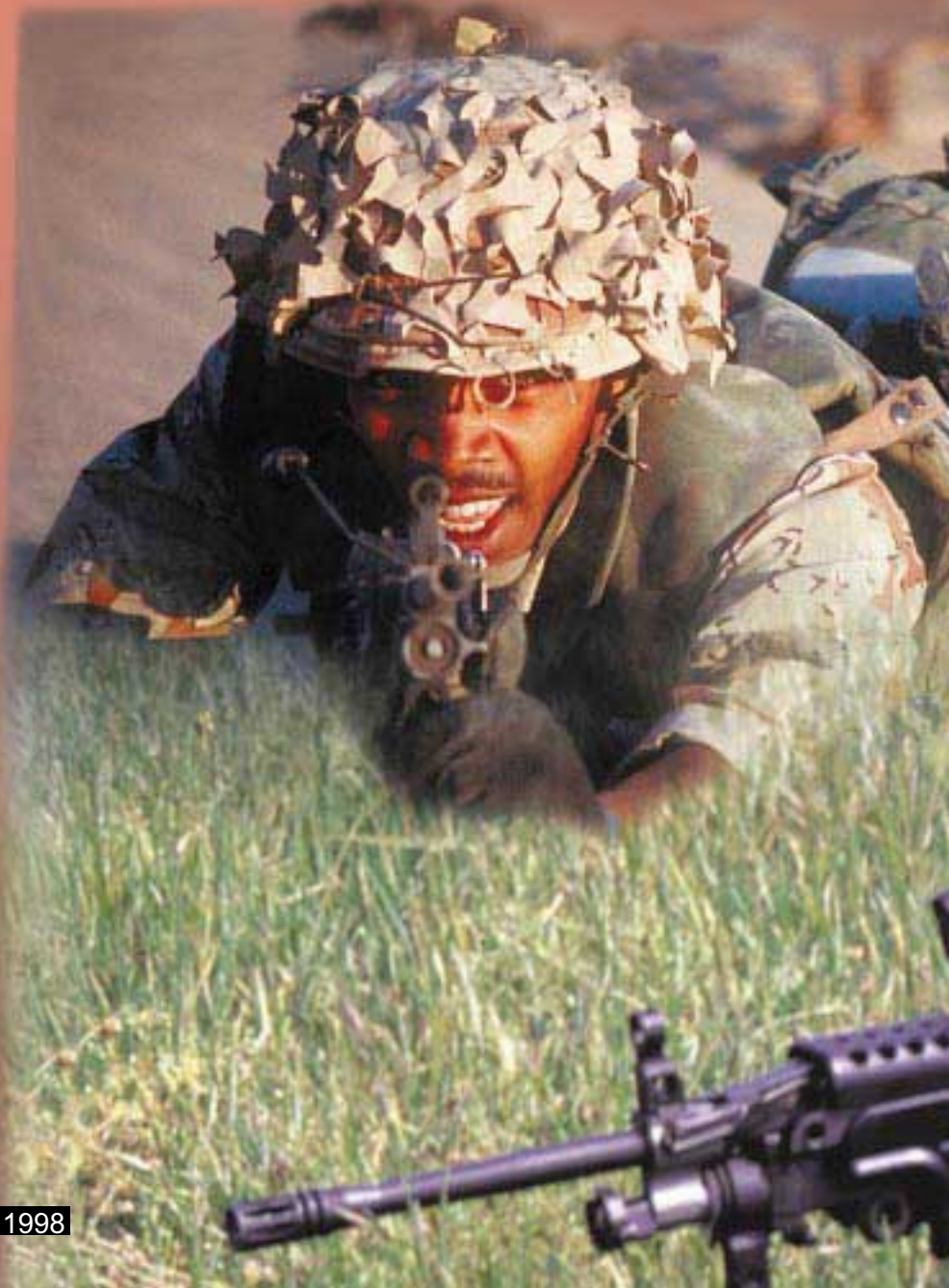
Here are some samples of the reports we have received:

A corporal had conducted cyclic rate of fire (850 rounds per minute) for two minutes when his SAW jammed. He waited 30 seconds, opened the feed tray and discovered a round in the chamber. The round cooked off in his face. This Marine should not have opened the feed-tray cover. Instead, he should have pushed the safety to the right, kept the machine gun pointed down range, and stayed away from it for 15 minutes. Then he could clear the weapon. Guidance on this is found in Chapter 2.26 of the operator's manual for the M249.

In a similar mishap, a lance corporal tried to clear his SAW. He didn't even wait 30 seconds but immediately lifted the feed-tray cover. A jammed round cooked off in his face.

During a second string of fire, a lance corporal's SAW jammed. After about one minute, he opened the feed-tray cover. The

assistant gunner on this weapon cleared the links and was about to try to reload the weapon when the lance corporal told him to stop because there was one round lodged partially in the chamber and a second one wedged above it. As the lance corporal pointed at the chamber to show the assistant gunner the round, it cooked off and amputated the tip of his finger.



Cook-Off Can Kill

The lesson is: If the weapon is hot, don't open the feed-tray covers.

The operator's manual lists warnings associated with handling hot weapons:

Never open the cover of a weapon if the barrel is hot and you suspect there is a live round in the chamber.

Always look into the chamber after clearing the weapon. Never do it before. If ammunition and weapons are exposed to the sun on a hot day, a cook-off can occur within 50 rounds of continuous firing.

Marines who operate the M249 SAW must follow guidelines and Instructions listed in TM

08671A-10/1A (Operators Manual Machine Gun 5.56MM, M249 W/Equipment) as well as standard operating procedures.

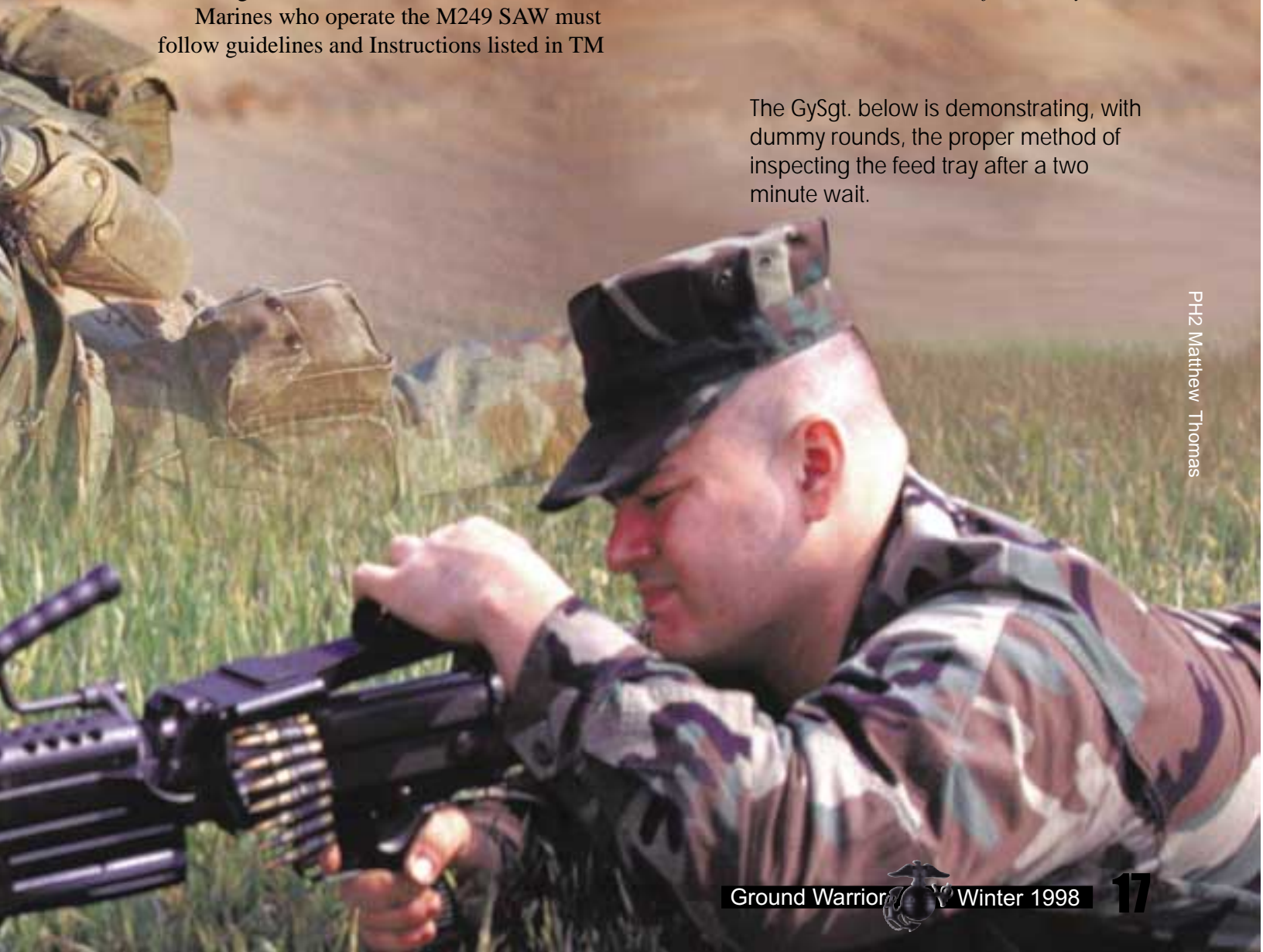
Everyone must be thoroughly familiar with all safety devices, precautions and operating procedures for all weapons. **Remember, Devil Dogs, our job is to shoot the enemy, not ourselves.** ▼

GySgt. Blackwell is a weapons analyst in the Explosive and Weapons Systems Division in the Shore Safety Programs Directorate at the Naval Safety Center.

His e-mail is bblackwel@safecen.navy.mil.

The GySgt. below is demonstrating, with dummy rounds, the proper method of inspecting the feed tray after a two minute wait.

PH2 Matthew Thomas



A photograph showing several soldiers in a river, likely during a military operation. The soldiers are wearing helmets and carrying gear, and are positioned in the water. The water is murky and greenish-brown. The background shows dense vegetation and trees. The text "Management..." is overlaid in large, bold, black letters on the lower left side of the image.

Management...

the Creek

DLA's Defense Supply Center, Richmond, has awarded a long-term contract to the manufacturer of the new weapons-cleaning system. This contract provides vendor delivery to the customer to ensure the fastest possible delivery. The environmentally compliant solvents that follow are included in the contract:

Item: IT-48WC
NSN: 6850-01-397-2539
Unit of Issue: Each
Delivered Price: \$2,475.48

Item: Skysol
NSN: 6850-01-381-4404
Unit of Issue: Drum (55 gallon)
Delivered Price: \$1,178.45

Item: Skysol
NSN: 6850-01-381-4420
Unit of Issue: Can (5 gallon)
Delivered Price: \$155.46

Item: Skysol 100
NSN: 6850-01-381-4401
Unit of Issue: Drum (55 gallon)
Delivered Price: \$1,637.09

Item: Skysol 100
NSN: 6850-01-381-4423
Unit of Issue: Can (5 gallon)
Delivered Price: \$202.51

Item: Breakthrough
NSN: 6850-01-378-0666
Unit of Issue: Drum (55 gallon)
Delivered Price: \$1119.38

Item: Breakthrough
NSN: 6850-01-378-0679
Unit of Issue: Can (5 gallon)
Delivered Price: \$150.09

Item: Breakthrough
NSN: 6850-01-378-0698
Unit of Issue: Can (15 gallon)
Delivered Price: \$385.83

The standard unit price of items in the federal supply system always includes delivery to addresses anywhere in the world—no matter how remote.

Defense Supply Center Richmond lists these and hundreds of other environmental products in the DLA EP catalog. You can use normal MILSTRIP or FEDSTRIP requisitioning procedures to place your order, or you can requisition by fax at (800) 352-3291 or DSN 695-5695. DSCR's web site is www.dscr.dla.mil, where you can browse catalogs and place orders on-line. ▼

Mr. Perez (sperez@dscr.dla.mil) is a product executive for environmental products at the Defense Supply Center, Richmond, Va.

The new system, shown below, reduces the cleaner's exposure to toxic chemicals.



Rae Mack

Between FY94 and FY97, 10 Marines between the ages of 20 and 44 died of heart attacks or heat stroke while running for their PT. Another Marine is in a coma from permanent brain damage suffered during PT.

Seven of the ten victims were gunnery sergeant or below, and five of them had previous heart attacks. One suffered heat stroke, and one fell victim to a combination of heat stroke and heart attack. All seven of these Marines had pre-existing medical conditions that contributed to their deaths, and at least five of these seven victims knew they had health problems (because of such symptoms as chest pains and shortness of breath) but chose to ignore them. In two cases, Marines or recruits knew about the victims' medical problems, but they didn't tell anyone in the chain of command or medical authorities.

Some victims did not follow their doctor's orders. For example, a doctor had told one that he needed to lower his cholesterol and to stop smoking. Because the Marine didn't turn in his hospital records to BAS, however, he didn't receive follow-up diagnoses and treatment. Another Marine had told his peers that he had a "bad ticker" and felt he would die from it some day, but he never reported the problem to medical

personnel or went to sick call about it. At least five of these Marines might be alive today if they had taken care of themselves.

A corpsman at the Naval Safety Center who has treated both Navy and Marine Corps personnel, HMCS (SS) William Irwin, says it is the Marines' desire not to be labeled weak or "sickbay commandos" that may steer them away from the doc, as well as peer pressure not to be seen as feeble. Leaders must stress to their Marines that they need to listen to proper medical opinion and not believe that they can "walk off" serious medical problems. Every Marine must understand that medical personnel are there to provide care, and their advice should be heeded.

Leaders at all levels must identify hazards associated with PT. They then must implement controls, and have an emergency-response plan.

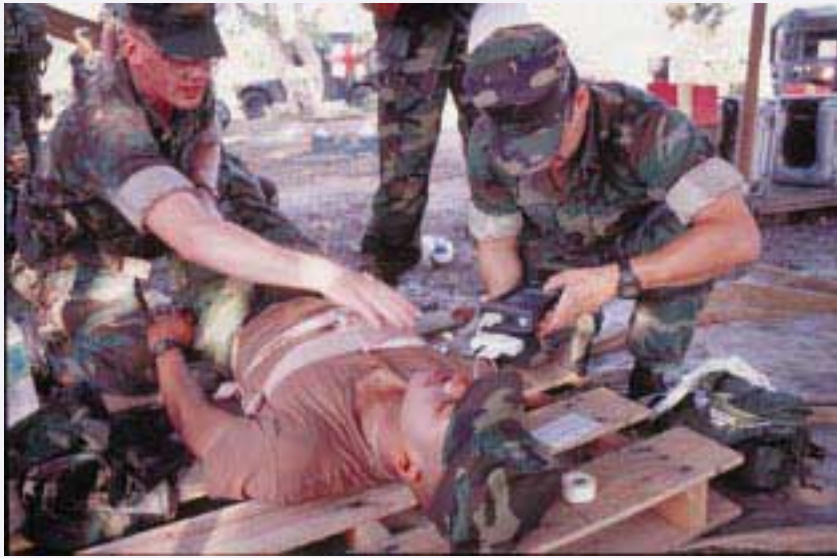
Like most Marines, you probably believe the saying: "Whatever doesn't kill us makes us stronger." However, not reporting medical problems, ignoring medical advice, and otherwise short-circuiting the medical system doesn't make us stronger—it makes us dead.



PT: Possible Term

By GySgt. Daniel Smith





Marines can't always count on high-tech medical care to be on-hand. Knowing basic CPR can save you and your fellow Marines.



Trust Your Training

If you have a health problem, consider this before you run PT: You can't always trust others to take care of you when you need help. Five of the victims in the previous article received improper or no treatment from fellow Marines when they collapsed. In another case, a Marine received proper treatment by fellow Marines, but woefully inadequate treatment by Air National Guard personnel from a nearby first-aid station. They finished their cigarettes before responding. When they arrived at the scene, they made the Marines stop CPR, then ignored the victim while asking a series of questions. When they finally checked the victim, he had no pulse and wasn't breathing, so they restarted CPR. Instead of using the clinic's ambulance, the medical personnel called for a civilian ambulance, which further delayed the start of advanced treatment for the Marine. He was dead on arrival at the hospital.

Everyone should be trained in basic CPR procedures. It will keep your fellow "devil dog" alive until a doctor is on scene. If you start to perform CPR, don't stop and expect to start up again. Keep a victim's heart pumping and lungs breathing until an ambulance arrives.

Although it's possible to survive a heart attack, the odds are against it. Your odds get worse if you don't immediately receive care by someone on the scene, and your odds get really bad if responding medical personnel drop the ball. Do yourself a favor and reduce the risk of a heart attack in the first place by taking care of yourself. Got a medical problem? Get it checked. Then follow the doctor's orders and make sure everyone in your chain of command knows about your condition. ▼

GySgt. Smith is a tactical-operations analyst in the Shore Safety Programs Directorate at the Naval Safety Center.





“BRO”

By GySgt. Daniel Smith

Facing a night of hazardous training, a company of Marines did everything by the book—even exceeding some safety requirements.

However, one of them will spend the rest of his life paralyzed from the waist down. Here’s how it happened—and how it might have been prevented.

The Marines were holding cliff-assault training. Four separate lanes were involved in the assault and retrograde, with about 40 Marines using each lane for the ascent and descent. By 0030, everyone had completed the assault without incident, and only two Marines were left to complete the retrograde on lane No. 3 (using standard rappel procedures over the face of the cliff).

The next to last Marine to rappel lane No. 3 was a lance corporal. After the rappel-point NCO had clipped him onto the ropes, the lance corporal began his descent. Part way down the cliff was what looked like a rock ledge, which broke free from the cliff as he passed it. He immediately yelled, “Rock!” as loudly as he could to warn anyone below of the danger. There was nothing else he could do but watch the rocks tumble down the cliff, striking sparks as they fell. They made a loud noise when they hit the ground—loud enough to be heard by Marines 300 meters away.

The rappelling Marine’s belay man was talking to another lance corporal at the base

“GK!”

of the cliff when the rocks started falling. Having seen the rocks and heard the rappel man’s warning, the belay man repeated the warning and jumped back from the cliff. This movement locked off the rappel man’s descent. When the rocks stopped falling, the rappel man completed his descent.

As the Marines started checking to see if anyone was hurt, they found a lance corporal lying beside the rocks that had fallen. He was holding his leg and said it hurt. They then heard someone moaning in a ditch below. It was the lance corporal the belay man had been talking to when the rocks started falling.

The Marines quickly summoned corpsmen, who determined that the lance corporal near the pile of rocks only had a minor cut on his leg. The one in the ditch, however, had serious injuries. Doctors later determined he had a broken leg, a minor head injury, a fractured vertebra, and a spinal-cord lesion—spelling permanent paralysis from the waist down. The corpsmen treated both victims on the scene and quickly organized Marines into a litter team to move the one from the ditch. They also called for an ambulance and a life-flight helicopter.

It seemed as if the Marines had done everything they were supposed to do to safely carry out this training. They had completed the required work-ups for the cliff assault. Although they were supposed to have eight trained assault climbers, they had nine, and MWTC instructors monitored the training. The assault climbers inspected the cliff’s face the day of the mishap, supervised by the instructors. The first man to rappel down the cliff, a trained assault climber, inspected it again. Rappelling techniques and

verbal warnings were correct. Experts consider the cliff the Marines used as one of the safest available because it is granite, which provides good anchor points with very few flakes. The Marines were inspected before, during and after the training to ensure they wore the correct PPE.

Nevertheless, one hazard—falling rocks—was left inadequately controlled. Operational risk management (ORM) might have prevented this tragedy. The ORM process identifies hazards and puts controls in place to eliminate or reduce risks to acceptable levels.

This mishap occurred before MCO 3500.27 was signed, establishing ORM in the Marine Corps. If ORM had been established before this mishap, it’s possible the falling rocks wouldn’t have injured anyone.

The Marines knew rappelling was hazardous. They also knew what caused many of the hazards, such as falling rocks. They had controls in place to reduce this possibility (e.g., choosing a relatively safe cliff and inspecting its face before the training). They also used verbal warnings and wore PPE to reduce the probability of injury if rocks fell. One control they didn’t have in place, however, was limiting the number of Marines exposed to falling rocks. They should have required everyone but the belay man to move away from the base of the cliff as soon as they had finished belaying the next man down. With this control in place, only one Marine would have been exposed to falling rocks.

This mishap affected the unit’s ability to accomplish its future mission. If that shortage is resolved by transferring a Marine from another unit, then that second unit’s capabilities are diminished. The dollar cost incurred with the permanent disability is huge, and the Marine Corps will pay it for as long as the lance corporal lives. The personal tragedy for the disabled Marine is the most serious result of all. ▼

GySgt. Smith is a tactical-operations analyst in the Shore Safety Programs Directorate at the Naval Safety Center.

M Drowsy Driving

By Lynn Tacha

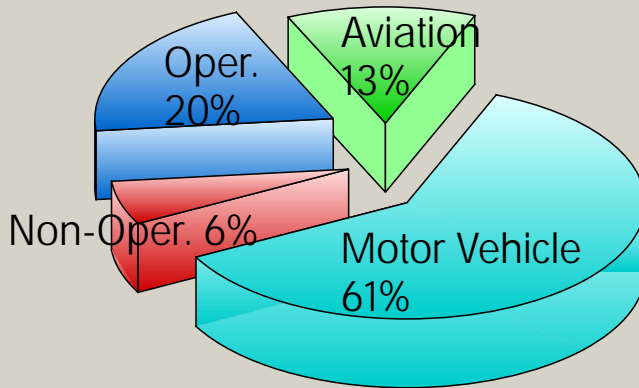
More Marines die on highways than anywhere else. One of the major causes is driving while they are tired. Last fiscal year, 50 Marines died in traffic crashes; 16 of them fell asleep at the wheel or were riding with someone who did. At least, that's what appeared to have happened—dead Marines tell no tales.

Not everyone in these crashes died. Some were injured, others disabled for life. For example, one evening last March, a lance corporal was driving from his girlfriend's house to the barracks when he began to feel tired. The distance was approximately 35 miles, but not wanting to fall asleep at the wheel, he pulled off the road to rest. He slept about two hours. When he awoke, he felt somewhat refreshed and resumed his trip. He rolled down the driver's window, thinking the cool, night air would keep him awake.

Within half an hour, he nodded off at the wheel. When he awoke, his car was going 60 mph and drifting off the road. His first reaction was to get back on the road right away. The sudden jerk on the steering wheel caused the car to flip several times. When the car rolled, the

lance corporal's head was whipped around so violently that his spinal cord stretched and several vertebrae broke. Doctors say the lance corporal may be permanently paralyzed from the chest down.

Motor Vehicle Deaths Surpass All Others FY94-98



More Vehicle Deaths Due to Falling Asleep FY98

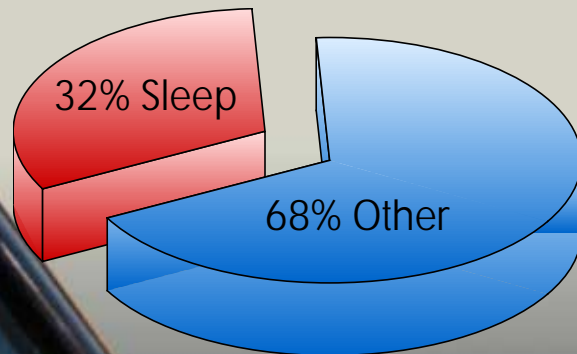



photo by PH2 Matthew Thomas


iving

This man had not been drinking, and he wore his seatbelt. He also had taken driver-improvement training. Unfortunately, his precautions were useless because he wasn't awake to use them. He had spent most of the day and evening hours helping friends move furniture in a town 20 miles away, so he may have been fatigued from the lifting. He then stopped by his girlfriend's house prior to heading back to the base.

When driving, people are most likely to get drowsy during the hours when they usually sleep, between midnight and 7 a.m.; at mid-afternoon; when driving alone; or when taking long, monotonous trips. Alcohol, drugs and prescription medicine also increase the risk of falling asleep at the wheel. As a driver gets tired, his driving performance declines. It takes longer for him to make a decision. People who need sleep tend to have "micro sleeps," which are involuntary naps that usually last up to 10 seconds. Even though a person's eyes may be open, his brain is not processing information. In these 10 seconds, a passenger car can travel about 880 feet, the length of three football fields. As an experiment, the next time you're a passenger in a car, close your eyes and count to 10 slowly. Then open them and see how far you've traveled. Imagine driving that distance with your eyes closed.

Here are some ways to fight falling asleep at the wheel.

 1 Get a good night's sleep before your trip.

 2 Plan to drive long trips with a companion, switching drivers for regular stops, every 100 miles or two hours. Try not to travel more than 10 to 12 hours a day. Passengers should stay awake to talk to the driver.



Avoid medications that make you sleepy or affect motor skills and perceptions.

Here are some symptoms of fatigue: Drifting in the traffic lane and bumping into rumble strips, having trouble remembering the last few miles driven, wandering or disconnected thoughts, having difficulty focusing or keeping eyes open, and yawning repeatedly. ▼

Lynn Tacha is a USMC traffic safety specialist at the Naval Safety Center.

A Message Hits Close to Home

By Lt. Paul N. Berthelotte

Right after I checked into the Naval Safety Center last summer, I read a mishap report about a Marine Corps sergeant involved in a traffic crash. He was driving from home to work at 0545. The drive was uneventful until he dozed off, ran off the road, woke up, and jerked the wheel. Unfortunately, he turned too hard to the left, crossed the other lane, and hit a tree. He was wearing his seatbelt, which saved his life. Because of the early hour, there was no traffic in the oncoming lane when he crossed, and a few minutes later, a passing motorist saw the crash and stopped to help.

The sergeant had been making the one-hour trip regularly for more than a year. He had gone to bed the night before at 2130 and had gotten a good night's sleep. He woke up the next morning feeling fine. The only thing that interrupted his routine was when his eyes shut at 50 mph.

The sergeant's injuries included a broken right ankle, a cut elbow, and knee injuries that required reconstructive surgery. Just recently, doctors removed the last plate from his leg.

Messages of this type come in every day, and normally I would review and file them away, but this message is one I will never forget. Because of it, I have taken a look at my driving habits and made some changes. You see, the Marine's name is my brother. ▼

Major Killer



Even with practice explosives, you must be careful.

Don't laugh. One person was killed and another seriously injured after a stupid stunt where each of them held plasticized explosives in their mouths. Several more were injured in the same manner using blasting caps. They now wear dentures. These mishaps are the product of blatant disregard for standard safety procedures and a total lack of common sense.

The Explosives Qualification and Certification program was implemented because of mis-

haps that occurred from improper handling, loading, processing and testing of ordnance and explosive devices. These mishaps killed 20 Marines and injured 380 others in the last 10 years, attesting to the dangers in handling explosives.

Since 1994, the number of Explosive Mishap Reports and Conventional Ordnance Discrepancy Reports has increased steadily. The most disturbing aspect of this trend is the number of safety-related mishaps that were personnel error. That



number has risen from 491 in 1994 to 563 in 1997. There have been 452 so far in FY98.

The causes of these mishaps can be traced to four major areas:

1. High operational tempo combined with haste and inattentiveness: In a previous article a Marine severely injured his hand while acting as a-gunner on a mortar team. Both he and the gunner had been dropping rounds down the tube, rather than just the a-gunner as in the manual.

2. Inexperience and bad attitudes: Leaders must make sure their Marines have the proper attitude, enough training and experience to safely perform the task assigned. This supervision is essential in the early development of correct explosives-handling skills. A new Marine should never handle explosives without qualified supervision.

However, experienced Marines should listen to that lance corporal or private first class fresh from school. He or she might make you aware of maintenance procedures that have been updated over the years.

3. Ignoring technical and loading manuals, checklists:

When switching to a new weapon system, don't assume your experience with one weapon makes you able to immediately handle any weapon. Take some time to read through the manual and ask an expert on the system

for the gouge. He will be able to relate common problems or mistakes with the weapon.

When conducting range-clearing operations, never pick up ordnance. This rule may save your hands.

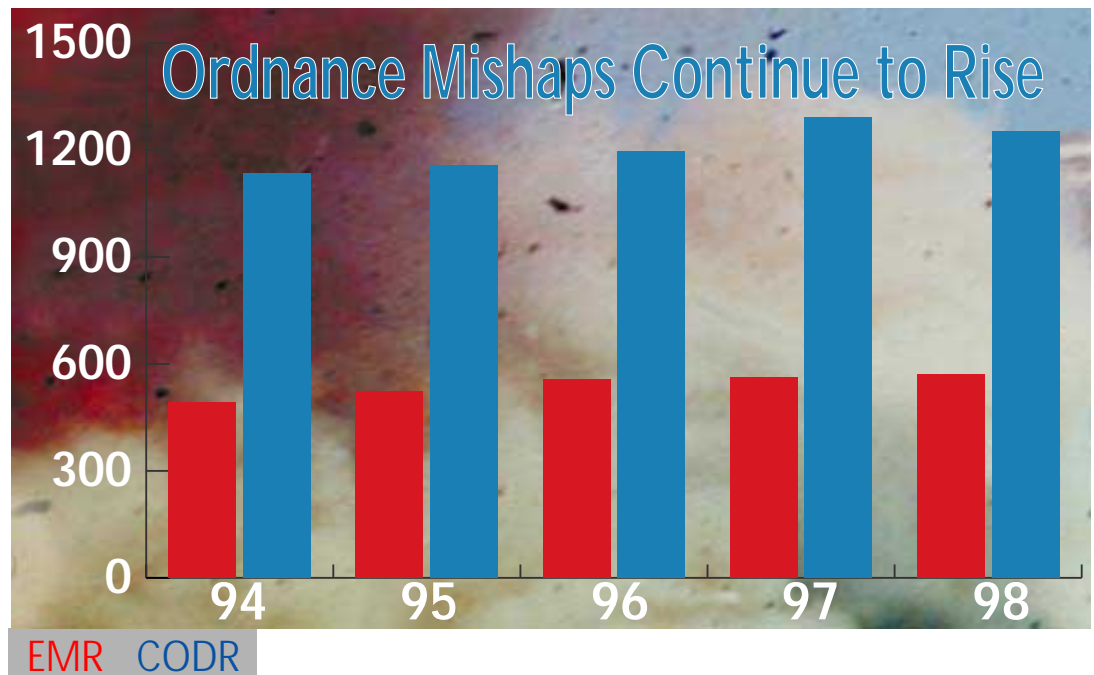
4. Taking unnecessary risks and disregarding common safety practices:

No ordnance is completely Marine-proof. They are designed to explode when and where required, but can also explode when least intended or expected.

For example, one Marine took home a Mk-46 decoy flare. He was dismantling it on his kitchen table, where it ignited and fell onto his lap. He severely burned his genitals and a couple of fingers.

These guidelines are designed to keep you alive and in one piece. The personnel in this article learned the hard way that explosives are not toys or food. Learn from their mistakes, rather than your own. ▼

Reference: Marine Corps Order 8023.3.
The editor can be reached at
pberthel@safecen.navy.mil, (757) 444-3520,
Ext. 7255 (DSN 564).



3 Dead, 18

By GySgt. Brian McGeorge



Three Marines died and 18 were injured in 49 LVS mishaps since FY 94. The injured Marines spent 64 days in hospitals and lost 280 days from work. Marine Corps property and equipment losses amounted to more than \$3 million. These mishaps also caused more than \$94,000 damage to civilian property.

Sixcon containers, used to haul liquids, caused seven of these reported mishaps and accounted for two of the deaths and four of the injuries. The equipment losses from these seven crashes totaled more than \$1 million.

When a sixcon container isn't full, the sloshing liquid makes the trailer sway as it goes around corners. This swaying can make the driver lose control while trying to correct it, and the vehicle can overturn. While the baffle acts to reduce the swaying of the vehicle, it does not totally eliminate the effect from the moving liquid. Drivers need to slow down when

transporting sixcon containers through a series of turns.

One of the mishaps involved a driver who lost control and flipped his vehicle while hauling water. He was not qualified to operate an LVS Mk-48/18. A thorough pre-operation check, as outlined in the LVS technical manual, would have tipped off a qualified operator that the hydraulics-selector valve was in the wrong position. Because it was in the auxiliary (instead of the operational) position, the vehicle didn't have 100 percent steering capability, and the power steering was inadequate.

As the LVS turned left onto the main service road, the driver found excessive play in the steering wheel, and the vehicle started to sway. He gained control but lost it again while traveling down the road at about 45 miles per hour. He over-corrected for the sway and was killed when he turned over the vehicle while trying to bring it back onto the road.

All seven of these mishaps had a common theme: They involved some kind of error by the operator, dispatcher or supervisor. Many Marines don't understand the operational limits of an LVS,



On a steep downgrade with hairpin turns, LVS operators must use low gear to keep from speeding up. They must use the Jacob's brake (which uses engine compression to slow vehicles) and regular brakes to help control their speed. During bad weather, drivers must slow down and stay farther away from vehicles in front of them. This precaution allows more reaction time and distance in which to stop.

Here are some steps you can take to prevent LVS mishaps:

- Have section heads hold annual driver training, and document how people test on negotiating various kinds of terrain and road conditions, while carrying different kinds of freight.

- Make drivers attend monthly driver-safety classes.
- Brief drivers on the area of operations and road hazards before starting a convoy.
- Review the technical manuals for vehicles to become more familiar with their limitations and recovery techniques.
- Do safety checks before and after driving a vehicle.
- Implement quality-control procedures that will identify unserviceable from serviceable equipment. With these procedures in place, an operator won't leave the motor pool driving dangerous equipment.
- Assign motor-transport Marines, fresh out of basic MOS school, to duties as drivers or assistant drivers, not as office personnel. Your concern must be to improve their driving skills. ▼

Editor's Note: Drivers also need to read and be familiar with WSEM alert NR A0010-98 LVS Trailers DTG 231005Z APR 98 FM COMMARCORLOGBASES Albany GA. This alert specifically addresses proper load configurations and speed while operating the LVS.

GySgt. McGeorge is a combat-vehicle analyst in the Shore Safety Programs Directorate at the Naval Safety Center.

Injured



h can haul up to 22 tons of cargo. They don't e that heavy equipment requires more disci- than a HMMWV to control at different s, through varying kinds of terrain, and in bad er. peed is one of the main causes of LVS mishaps. ators may be driving at the posted speed limit, at limit is too high for heavy equipment.



Two Marines Perish Fiery 5-Ton Wre

**An hour into
the exercise,
the training
fell apart.**

I recently investigated a mishap in which two 19-year-old Marines died during motor-vehicle training. The command had many chances to break the chain of this tragedy. It is a case study of how operational risk management (ORM), if it had been applied, would have prevented a mishap.

It was a clear, January day when a group of Marine students began the Interservice Motor Vehicle Operator course (MOS 3531). It was to be a full day of training, starting at 0445 and ending at 2130. The schedule called for day convoy-driver training on unimproved and off-road conditions, with an evening meal in the field and an hour class on night-vision goggles (NVGs). The hands-on training was to resume at twilight.

The instructors set the following rules for the night portion of the training:

- Each five-ton truck was to carry a student driver and a student assistant driver, who was also to use NVGs to help the student driver stay on the trail. At a halfway point in the convoy route, the students were to switch places so each could experience night tactical driving.
- Students were to drive no faster than 5 to 10 mph, and if a student driver lost sight of the truck in front of them, he was to stop until an





instructor arrived. The instructor then would help the student catch up with the rest of the convoy.

The ratio of students to instructors was eight to one, and there were 29 trucks in the convoy. The route they traveled included single-lane trails that expanded into a public access, two-lane gravel road with several sharp turns and grades to four-and-a-half percent or more. Students were to drive this route under blackout conditions. The route had been much shorter, but instructors extended it to 10.5 miles to add more realism. The instructors were responsible for telling range control when they entered and left the training route.

An hour into the exercise, the training fell apart. As drivers in the convoy entered one of the curves in the road, they saw a bright light that construction workers had erected. Because of that light, several drivers lost their night vision, drove off the road, and missed the turn. This delay created gaps in the convoy, which the students tried to close by speeding.

When the truck carrying the two 19-year-olds came to that curve, the driver also lost her night vision and steered off the road. By the time she was back on track, the trucks in front of her were so far ahead that they were out of sight. Going downhill at 25 to 35 mph, she tried to catch up to the trucks in front of her. Near the bottom of the hill, she lost control. The truck spun, slid backwards and sideways, and hit a berm on the edge of the road. The truck then vaulted through the air and landed on its top with such force that the aluminum oil pan on the engine and the transmission case split open.

With the engine still running at one-third throttle, engine and transmission oil sprayed around the battery box located under the



assistant driver's seat. The batteries had no hold-down brackets. They bounced around and shorted out, causing an electrical arc, which ignited the vaporized oils. The truck burst into flames. Other students from the convoy were at the scene within two minutes, but the fire was too intense for any rescue effort. The driver and assistant driver died in the fire.

In all the mishaps recorded for this series of truck in any of the services, this was the first time one had caught on fire after a wreck.

The obvious reasons for this mishap were speed and loss of control, but those are only surface causes. That's where ORM comes in. If people had applied only the basic rules of ORM, these two Marines would be alive.

Before you can develop an effective ORM plan, you have to know the hazards associated with the mission or tasks, what causes the hazards, and what you can do to get rid of them. The investigative team found numerous hazards—each of which could have been corrected before this convoy started out.

The driver of the truck had no previous civilian driving experience and did not have a civilian driver's license before she entered the Marine Corps. She also didn't meet the Marine Corps height requirement for the 3500 series MOS of 64 inches; she was almost 2 inches shorter. This requirement is necessary because drivers must easily reach the foot controls and be able to press the brake pedal hard enough to stop.

The driver had been a weak student and had failed the HMMWV phase of the course. She was being recycled, and instructors said she was showing improvement. However, for this difficult part of the 5-ton training, she probably needed an instructor with her. Instead, her assistant driver was another student. Even though he was considered a good driver, he was no substitute for an instructor.

She had been ill earlier in the week. The day of the mishap, she had told her instructor that she didn't feel well and didn't think she was ready to drive that night. The instructor told her not to drive and to remain as the assistant driver. However, halfway through the night training, she changed positions with her assistant driver.

The training day was extremely long—from 0445 to 2130. This was the student's first expo-

sure to any type of night driving and the students' first exposure to blackout driving.

Range control had not been briefed that training was being conducted. They also didn't know about the new route. When the call for help came into range control, they sent emergency personnel along the old route, where they thought the convoy was. Actually, the mishap happened five minutes from a fire department, but rescue personnel didn't show up until 20 minutes later because of being given the wrong information.

None of the students had fire extinguishers in their trucks.

The convoy was too large to control with the number of instructors available. There were 29 trucks with two students in each—58 students—and only seven instructors. Two were in the lead, two were at the rear, and three were roving.

Part of the training route included a public-access road, which is not authorized.

Drivers were given only 15 minutes to acquire their night vision before beginning the training. They should have been given at least an hour to adjust their vision.

There was no approved training SOP for this course.

No one used ORM to assess the new hazards posed by the changed route.

Several red-flag issues here needed to be addressed. The fact that the student had no previous driving background and had shown poor performance during the training should have prompted more instructor attention. However, the student-to-instructor ratio of 8-to-1 did not allow instructors to devote enough individual time to each student. The program of instruction called for a 6-to-1 ratio. Some of these issues were beyond direct control of the school. However, there were some that could have been controlled at a local level or could have been referred to a higher authority in the chain of command.

Writing an ORM plan may take some time to do before an undertaking, but keep in mind that if a mishap happens, we have to spend even more time investigating it—and somehow tell grieving family members how sorry we are about the deaths of their loved ones. ▼

Mr. Wilder is head of the mishap-investigation division in the Shore Safety Programs directorate at the Naval Safety Center.



Marine Corps Program Personnel

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Dial the extension anytime during the greeting.

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Lynn Tacha Traffic Safety Specialist ltacha@safecen.navy.mil	7139	GySgt. Tod Crady Parachute Safety Analyst tcrady@safecen.navy.mil	7160

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**Find hazards here,
not halfway down**