PREFACE

This publication is intended to provide the military leaders of the Army with the procedures and examples needed to enable them to protect their troops in training or combat from unnecessary risks. Force protection involves providing tough, realistic training coupled with risk controls that protect in training and combat.

This publication is envisioned as a working document intended to grow as risk management ideas mature and expand. Accordingly, the comments and suggestions of users are solicited. Further examples are solicited based on field applications of risk management ideas.

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The estimate often requires rapid thinking, with consideration limited to essential factors. In campaign, exact conclusions concerning the enemy can seldom be drawn. To delay action in an emergency because of insufficient information shows a lack of energetic leadership, and may result in lost opportunities. ***THE COMMANDER MUST TAKE CALCULATED RISKS.***

WAR DEPARTMENT
FIELD SERVICE REGULATIONS
FM 100-5 OPERATIONS
MAY 22, 1941

RISK MANAGEMENT
REFERENCE GUIDE & COURSE BOOK

CHAPTER 1
INTRODUCTION TO SAFETY RISK MANAGEMENT

The Challenge

Current projections indicate that the Active Army will have about 535,000 soldiers by 1995. That is a major reduction from the nearly 800,000 of the last several years. On the other hand, there is no real reduction in the Army's mission. The Army still must respond to the call of the nation's leaders to fight the AirLand Battle anywhere on the globe, in the shortest possible time and win with the least possible casualties. If anything, the mission will become more difficult because more of the Army will be CONUS-based. This increases the requirement to deploy over long distances to get where the fighting is. If the Army is going to accomplish all that it has in the past, and do it with 20% fewer soldiers, then clearly it must be a more efficient combat force. But how can that gain in efficiency be achieved? Part of the answer can be found in extensive application of safety risk management (SRM) in training and combat. How can SRM contribute to an expanded combat capability? Consider the following:

a. As the external threat appears to decline in the public's eye, the Army can expect an increasing intolerance of accident losses in training. Even before the end of the cold war public scrutiny and oversight of Army training accidents had been increasing. In the current climate, we can expect even closer review of serious accidents by outside Congressional, media, and even parental/family influences. SRM, with its power to improve training safety, will enable us to considerably improve our training safety record even as we maintain and expand the realism and effectiveness of our training.

b. With the smaller force, training as we have in the past will not be good enough. We will need to expand our capabilities through tougher, more realistic training. But tougher, more realistic training inevitably means greater risk and more training accidents - which society does not want and may not accept. But what if SRM can improve realism and cut training accidents? Then we could actually expand our operational capabilities, yet have fewer accidents. That is exactly what SRM can do, as will be demonstrated in this publication. Accordingly, SRM should be considered a vital element in the Army's effort to successfully complete the transition ahead and emerge as an organization still fully capable of carrying out its mission.

c. Accident losses in combat have long been a drain on Army combat capabilities. At least 20% and as high as 80% of Army personnel and material losses in combat have been the result of accidents (FIGURE 1-1). SRM can reduce this toll by 50% or more thereby contributing significantly to combat power and force protection.

In summary, SRM can contribute effectively to the Army's organizational

and operational objectives in the years ahead in unique and important ways.

Introduction to SRM

Safety risk management is the application of systematic thinking to the problem of making military operations safer (enhancing force protection) and more effective. It is a systems based concept. The concept grew out of ideas that were originally developed to improve safety in the development of new weapons, aircraft and space vehicles, and nuclear power (FIGURE 1-2).

ORIGINS OF SAFETY RISK MANAGEMENT

- **WEAPONS DEVELOPMENT**
- **NUCLEAR WEAPONS, REACTOR DEVELOPMENT AND OPERATIONS**
- **AEROSPACE**

FIGURE 1-2

The ideas are especially effective in dealing with complex, high risk activities. It is this capability that has led to their application to tactical training missions, which are often both complex and high risk. These applications have been very successful on a small scale. They are now proven and ready for widespread integration in Army training. Safety risk management is not a "science" in the sense that it provided leaders with a precise course of action. Neither is it just common sense" or "something good leaders have always done." SRM is an important new tool for the improved conduct of training and combat operations that is intended to integrate fully in established Army systems. It is an "art," but an art based on systematic procedures and specific techniques.

Risk management ideas have already been used successfully in many other areas of Army operations. Prominent among these are the intelligence field (AR 380-19), security (AR and DA PAM 190-51), finance, and tactical doctrine (FM 100-5) (FIGURE 1-3). These applications have demonstrated the ability of risk management to improve operations well beyond more traditional, ad hoc management procedures.

OTHER ARMY RISK MANAGEMENT APPLICATIONS

- **INTELLIGENCE (AR 380-19)**
- **FINANCE**
- **PHYSICAL SECURITY (AR 190-51, DA PAM 190-51)**
- **TACTICAL DOCTRINE (FM 100-5)**

FIGURE 1-3

FIGURE 1-4 outlines five basic definitions associated with SRM. In considering these definitions there are some key points to keep in mind as follows:

KEY DEFINITIONS

- **HAZARD** - A condition with the potential of causing injury to personnel, damage to equipment or structures, loss of materiel, or reduction of ability to perform a prescribed function.
- **RISK** - An expression of possible loss over a specific period of time or number of operational cycles.
- **RISK ASSESSMENT** - The process of detecting hazards and systematically assessing their overall risk. It is a part of the Risk Management Process.
- **RISK MANAGEMENT** - The process whereby management decisions are made and actions implemented to reduce the effects of identified hazards.
- **GAMBLING** - Making nonsystematic risk decisions.

FIGURE 1-4

a. Hazards exist everywhere; To commanders, hazards can't be considered effectively in their training or operations planning until they are converted to "risks." As risks, the loss potential and

probability can be estimated. When the risk of a hazard is estimated, it becomes possible to make rational decisions on risk control options and adopt a course of action.

b. Once a hazard has been uncovered and a risk assessment has been made, the leader is compelled to continue the process. He has to decide what options exist to control the risk then select a course of action. He must then implement the selected controls and supervise to assure their effectiveness. These five steps - hazard identification, hazard assessment, risk control options and decisions, risk control implementation, and supervision - constitute a logical process for control of the problem of risk. Some Army leaders have concluded that all that is needed is "risk assessment." They direct subordinates to conduct "risk assessments" of training or operations. Of course it is essential to find the hazards before the risk can be assessed. Then, when risk is assessed, something needs to be done to control it and make risk acceptance decisions. The process is proper risk management, not just risk assessment.

c. In FM 100-5, the Army proclaims the need for bold, risk taking leaders. But how do you distinguish between a bold risk taking leader and one who simply "gambles" with the lives of his troops? The answer is found in the SRM process. The bold risk taking leader makes use of the SRM process to detect and control risks and balance risk benefits against risk costs. The "gambler" just does it. He doesn't try to identify risks and he does little, if any, consideration of risk costs versus benefits. His subordinates are usually the ones who pay the price when the gamble fails. In a nutshell, the risk managing leader can reasonably predict the results of his decisions and is satisfied with the cost benefit of the result. The gambler has no idea of the outcome of his decisions.

SRM Rules and Processes

FIGURE 1-5 summarizes the four basic rules of SRM. Key issues on each of these points include the following:

a. The first rule is one of simple efficiency and economy. It saves money and improves efficiency if SRM is integrated early in the planning life cycle of training or combat operations. Risks are more easily assessed and managed in the planning stage of an operation. If risk control measures are tacked on as an afterthought in the training area or on the battlefield, they will probably fail.

b. The key word in the second principle is "unnecessary." An unnecessary risk is any risk that, if taken, will not contribute meaningfully to mission accomplishment. Leaders who accept "unnecessary" risks are gambling with the lives of their soldiers -- for nothing.

FOUR RULES OF
SAFETY RISK MANAGEMENT

- **INTEGRATE INTO PLANNING**
- **ACCEPT NO UNNECESSARY RISKS**
- **MAKE RISK DECISIONS AT THE PROPER LEVEL**
- **ACCEPT RISK IF BENEFITS OUTWEIGH THE COST**

FIGURE 1-5

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c. What is the "right level" of risk decision in the third rule? It is a level where the decision maker has the experience and maturity to make a good decision. Normally this is the leader directly responsible for the mission. On the other hand, decisions should be made at the lowest possible level consistent with the preceding sentence. This is because junior leaders will have to make tough risk decisions on the AirLand Battlefield. They need the practice in training. This is why training must be developed in such a way that junior leaders must make risk decisions, but their mistakes must not be allowed to kill or injure soldiers. More on how to do this is in chapters 2 and 3.

d. The fourth rule recognizes two key ideas. The first is that nothing humans do is risk free. There is always risk. And where there is risk, sooner or later there will be accidents. The second is that Army leaders are in the risk-taking business. We strive to make our weapons more lethal, our operational tempo (OPTEMPO) faster and longer, and our synchronization and coordination ever more precise. We seek these things in training, despite the risk, because of the benefits they pay in combat. As FM 25-100 instructs, when we are proficient at a given level of performance, we challenge ourselves to reach a new level. Leaders who are in the risk-taking business must be top quality risk managers.

The SRM Process

The SRM process is depicted at FIGURE 1-6. It is based on the Army's basic problem solving concepts as outlined in FMs 101-5 and 22-100. The process begins with the detection of hazards. The importance of this step is illustrated by the fairly obvious fact that if you don't detect the hazard, you can't assess or control the risk it creates. In chapter 2, Improve Training Safety, we will examine a variety of techniques designed to improve the hazard detection capabilities of the typical junior leader. The second step is hazard

FIGURE 1-6

assessment. Here the objective is to determine the potential impact of a hazard on the mission. There are two major considerations. One is probability - how likely is the hazard to cause loss? The other is severity - if the hazard does cause a loss, how severe will that loss be? We'll cover risk assessment procedures in Chapter 5 in the context of improving training safety. The third step is to create as many risk control options as possible and then select those that best control risks without significantly impeding mission objectives. This is the tough part: finding the proper balance between risk control and mission needs. Step 4, risk control implementation, involves the integration of risk controls into standard operating procedures (SOP), operational plans (OPPLAN), and similar operational directives. Finally, effective supervision (step 5) assures the sustained effectiveness of risk controls.

Levels of Risk Management

The nature of Army operations requires that the safety risk management process be tremendously flexible. Army leaders must often make tough, complex decisions in a matter of minutes or even seconds. The SRM process must compress these time frames or be left out. On the other hand, many decisions involving the lives of soldiers permit weeks or months of staff work. It is appropriate to use this time effectively, requiring more detailed risk management. As shown at FIGURE 1-7, the SRM process can be expanded progressively until the "deliberate" level of SRM is reached.

LEVELS OF SAFETY RISK MANAGEMENT

HASTILY EXECUTED OPERATIONS

(The only difference between these operations and deliberate operations is planning time available. The method of execution and skills required are trained for.)

MENTAL CONSIDERATION OF THE SAFETY RISK MANAGEMENT (SRM) PROCESS AS A PART OF THE OPERATIONAL ESTIMATE.

ADD TIME AND TECHNIQUES

DELIBERATE OPERATIONS

PLANNED NEAR TERM OPERATIONS. APPLICATION OF THE SRM PROCESS USING WORK SHEETS AND THE CORE ELEMENTS OF THE PROCESS, E.G. OPERATIONAL ANALYSIS, PHA, RISK CONTROL OPTIONS, TRAINING REALISM ASSESSMENT, IMPLEMENTATION PROCEDURES AND SUSTAINED MONITORING.

ADD TIME AND TECHNIQUES

LONG TERM MISSION CONCEPT

PLANNED LONG TERM OPERATIONS. IN-DEPTH WORKING GROUP APPLICATION OF MORE DETAILED QUALITATIVE AND QUANTITATIVE TECHNIQUES, ESPECIALLY IN THE HAZARD IDENTIFICATION, HAZARD ASSESSMENT AND RISK CONTROL

OPTIONS PHASES.

FIGURE 1-7

The deliberate level of risk management is considered to be especially appropriate for development of tactical training. Typical actions associated with deliberate risk management are outlined at FIGURE 1-8. Several applications of deliberate SRM will be provided in the Improve Training Safety and Improve Training Realism chapters of this publication. When risk is particularly high and time and resources permit, "in-depth" SRM is appropriate. For example, a major new training initiative such as use of night vision goggles in various operations would warrant in-depth SRM.

STEPS IN DELIBERATE RISK MANAGEMENT

Following are the elements of basic risk management that might be conducted on a typical training operation. This process will assure a high degree of safety while allowing more realism in all training operations.

THE OVERALL SRM PROCESS	SPECIFIC ACTIONS
	Action 1. Make an operations analysis. An operations analysis is simply a description, normally in time sequence, of the events that are expected to occur during the operation. *Break the operation down into "bite size" chunks.*
HAZARD IDENTIFICATION	Action 2. Make a preliminary hazard analysis (PHA). This is a list of the various hazards that could occur and result in accidents. It is developed using experience, databases, brain storming, scenario thinking, and similar techniques.
	Action 3. If necessary, use more in-depth hazard analyses. These are normally used when time permits and certain risks may require more careful consideration to be fully understood.
HAZARD ASSESSMENT	Action 4. Assess the hazards. Determine the relative probability and severity of the various hazards that have been discovered and their potential impact on the mission. *HAZARD IDENTIFICATION and HAZARD ASSESSMENT combine to form a RISK ASSESSMENT.*
RISK CONTROL OPTIONS & DECISION MAKING	Action 5. Develop risk control options starting with the most serious risks. Action 6. Complete a Training Realism Assessment (TRA) to assure the suitability of risk controls. Action 7. Make risk decisions. Select those risk controls that will reduce the risk to a practical minimum consistent with mission objectives.
IMPLEMENT	Action 8. Implement the risk control procedures. This

CONTROLS is best accomplished by integrating them as standards in unit SOPs, orders, and training operations.

Action 9. Maintain the effectiveness of risk controls.

SUPERVISE Assure that risk control standards are performing as expected and that they are being maintained at a high level.

FIGURE 1-8

In-depth SRM normally involves all the actions associated with the deliberate process plus more in-depth analyses as described in FIGURE 1-9. In-depth analyses will generally involve major input from safety professionals. No matter how little or how great the time available, there is an appropriate SRM process to fit the bill. Leaders need to be provided a spectrum of SRM capabilities up to at least the deliberate level.

PROCEDURES FOR
IN-DEPTH SAFETY RISK MANAGEMENT

In-depth safety risk management involves all of the procedures associated with the deliberate safety risk management process, plus the following:

a. Much more extensive coordination among subject matter experts. Examples might include representatives from various branch schools (infantry, armor, etc.). Technical experts from various material specialties may be consulted within Army Material Command (AMC).

b. Use of more complex analyses such as formal logic diagrams (fault tree, cause and effect, failure mode and effect), multilineal event analyses, energy analysis. Quantitative analyses may also be possible using information from various databases. Such analyses may be able to actually estimate the kind and extent of losses to be expected from various courses of actions.

c. Testing. Often it may be feasible to actually test the risk associated with various courses of action by evaluating them in operation on a small scale.

d. Higher level and more formal risk acceptance procedures. Risk decisions may be formalized and documented in more detail. They may be elevated to higher levels of command.

e. More coverage of the operational lifecycle. Safety risk management may begin earlier and extend much longer over the lifecycle of the system being managed.

FIGURE 1-9

The Benefits of Safety Risk Management

SRM produces three direct benefits and one overall benefit. The three direct benefits are:

a. Major improvement in training safety. The U. S. Army is probably the best in the world at conducting tough realistic training with excellent levels of safety. Some of this superiority is due to the investment in such superb training facilities as the National Training Center (NTC) and Joint Readiness Training Center (JRTC). Some is due to the creativity and innovation of leaders at all levels. As good as the Army is, SRM has the potential to improve safety performance by 50% or more over current levels without any adverse impact on training effectiveness. The details of how this benefit is produced will be covered in the Improve Training Safety section of this publication. There are two reasons for making the prediction of 50% or more improvement in training safety. The first is extensive experiments and studies conducted by the Nuclear Regulatory Commission, NASA, and the National Institute of Occupational Safety and Health (NIOSH). In these experiments, test subjects were consistently able to improve their ability to detect and control hazards by 50% or more using SRM techniques. compared to traditional procedures. The second is the results achieved in actual application to Army training operations. Examples presented in the next chapter will support the 50% projection.

b. Significant Improvement of Training Realism. It is not immediately obvious how a safety program (or "Force Protection" program as it is combing to be called) can serve to increase training real is m. The reason SRM can contribute to training realism is that the procedures used in the past to develop safety controls often led to imposition of ineffective and unneeded risk controls. For example, a serious accident occurs. The commander reacts to the problem by imposing stringent safety rules. These rules may have been intended as an interim measure. All too often they become institutionalized and permanent. The result is degraded training effectiveness. SRM has procedures that allow us to detect these ineffective or overly restrictive risk controls and eliminate or modify them. These procedures will be demonstrated in the Improve Training Realism chapter. Remarkably, it is usually possible to improve training safety and improve training realism in the same training activity. This is because traditional risk controls are the result of a hit-or-miss intuitive and ad hoc style of risk management. The result of this approach is typically overcontrol of risk in some areas and undercontrol in others. The systematic nature of the SRM apProach detects both these situations and allows the commander to correct both. The result is much safety and significantly more realistic training.

c. Improve Combat Safety. In the past, U.S. Army accidents in combat have consistently accounted for at least 20% of all casualties and 40% of material losses. In the most recent conflicts, the accident related casualties have been closer to 50%. These figures exclude losses due to fratricide, which is a special kind of accident. There is good evidence that these losses can be reduced by as much as 50% - without any significant adverse impact on operational effectiveness or resource demands. In fact, the prevention of accident losses is obviously an important operational gain. Some of this evidence is directly from the battlefield. The 4th Infantry Division reduced accidents in Viet Nam by a full 50% - on a year-to-year comparison while maintaining a generally consistent OPTEMPO. The reason that reductions of this scale can be achieved is that the typical unit moving into combat experiences accidents at a rate 10 times that encountered in the garrison environment. Most of this increase occurs in relatively few areas (weapons, motor vehicles, fires, etc.). These areas can easily be targeted for effective controls even in the middle of combat operations. Even greater improvements in combat safety should be possible for a unit that has applied SRM in training. Such a unit will

have safety standards that transition easily to combat, and will have trained both more realistically and safer than units have in the past. The result will be improved safety performance in combat. SRM also can be used directly in combat. It helps to improve management of accident risk in operational planning and in the operation of vital logistical links. The bottom line is that SRM can cut combat accident losses by 50% - or more. Details will be provided in the Improve Combat Safety chapter.

Finally, Improved Overall Combat Potential is gained. As a result of the three factors outlined above, the Army's combat potential can be improved considerably above current levels. The many elements contributing to this improvement are summarized in the Improve Combat Potential section of this publication. This enhanced capability could be the "edge" that produces victory on some future battlefield. It is certainly one of the ways to enhance the leaner Army of the future in meeting its worldwide mission responsibilities.

SUMMARY

The objective of safety is to help units protect strength through accident prevention which will enable us to win fast with minimum losses. Safety starts with readiness and readiness depends on a unit's ability to perform its mission essential tasks list (METL) to standard. The commander includes initial risk management as part of his METL development process. The readiness standards he can use to judge his unit include: do I have soldiers with the self-discipline to consistently perform tasks to standards?; does my unit have leaders who are ready, willing, and able to enforce standards?; do we have training that provides skills needed for performance to standard?; do we have the existence of standards and procedures for task performance that are complete, clear and practical?; and do we have the necessary support for task performance, including required equipment, maintenance, facilities, and services? Ready units are prepared to perform the Battlefield Functions to standard. Battlefield Functions are the major elements that provide organization and direction to the performance of soldiers (MAN) and equipment (MACHINE) on the battlefield (OPERATIONAL ENVIRONMENT). It is also the area where SRM can have the greatest and most direct interface. Efficient and effective Battlefield Functions performance permits the requirements of AirLand imperatives to be met and leads to fully successful accomplishment of the AirLand tenets. This produces the desired result of winning fast with minimum loss of soldiers and equipment.

CHAPTER 2
NEXT ACCIDENT ASSESSMENT

As previously discussed, the first step in safety risk management is ***HAZARD IDENTIFICATION***. This requires the gathering of information. The more information obtained, the better the decisions should be concerning possible countermeasures or acceptable levels of risk. An excellent place to begin information gathering is to conduct ***The Next Accident Assessment***.

The Next Accident Assessment is a short two-part assessment that is based on the top five causes of human-error accidents in both ground and aviation over the last ten years. Human error has historically accounted for 80 percent of all Army accidents. The causes of human error accidents involve self-discipline, leadership, training, standards, and support. The Next Accident Assessment helps evaluate the potential risk of an individual or unit that may cause the next accident. The assessment is based on three questions soldiers and leaders must ask themselves as part of their personal accident effort. They are:

·Who will have the next accident?

·What kind of accident will it be?

·What am I doing about it?

The two components of the assessment are an individual assessment soldiers administer to themselves, and a commanders' and leaders' assessment used to record unit data.

On the individual assessment (*Copy included in* **ASSESSMENT** APPENDIX), soldiers rate their self-discipline, their leadership, the training they receive, and the support they get in the performance of their work. Point values are assigned to each answer, allowing solders to grade themselves and assess their personal risk of causing an accident.

The leader's assessment (FIGURE 2-1, *provided later in this chapter*) covers the same subject areas, but asks commanders for specific figures on unit training, equipment, test scores, proficiency, and counseling. They can then determine the likelihood of an accident happening within their unit.

INDIVIDUAL ASSESSMENT

Self-discipline

Although an individual may know the standard for performing his job tasks and has been trained to perform those tasks to standard, he may frequently choose not to. This selective noncompliance is often the result of the person's attitude. That would indicate a lack of self-discipline. The indicators listed below can provide a profile of an undisciplined

individual. Points are assessed for undiscipline if the individual has:

a. Been formally or informally counseled for poor performance or conduct on or off duty. Examples include:

·Elected not to follow instructions, procedures, or laws.
·Took unnecessary risks.
·Exhibited inappropriate personal conduct or irresponsibility.
·Not finished assigned work (dependability).
·Habitual lateness.
·Is not a team player.
·Makes inappropriate decisions for his age, grade or rank, or experience.

The individual would give himself 8 points if he has been counseled 3 times for any combination of the above reasons in the last 12 months, or more that 4 times in the last 24 months.

b. Has had at fault reportable accidents (vehicle or nonvehicle, on or off duty) or traffic citations on or off duty.

NOTE*: *At fault is defined as knowingly and willfully doing something wrong that caused the accident. And a reportable accident is one requiring a police report, accident report, or insurance claim.

The individual would give himself 8 points if he had 2-4 accidents or citations in the last 12 months, or 5 or more in the last 24 months.

c. Abused alcohol or drugs. Examples include:

·Missed all or part of a workday because of alcohol or illegal drugs any day during the past 12 months.
·Been on duty while under the influence of alcohol or illegal drugs any day during the past 12 months.
·Been referred to Community Mental Health or other agency for alcohol/drug abuse evaluation during the past 24 months.

The individual would be given 8 points if any of the above examples apply to him.

d. Received judicial or nonjudicial punishment. Examples include:

·Deserted.
·Went Absent Without Leave (AWOL).
·Committed any crimes against property.

·Committed any crimes of violence.

The individual would be given 8 points of he had received punishment for any of the above in the last 24 months.

e.GT Score (enlisted personnel only).

Eight points are given if the individual has a GT score of 90 points or less.

f.Sex and age.

The individual is given 8 points if he is a male under the age of 25.

Leadership

The attitude of an immediate supervisor plays an important role in developing or nurturing how his subordinates perceive safety. If a supervisor is not ready, willing, or able to supervise subordinates' work and enforce performance to standards, it will adversely impact on the unit and mission accomplishment. Examples include:

·Supervisor does not have sufficient technical knowledge or experience or management ability to properly supervise.

·Supervisor tolerates below standard performance, rarely makes on the spot corrections, does not emphasize by the book operations, or is reluctant to take disciplinary action.

18 points would be given if an individual's supervisor fits either example.

Training

If individuals do not receive the training needed to perform their job tasks to standards, they will suffer an increase risk in accident potential. This means insufficient, incorrect, or no task training that should have been provided by schools, the unit, or an on the job training (OJT) program. Indicators of insufficient training include:

·Last MOS SDT (SQT) score was less than 70.
·Not proficient in tasks outside the individual's job series or MOS (other duties assigned) but are required to do in his current job.

18 points are given if either of the above examples fit an individual.

Standards

Soldiers are frequently required to perform tasks for which task-conditions-standards or procedures either do not exist, are not clear, or are not practical. Examples these three shortcomings may exist include:

·Tasks in the soldier's MOS (common and MOS tasks) or job series.
·Tasks outside of the individual's MOS or job series (other duties) that are assigned to him.

8 points are given if either example applies.

Support

Frequently soldiers are tasked to perform some mission without the support appropriate to performing the task to standards. In today's Army, ever dwindling resources, both in manpower and material, will be the norm. Doing "everything with nothing" will become a standard practice and the associated risks must be dealt with. Examples of areas where shortcoming may exist include:

·Personnel (don't have complete crews for systems, wrong MOS, not trained to standards, etc.)
·Equipment (TA-50, weapons, transportation, personnel protective or safety equipment, etc.)
·Supplies (ammo, fuel, food, water, parts, clothing, publications, etc.)
·Services/facilities (maintenance, medical, personnel services, storage, etc.)

8 points are given if shortages in any example applies.

At this time the individual would total up the number of points he has given himself. He would find out where his score fits on the scale below to determine his individual risk of causing the next accident.

POINTS	**0-20**	**21-30**	**31+**
RISK	**LOW**	**MEDIUM**	**HIGH**

The individual would then have an understanding of the risk he presented in making a mistake that would cause the next accident and what the reasons would be. The individual and the chain-of-command can reduce the individual's risk by taking actions to correct or control those reasons/faults that apply to the individual.

COMMANDERS AND LEADERS ASSESSMENT

This is an accident risk assessment of personnel rated by the commanders/leaders. They would complete the assessment form by doing the following:

·List the name of each person they now rate. The leader would be the first-line supervisor. **NOT** included are personnel for which the leader is the intermediate or senior rater. The form at FIGURE 2-1 has space for only 10 personnel. For more than ten personnel, simply continue on an additional form.

·The leader would then answer questions on the Next Accident Assessment for each person he rates. Points would be assigned to each person as indicated.

·Each person's points would be added up and entered at the bottom of the form. Then the points are used to determine the accident risk to each person. The same scale is used in the individuals test:

POINTS	**0-20**	**21-30**	**31+**
RISK	**LOW**	**MEDIUM**	**HIGH**

Each person's risk would be entered at the bottom of the page.

There are some variations of the assessment, based on the type of unit:

·If the unit/organization is combat, combat support, combat service support or any other unit that conducts cyclical training:

- *When answering questions 2 through 5, the leader would answer them with respect to the individual/collective tasks the leader anticipates his unit/organization performing during the next training cycle.*

·All other units/organization:

- *When answering questions 2 through 5, the leader would answer them with respect to the individual/collective tasks routinely performed by his unit/organization.*

·Military Commanders and Leaders:

- Squad Leader/ Omit question #2. Answer all

Team Leader other questions for soldiers in their squad/team.

- Platoon Leader/ Platoon Sergeant — Answer all questions for their leaders and other sergeants.

- Company Commander — Answer all questions for their platoon leaders and platoon sergeants.

- Battalion Commander — Answer all questions for his company commanders and battalion staff.

·Civilian Supervisors

- First Level — Omit question #2. Answer all other questions for personnel under their direct supervision.

- Second Level — Answer all questions for supervisors and staff personnel under their direct supervision.

Self-discipline

Although an individual may know the standard for performing his job tasks and has been trained to perform those tasks to standard, he may frequently choose not to. This selective noncompliance is often the result of the person's attitude. That would indicate a lack of self-discipline. The indicators listed below can provide a profile of an undisciplined individual. Points are assessed for undiscipline if the individual has:

a. Been formally or informally counseled for poor performance or conduct on or off duty. Examples include:

·Elected not to follow instructions, procedures, or laws.
·Took unnecessary risks.
·Demonstrated inappropriate personal conduct or irresponsibility (example - wrote bad checks)
·Not finishing assigned work (dependability).
·Lateness.
·Not being a team player.
·Inappropriate decisions for age, grade or rank, or experience.

On the answer sheet, 8 points are given for each person he currently rates and has been adversely counseled 3 times for any combination of the above reasons in the last 12 months, or more than 4 times in the last 24 months.

b. Has had at fault reportable accidents (vehicle or nonvehicle, on or off duty) or traffic citations on or off duty.

NOTE*: *At fault is defined as knowingly and willfully doing something wrong that caused the accident/citation (examples include speeding, DUI, inattention, not following procedures). And a reportable accident is one requiring a police report, accident report, or insurance claim.

On the answer sheet, 8 points are given for each person the leader currently rates who has had 2-4 accidents or citations in the last 12 months, or 5 or more in the last 24 months.

c.Abused alcohol or drugs. Examples include:

·Missed all or part of a workday because of alcohol or illegal drugs any day during the past 12 months.
·Been on duty while under the influence of alcohol or illegal drugs any day during the past 12 months.
·Been referred to Community Mental Health or other agency for alcohol/drug abuse evaluation during the past 24 months.

On the answer sheet, 8 points are given for each individual rated if any of the above examples apply to him.

d.Received judicial or nonjudicial punishment. Examples include:

·Deserted.
·Went Absent Without Leave (AWOL).
·Committed any crimes against property.
·Committed any crimes of violence.

On the answer sheet, 8 points are given for each individual rated if he had received punishment for any of the above in the last 24 months.

e.GT Score (enlisted personnel only).

On the answer sheet, 8 points are given for each person rated who has a GT score of 90 points or less.

f.Sex and age.

On the answer sheet, 8 points are given for each person rated who is a male under the age of 25.

Leadership

If a supervisor is not ready, willing, or able to supervise subordinates' work and enforce performance to standards, it will adversely impact on the unit and mission accomplishment. Examples include:

·Leader/Supervisor does not have sufficient technical knowledge or experience or management ability to properly supervise.

On the answer sheet, 6 points would be entered for each subordinate leader/supervisor being rated who fit the example.

·Leader/supervisor tolerates below standard performance, rarely makes on the spot corrections, does not emphasize by the book operations, or is reluctant to take disciplinary action.

On the answer sheet, 12 points would be given for each subordinate leader/supervisor being rated who fits this example.

Training

Those personnel under a leader's immediate control who did not receive the training needed to perform their job tasks to stan will suffer an increase risk in accident potential. This means insufficient, incorrect, or no task training that should have been provided by schools, the unit, or an on the job training (OJT) program. Indicators of insufficient training include:

·Last MOS SDT (SQT) score was less than 70.

On the answer sheet, 9 points are given for each person being rated who fits this example.

·Not proficient in tasks outside the individual's job series or MOS (other duties assigned) but are required to do in his current job.
On the answer sheet, 9 points are given for each person being rated who fits this example.

Standards

Soldiers and leaders often perform tasks for which guidance is broad or the mechanics for executing the assignment are left to the leader with the responsibility to accomplish the mission. Points are given for individuals who **frequently** perform job tasks for which task-conditions-standards or procedures either do not exist, are not clear, or are not practical. Examples of these shortcomings include:

·While conducting vehicle performance tests, two M1 tank drivers, traveling in opposite directions on test track, collided head on.

No procedures had been established to control movement on the test track.

·Driver attempted to make U-turn in M817 dump truck but turning radius of vehicle was too wide to complete the turn. Drivers PAM did not contain clear and concise guidance on proper procedures for making U-turns in large vehicles.

·Service Member, removing a 195-LB rear wheel assembly from an M35A2, 2 1/2-ton cargo truck, injured his back. He did not seek assistance in performing this task because the procedure in TM 9-2320-209-10-4 is not practical, i.e., it indicates that one person can safely lift the wheel assembly unaided.

On the answer sheet, 4 points are given for each person the leader rates that fits any of the above examples.

Support

Ever dwindling resources, both in manpower and material, will force the leader of tomorrow to do "more with less." Soldiers will, through no fault of their own may not receive the support needed to perform job tasks to standard. Examples of areas where shortcoming may exist include:

·Personnel (don't have complete crews for systems, wrong MOS, not trained to standards, etc.)

·Equipment (TA-50, weapons, transportation, personnel protective or safety equipment, etc.)

·Supplies (ammo, fuel, food, water, parts, clothing, publications, etc.)

·Services/facilities (maintenance, medical, personnel services, storage, etc.)

On the answer sheet, 2 points are given if shortages in any example applies to any person the leader rates.

Summary

The Next Accident Assessment provides individuals a personal risk appraisal and awareness of risk generating factors. It will also provide commanders and leaders with a tool to help determine Battlefield Functions and unit accident risk for its Mission Essential Task List (METL). Additionally, it provides the commander with the ability to identify readiness shortcomings for control actions and reduce accident risks before execution of training or operations.

CHAPTER 3

SAFETY RISK MANAGEMENT IN HASTILY EXECUTED OPERATIONS

In the past, there was a common misconception that Safety Risk management (SRM) had application only after lengthy and bureaucratic paperwork requirements are completed. It was also thought that all decisions had to be documented in the event something went wrong and prompted an accident investigation team to start asking embarrassing questions of the command. Today, the U. S. Army Safety Center (USASC) Centralized Accident Investigation (CAI) teams are directed to center their investigations around the thought processes that went into making a decision, not on policing up the paperwork trail. The USASC also concedes that the "thought process" is the key element in SRM.

The vast majority of the SRM decisions an individual will make over the course of a lifetime will be the result of a mental consideration of the SRM process as a part of the operational estimate. SRM is not meant to replace such elements of military training as "crew drill" or "actions on contact" when there is little or no time to evaluate the situation to make a decision. In these instances the individual or team is required to act instinctively in order to stay alive.

When an individual is queried about the thought processes he uses to make decisions on a day to day basis, he will normally respond with, ***"I just use common sense."*** In some instances, an individual may instinctively use some sort of analytical process to rationally weigh all the options available to him before he decides on a course of action. Unfortunately, most individuals use, what is termed as, an **"experiential intuitive"** decision making process. Experiential intuitive decision making occurs when an individual is confronted with an unusual situation that requires a decision. The individual will "sort through" his brain for a similar situation that he has committed to memory (either one he has experienced personally or one he has had related to him). He then modifies the old situation's solution, based upon the new parameters, and quite literally, pulls an answer off "the top of his head." The primary focus of the experiential intuitive decision making process is coming up with a solution, any solution. Whereas SRM is focused coming up with the **right** solution. In the past, American soldiers have been able to very effectively use the experiential intuitive process. This is mainly because of the varied experiences of each soldier, the willingness of soldiers to share experiences and the fostering of an atmosphere that support development of uninhibited solutions to problems.

SAFETY RISK MANAGEMENT CONTRAST

TRADITIONAL METHOD	SRM PROCESS
"COMMON SENSE"	
RANDOM	METHODICAL
MORE OMISSION	LESS OMISSION
UNINFORMED DECISION	INFORMED DECISION

FIGURE 3-1

FIGURE 3-1 illustrates the differences between the traditional decision making process and SRM. Traditional or common sense decisions are random, less methodical. Therefore they will suffer more omissions. SRM, being analytical, identifies more of the hazards. And mere knowledge of a hazard can often negate or lessen the potential results of it. Even when a viable countermeasure cannot be put into effect, the individual, when warned of a hazard, has some responsibility for his own well being and survival. As illustrated in FIGURE 3-2, the individual is a part of the decision making process and has some say in what he will do to preserve his own life and limb.

THREE TIERS OF SAFETY

COMMAND LEVEL	LEADER LEVEL	INDIVIDUAL LEVEL
1. PLAN FOR SAFETY.	1. EMPHASIZE ADHERENCE TO STANDARDS AND ACCIDENT PREVENTION.	1. TAKE RESPONSIBILITY FOR PERSONAL SAFETY.
2. SET SAFETY STANDARD.	2. ASSESS AND BALANCE RISK AGAINST TRAINING OR OPERATIONAL REQUIREMENTS.	2. RECOGNIZE UNSAFE ACTS AND CONDITIONS AND DO SOMETHING ABOUT THEM.
3. CONDUCT TRAINING CONSISTENT WITH ABILITIES OF TRAINERS.	3. RECOGNIZE, AND ELIMINATE OR CONTROL, HEALTH AND SAFETY HAZARDS.	3. PERFORM TO STANDARDS.
4. RESOURCE SAFETY.	4. REENFORCE POSITIVE COMMAND CLIMATE TOWARDS SAFETY	4. MODIFY YOUR OWN RISK BEHAVIOR.
5. MAKE RISK ACCEPTANCE DECISIONS WHEN YOU CAN'T ELIMINATE THE RISK.	5. MAKE RISK DECISIONS, SUPERVISE AND FOLLOW UP.	5. WORK AS A TEAM MEMBER (CREW COORDINATION)
6. PROVIDE POSITIVE COMMAND CLIMATE TOWARDS SAFETY.		

FIGURE 3-2

To illustrate how SRM might be used in hastily executed operations, let us consider the following scenario *(NOTE: The follow scenario is taken from TVT 20-932, REDUCING THE RISK IN TRAINING-NOBODY'S FAULT). This scenario is based on an actual accident.)*:

> You are the squad leader of an Infantry squad. Your squad is competing against other squads in a timed, land navigation event. Thus far, the scores of the other events in the competition are extremely close. This last land navigation event will decide the winner of the overall competition. Since you became the squad leader two years ago, your squad has always won the competition.
>
> The competition calls for your squad to be equipped with all items required in the battalion Standard Operating Procedures (SOP) guide. This includes weapons, rucksacks, flashlights, extra socks, ponchos, two ropes per squad, one radio (AN/PRC-77), full load carrying equipment (LCE), helmets, three compasses per squad, three maps, etc.
>
> The land navigation course is in a wooded training area with rolling hills. There has been a lot of rain lately and some of the creeks in the area are swollen. Your commander has directed that there would be no river crossings unless absolutely necessary.
>
> As the day progresses, your squad becomes lost and looses valuable time. One member of your squad has been returned to the bivouac site because of an injured foot (you sent someone back with him). Suddenly, your squad finds itself confronted by a large creek which is between you and your objective. You cannot tell the depth of the creek but it looks to be at least 5 feet deep, moving rapidly, and it is at least 30 feet wide. Because you have come upon the creek at a bend, you can't tell if it is the same up or down stream. You are hot, tired, and frustrated. The men are looking to you to make a decision on what to do next.

What would you expect the squad leader to do? What would **you** do in his situation?

Initially, one would consider the commander's directive, "...no river crossings unless absolutely necessary." But what if the squad leader doesn't consider the creek a river? What if he believes crossing this swollen creek is absolutely necessary to accomplish his mission? What if he has crossed hundreds of creeks like this before and never had an incident? Should he have any reason to believe something will happen now? What if this was a combat situation, would that change the potential benefits to be gained by crossing the creek?

All of these are valid questions, and the answers are situationally dependent. The commander may have elevated the situation if he had been clearer in his guidance. *No stream crossings over 4 feet deep and 20 feet wide without proper safety precautions (eg. safety line). Absolutely necessary means only in the event of a life or death emergency.* As it stands, the

squad leader was well within his prerogative as a leader to assess the situation and decide on the appropriate course of action. SRM does not advocate pushing the decision making process higher up on the chain-of-command. SRM states that risk decisions must be made at the appropriate lever. Whoever is responsible for the mission and had the resources to accomplish that mission, makes the decisions. In combat, life or death decisions will be made daily by very junior leaders. Therefore we must train them to make decisions in peacetime, where we have some controls available to us if they make a wrong decision that has the potential to injure a soldier or damage expensive equipment. Soldiers will take the lessons learned in peacetime to war with them. If they are habitually using SRM when planning their operations in peacetime, they will not abandon the process in combat.

For the purposes of this exercise, let us assume there was no choice in the matter, the squad has to cross the creek. As the squad leader, the first thing you want to do is identify all the hazards. You also want to use every asset available to you, this included the expertise of other members of the squad. SRM is not conducted in a vacuum. From the fire team leaders to the rifleman, everyone in the squad has had different experiences they can draw upon. One way to extract their experiences is to use a technique called "**brainstorming**." Brainstorm is a group problem solving technique that involves the spontaneous contribution of ideas from all members of the group. More details on the various way to conduct a brainstorming session are included in the **TOOLS** APPENDIX. Brainstorming need not include the entire group, but merely the fire team leaders. However, the more people involved, the more hazards that will be identified. FIGURE 3-3 lists some of the hazards associated with the crossing.

RIVER CROSSING SCENARIO
POSSIBLE HAZARDS

- NON/WEAK SWIMMERS
- STREAM CURRENT
- STREAM WIDTH
- STREAM DEPTH
- DEBRIS
- FATIGUE
- WATER TEMPERATURE
- EQUIPMENT WEIGHT
- WEAPONS SECURITY

FIGURE 3-3

Once the hazards are identified, a quick mental risk assessment is conducted of them. For the purposes of this exercise, use a simplistic **EXTREME RISK**, **HIGH RISK**, **MEDIUM RISK**, and **LOW RISK** categorization. FIGURE 3-4 has possible risk factors assigned to the various hazards previously identified. The level of risk assigned to each hazard is subjective, and often based on the experiences of the individual or group. Once the risks have been categorized, your priority system is established. You will want to eliminate or control the highest risks first. Although the lower risks may not adversely impact on the mission, if you can quickly come up with a fix for them, do so. Just because something is low risk, it does not mean you should not try to eliminate or

control it, if you can. You simply would not want to expend assets on a low risk hazard at the expense of a high risk hazard.

RIVER CROSSING SCENARIO
POSSIBLE HAZARD ASSESSMENT

· NON/WEAK SWIMMERS	ER	
· STREAM CURRENT	HR	
· STREAM WIDTH		MR
· STREAM DEPTH		HR
· DEBRIS		LR
· FATIGUE		HR
· WATER TEMPERATURE	MR	
· EQUIPMENT WEIGHT		MR
· WEAPONS SECURITY		HR

FIGURE 3-4

Upon completion of the risk assessment process (**HAZARD IDENTIFICATION** and **HAZARD ASSESSMENT**), you will want to develop countermeasures to the hazards. Again, development of the countermeasures need not be the efforts of an individual. The more people offering recommendations, the more recommendations the leader has to choose from. Countermeasures that eliminate or control more than one hazard are usually the best. Normally they are directed at eliminating the root causes of a particular hazard. FIGURE 3-5 lists some possible countermeasures. When the recommendations have been presented, the leader must make the decisions. He would have weighed the benefits of each course of action and the possible costs. Albeit, this process may have only taken a few minutes to work out, its impact on force preservation is monumental.

As the leader makes his decisions on the proper course of action, the remaining steps of SRM are routine for him; supervise the countermeasure and evaluate if it works. If during the evaluation process it is discovered that the decided upon course of action does not work, or the situation changes, SRM provides a continuous process for reassessment and changing of the countermeasures. However, only the new information would need to be assessed. There should not be a need to begin the process from square one.

RIVER CROSSING SCENARIO
POSSIBLE HAZARD CONTROLS

	CONTROLS
· NON/WEAK SWIMMERS	ELIMINATE FROM CROSSING
· STREAM CURRENT	RECON FOR BRIDGE
· STREAM WIDTH	1 ROPE CROSSING

·	STREAM DEPTH	RECON FOR FORDING SITE
·	DEBRIS	FACE UPSTREAM
·	FATIGUE	REST
·	WATER TEMPERATURE	KEEP CLOTHING DRY (BAG)
·	EQUIPMENT WEIGHT	RUCKSACK ON ROPE
·	WEAPONS SECURITY	"DUMMY CORD"

NOTE: THIS IS ONLY A SAMPLING OF CONTROL MEASURES. NUMEROUS OTHERS EXIST.

FIGURE 3-5

Summary

SRM can be used in hastily conducted operations with relative ease. As illustrated in the Soldier Training Publication (STP) NO. 21-24-SMCT (*CONTROL MISSION SAFETY HAZARDS*) for skill levels 2-4, SRM is designed to be an integrated part of operational planning and not an "add on" safety constraint.

CHAPTER 4

SRM IN DELIBERATE OPERATIONS

Let us now consider the application of Safety Risk Management (SRM) when there is more time available for planning. As in any SRM application the four rules and five steps presented in the first chapter still apply. The only real difference will be the tools you will use to identify and assess the hazards, and the types of countermeasures selected. Those will change only because of the amount of time available for developing the operation. For clarification purposes, the terms *HASTY* and *DELIBERATE,* when used to describe SRM processes, have no doctrinal meaning. Thus, you would not necessarily associate using hasty SRM procedures with a hasty attack, per se.

To illustrate some of the tools available, let us consider the following scenario:

AMMUNITION TRANSPORTATION CASE

The Mission

On 21 September, one of your transportation companies equipped with M915 line haul tractor trucks pulling M872 semitrailers is to depart its home base for Fort Nowhere, AL to participate in a major exercise. Once there, the transportation company will conduct maintenance and drivers training for one week. At the end of that week, the unit will dispatch one platoon and whatever support deemed necessary from the company to exercise one of their wartime missions; the actual transportation of "x" number of short tons of artillery munitions over a long distance (approximately 600 miles) to Ft. Somewhere, North Carolina. Your driving has been directed to be mainly during the hours of darkness for several reasons; less traffic on the roads, supports "tactical" play, etc. The route will consist entirely of limited access highways. Driver's rest areas and refuel points have been selected and will be manned by activated reserve units. These rest areas and refuel points are truck weigh stations that are closed. The trip is expected to take approximately two days. Your commander sees this as an excellent training opportunity and has directed you to make it as "combat" realistic as possible.

The mission calls for your company's platoon (+) size unit to leave Ft. Nowhere for nearby Anywhere Army Depot at dusk, load the M872 trailers with ammunition then depart as a convoy for Ft. Somewhere. Upon arrival and unloading of the munitions, your unit is released to the commander's control for return to home base or any other follow on

missions.

Now, let us consider the fact that the battalion commander has directed that the mission be properly "*risk managed*" so there aren't any problems. On the surface, that seems like a pretty tough order. There are so many pieces of the operation that the average person may simply throw up his hands in defeat and just hope nothing happens. At the other extreme, he may concentrate on what he feels is the most critical or dangerous portion of the exercise and dedicate all of his time and assets on it, to the exclusion of the remainder of the operation.

STEPS IN DELIBERATE RISK MANAGEMENT

Following are the elements of basic risk management that might be conducted on a typical training operation. This process will assure a high degree of safety while allowing more realism in all training operations.

THE OVERALL SRM PROCESS	SPECIFIC ACTIONS
	Action 1. Make an operations analysis. An operations analysis is simply a description, normally in time sequence, of the events that are expected to occur during the operation. *Break the operation down into "bite size" chunks.*
HAZARD IDENTIFICATION	Action 2. Make a preliminary hazard analysis (PHA). This is a list of the various hazards that could occur and result in accidents. It is developed using experience, databases, brain storming, scenario thinking, and similar techniques.
	Action 3. If necessary, use more in-depth hazard analyses. These are normally used when time permits and certain risks may require more careful consideration to be fully understood.
HAZARD ASSESSMENT	Action 4. Assess the hazards. Determine the relative probability and severity of the various hazards that have been discovered and their potential impact on the mission. *HAZARD IDENTIFICATION and HAZARD ASSESSMENT combine to form a RISK ASSESSMENT.*
RISK CONTROL OPTIONS & DECISION MAKING	Action 5. Develop risk control options starting with the most serious risks. Action 6. Complete a Training Realism Assessment (TRA) to assure the suitability of risk controls. Action 7. Make risk decisions. Select those risk controls that will reduce the risk to a practical minimum consistent with mission objectives.
IMPLEMENT CONTROLS	Action 8. Implement the risk control procedures. This is best accomplished by integrating them as standards in unit SOPs, orders, and training operations.
	Action 9. Maintain the effectiveness of risk controls.

SUPERVISE Assure that risk control standards are performing as expected and that they are being maintained at a high level.

FIGURE 4-1

FIGURE 4-1 suggests the steps one would take to ensure total integration of SRM in the operational plan. The first step is to conduct an ***operations analysis***. An operations analysis is simply a description, normally in time sequence, of the events that are expected to occur during the operation. It is breaking the operation down into "bite size" chunks. The real benefit of this first step is that the task no longer seems insurmountable. Additionally, risk managing the various phases of the operation is more easily accomplished when each portion is smaller. Normally, as part of the routine planning process, a reverse planning sequencing or some other such formulation will have already been done by the battalion's operations section. FIGURE 4-2 illustrates one possible solution to the exercise's operational analysis.

SUGGESTED SOLUTION
THE OPERATIONS ANALYSIS

- Travel from home base to Ft. Nowhere, AL.

- Drivers training and vehicle maintenance.

- Move to Anywhere Army Depot

- Night ammunition upload.

- Night convoy movement to Ft. Somewhere.

0 First leg
0 Refuel operations/Bivouac
0 Second leg

- Night ammunition download.

- Return to home base.

FIGURE 4-2

After completion of the operational analysis, each phase of the operation is examined and a **preliminary hazard analysis (PHA)** is conducted. A PHA is a list of

the various hazards that could occur and result in accidents. It is developed using experience, databases, brain storming, scenario thinking, and similar techniques. These techniques are covered in more detail in the **TOOLS** APPENDIX. The list of hazards is called the **preliminary hazard list** or **PHL**. A PHL is made for each phase of the operation. This does not mean that equal time is spent on each phase, developing its PHL. The intent is to ensure each part of an operation is considered and not excluded because the planner got "tunnel vision." Invariably, the more dangerous parts of an operation will receive a disproportional amount of the planning time and inevitably the part of the plan that everyone thought would be accident free, is the one where the accidents occur. Part of this may because the individual soldiers and/or junior leaders drop their guard, but some problems result because the systemic fixes were not incorporated into the initial plan.

FIGURE 4-3 provides a possible solution to the preliminary hazard analysis. As you can see, each phase of the operational analysis has been considered in developing the preliminary hazard list. What has been developed is in essence a "checklist" of the hazardous areas that must be addressed.

THE PRELIMINARY HAZARD ANALYSIS

Hazard source

Ammunition upload -
Material Handling Equipment (MHE) failure (material)
=Poor maintenance
=Improper/no MWO
=Overloading
=Catastrophic fatigue

-
MHE accident (operator)
=Speeding
=Improper side clearance
=Misjudging heights
=Improper backing
=Improper load lifting/unstable
=Bypass/ignore safety features

-
Fire
=Smoking
=Electrical fire(BLDG/VEH)
=Secondary (result of ammo accident)
=Lightning strike

-Personnel injuries
=Lifting
=Horseplay

=Improper use of protective
equipment (gloves, hard hats,
safety shoes/boots)
=Falls

- Transport accident (operator)

=Speeding
=Improper clearance
=Improper use of ground guides
=Wheels unchocked
=Bypass/ignore safety features

- Transport breakdown (material)

=Poor maintenance
=Improper/no MWO
=Overloading

=Catastrophic failure

- Wrong load =Different/wrong lot #,

=Wrong mix
=Wrong type
=Wrong shipment

- Loading delay

=Mix up in schedule
=Insufficient equipment for
loading
=MHE accident
=Insufficient personnel to load
=MHE breakdown
=Accident
=Weather/storm delay

- Improper loading

=Overloading
=Shifting loads
=Improper securing
=Wrong mix of ammo/detonators

- Ammunition explosion

=Wrong mix ammo/detonators
=Improper handling
=Fire

=Sabotage
=Lightning strike
=Accidental weapons discharge

Night Convoy - Transport breakdown (material)
=Flat tires
=Brake failure
=Light failure (Turn sig/brake, etc)
=Power train failure
=Fuel starvation
=Improper maintenance
=Improper/no MWO
=Catastrophic failure

- Transport accident (operator)
=Speeding
=Improper passing
=Improper braking
=Following to close/improper clearance
=Driver fatigue
=Bypass/ignore safety features
=Failure to use seat belts
=Drinking and driving
=Load shifting
=Struck by outside force such as driver of civilian car

- Personnel injury
=Horseplay during breaks
=Improper lifting
=Burns, falls & cuts while inspecting vehicle
=Accidental discharge of weapons/pyro
=Animal/insect bites at rest sites

- Delay in route
=Road construction
=Detours
=Traffic congestion
=Lost convoy
=Weigh stations/local authorities

=Bad weather

- Fires

=Vehicles/engine fire

=Smoking

=Secondary (result of ammo explosion)

=Vehicle/brakes

Refuel - Fires

=Smoking

=Vehicles (brakes/engine, etc)

=Sparks from electrical wires/equipment

=Accidental weapons discharge

=Improperly grounded (static electricity)

=Lightning strike

- Personnel injuries

=Horseplay

=Burns/cuts/falls while inspecting vehicles/POL equipment

=Accidental weapons discharge

- POL equipment failure (material)

=Poor maintenance

=Improper/no MWO

=Overworking

=Catastrophic failure

-Fuel spill

=Improper handling

=Equipment failure (hose/pump/automatic shutoff)

=Catastrophic failure

=Inattention

- POL equipment mishap (operator)

=Inattention

=Improper use/setup

=Wrong fuel/lubricants, etc

=Bypass/ignore safety features

- Wrong site

=Poor coordination
=Directed change in location due to unforseen events

- Delay in Refueling

=Late setting up
=Congestion at pumps
=Confusion concerning procedures
=Insufficient equipment/personnel to man POL point

- Insufficient/wrong type POL

=Poor coordination
=Bad lot of fuel
=Unanticipated demand
=Fuel spill

Bivouac

- Personnel injuries

=Horseplay
=Cuts/burns/falls while inspecting vehicles
=Accidental weapons discharge
=Lifting injuries
=Animal/insect bites

- Fires

=Smoking
=Tent fire (heaters, unauthorized cooking fires, light sets)

- Insufficient tents/food/cots

=Poor coordination
=Unanticipated demand
=Poor feeding/billeting techniques
=Theft of materials
=Spoilage

- Wrong location

=Poor coordination
=Unanticipated location change

- Theft

=Uncontrolled location
=Lack of security

- Weapons discharge

=Improperly handled weapon
=Horseplay
=Intentional discharge
(guard, murder, etc)

- Poor quality rest for drivers

=Hot/muggy
=Noise
=Animals/insects
=Weather/storms

Ammunition Download - Material Handling Equipment (MHE) failure (material)

=Poor maintenance
=Improper/no MWO
=Overloading

=Catastrophic failure

- MHE accident (operator)

=Speeding
=Improper side clearance
=Misjudging heights
=Improper backing
=Improper load lifting/unstable
=Bypass/ignore safety features

- Fire

=Smoking
=Electrical fire(BLDG/VEH)
=Secondary (result of ammo
accident)

-Personnel injuries
=Lifting
=Horseplay
=Improper use of protective
equipment (gloves, hard hats,
safety shoes/boots)
=Falls

- Unloading delay
=Mix up in schedule
=Insufficient equipment for unloading
=Insufficient personnel to unload
=MHE breakdown
=Accident
=Weather delay

- Ammunition explosion
=Wrong mix ammo/detonators
=Improper handling
=Fire
=Sabotage

Return to Home Base - Transport failure (material)
=Poor maintenance
=Improper/no MWO
=Overloading
=Catastrophic failure

- Transport failure (operator)
=Speeding
=Improper clearance

FIGURE 4-3

If necessary, more in-depth hazard analyses may be used. In-depth analysis techniques are normally used when time permits and certain risks require more careful consideration to be fully understood. Examples of the more detailed analysis techniques available will be covered in the chapter on the **DELIBERATE APPLICATION OF SAFETY RISK MANAGEMENT** which follows this chapter. However, one extremely simplistic technique is the **CAUSE AND EFFECT** diagram.

Cause and effect diagrams are constructed to clearly illustrate the various causes affecting a process. Brainstorming is used to draw out all possible causes. The causes are organized into major categories. From this well-defined list of possible causes, the most likely are identified by the team and selected for further analysis. When examining each cause, look for things that have changed, deviations from targets, or patterns. Look to cure the cause and not the symptoms of the problems. FIGURE 4-4 illustrates a cause and effect diagram and its application to our current scenario. Cause and effect diagrams can be used to determine both positive and negative outcomes. Once the diagram has been completed, it becomes a checklist of

those accident producing items that must be addressed.

FIGURE 4-4

Once the hazards have been identified, the assessment process continues. Determine the relative probability and severity of the various hazards that have been discovered and their potential impact on the mission. Key to the elimination of any hazard is identification of the root causes.

Possible cause factors in our scenario are listed at FIGURE 4-5. For expediency, only the night convoy has been evaluated.

FIGURE 4-5

EVALUATION OF CAUSE FACTORS
Night Convoy

Transport breakdown (material)

=Flat tires
=Brake failure
=Light failure (Turn signal, brake lights, etc)
=Power train failure
=Fuel starvation
=Improper maintenance
=Improper/no MWO

Transport accident (operator)
=Speeding
=Improper passing
=Improper braking
=Following too close/improper clearance
=Driver fatigue
=Failure to use seat belts
=Drinking and driving
=Load shifting
=Struck by outside force such as driver of civilian car

Personnel injury
=Horseplay during breaks
=Improper lifting
=Burns, falls & cuts while inspecting vehicle
=Accidental discharge of weapons/pyro
=Animal/insect bites at rest sites

The two major cause factors appear to be deterioration of material to the point where it cannot do its desired function, and possible human error problems. Either wrong person doing maintenance (not properly trained), not enough time, personnel or support equipment/parts.

Key cause factor is failing to perform to standards. May be due to a false sense of urgency associated with mission accomplishment "regardless of cost." Possibility of being recipient of mishap because outside agency (civilian) "does not perform to standards" for safe vehicle operation.

Usual cause is human error, either through inattention, lack of supervision, does not realize the consequences of his actions, etc. Environmental is issue for bites.

Delay enroute =Road construction =Detours =Traffic congestion =Lost convoy =Weigh stations/local authorities =Bad weather	Major cause factor would seem to be environmental. Although intelligence information and good recons and prior coordination may eliminate lots of potential delays areas, majority will be beyond the control of the unit.
Fires =Vehicles/engine fire =Smoking =Secondary (result of ammo explosion) =Vehicle/brakes	Inadequate materials and human error stand out as principal causes.

FIGURE 4-5

Next, development of the risk control options, starting with the most serious risks, begins. Examples of possible risk control options are provided on the following pages in FIGURE 4-6. Again, only the Night Convoy phase will be considered in this test for expediency:

FIGURE 4-6

SUGGESTED SOLUTION
RISK CONTROL OPTIONS

PHASE	
NIGHT CONVOY	
- TRANSPORTATION BREAKDOWN (MATERIAL)	inspection program. Priority of effort to MSN vehicles. Increased emphasis on driver training on PM. Selection of Driver/Assistant Driver (old hand with new drivers). NCO supervisory TNG. Early ANORS parts request/stock.
	- TRANSPORTATION ACCIDENT (OPERATOR)
Intensified maintenance/	

	(long range) Review DVR selection and TNG program. ID weak DVRs and TNG issues (time, TNG sites, etc). TNG Asst DVRs to same standards. ID & request additional personnel/ equipment support (parts, TMs, maint, etc). Lots of LDR supervision of maint & DVR TNG. Conduct some convoy TNG at night. Early request of ANORS repair parts. Review AAR of similar OPS. WPNS handling/qual (incorporate tactical TNG W/day to day ops-maint, etc). Early route recon (AAA input). Contact & early IPRs W/outside support. Development and check of contingency plans. Check on coord W/local agencies as appropriate. (short term) Early reverse cycle program. Vehicle/Driver crew skill and maintenance award program. DVR "field craft" TNG and preparation (feature, individual responsibilities, LDR responsibilities, etc.) Ensure PM, checks & loading is "by the book." HAZ signs & equip. Escorts/local coord. TM/unit informed of plans (looking for input/ideals), address human error causes and make them part of solution.
- PERSONNEL INJURY	TNG on need for safety Supervision of soldiers. Standard setting (procedures on breaks - security, check vehicle, etc. included in all convoy TNG) and enforcement. Provide insect repellent & mosquito bars. Get soldiers used to weapons handling - including wpns handling TNG/Safety. TNG new soldiers (remind old hands) on hazards around vehicles. Get & review accident data & AAR info.

- DELAY ENROUTE	Develop contingency plans for detours (AAA, S-2, etc). Anticipate delays (MREs, water in TRKs). Have plan for straggler control. "Rally points." Ensure soldiers/crews know procedures for contacting unit (phone numbers, radio frequencies, location of RPs). Check coordination W/local authorities. Brief crews on possible congestion sites & procedures. Emphasis "time on our side."
- FIRES	PM. Brief crews. Match, lighters, smoking policies around ammo. Proper driving techniques (braking on grades, etc). Map & terrain recon for problem areas (grades, etc). Increase security awareness. Firefighting TNG, extinguisher checks (local purchase).

FIGURE 4-6

In addition to development of the risk control options, a **training realism assessment (TRA)** may be conducted for training operations. The intent of the TRA is to determine the suitability of the control option. The TRA will be covered in additional detail in another chapter. The actual results of a TRA depend on the control options that are being considered. The objective is to define all options that are inconsistent with the way we intend to fight.

SRM Estimates

An additional feature of SRM is its ability to adapt itself to a form that commanders are familiar with, specifically estimates of the situation. The **SRM ESTIMATE** APPENDIX at the end of this book provides an outline of how the SRM estimate should be organized (including suggested information) and an example structured in accordance with examples of other estimates (Threat estimate, Personnel estimate, Civil Affairs estimate, etc.) that are provided in FM 101-5 **STAFF**

ORGANIZATION AND OPERATIONS. The SRM estimates are appropriate to be used any time the other estimates (eg. personnel estimate) are required by the commander to assist him in the decision making process.

Summary

Use of SRM is extremely flexible. As demonstrated in the previous two chapters, it can range from a process taking only a few moments to a more expanded one taking several hours or days. Whenever possible, it should be an integrated part of any operational planning. In fact, the hazards identified need not be limited to safety related ones. Hazards, as explained in Chapter 1 may include the enemy, logistical shortcomings, environmental, etc. The processes for identifying problems and developing "fixes" are applicable in all situations.

CHAPTER 5

IMPROVE TRAINING SAFETY
LONG TERM MISSION CONCEPT
Introduction

The process of improving safety in training through the use of SRM takes place within the training management cycle (TMC) as outlined in FM 25-101. It requires no separate process; instead it involves the addition of actions at various points in the established TMC. These actions are natural and logical additions to the TMC and require minimal investment of effort. In return SRM offers major improvements in training safety and substantially improved training realism. Specific improvements in training safety are achieved through the nine actions outlined at figure 5-1.

HOW RISK MANAGEMENT IMPROVES TRAINING

- **DETECTS HAZARDS**
- **COVERS ALL ASPECTS OF OPERATIONS**
- **FINDS MORE UNUSUAL HAZARDS**
- **DETECTS FAILURE MODES**
- **MAKES USE OF THE LIFECYCLE**
- **IDENTIFIES MORE RISK CONTROL OPTIONS**
- **INTEGRATES RISK CONTROLS**
- **PRIORITIZES RISK CONTROL**
- **PROVIDES BETTER RISK DECISIONS**

FIGURE 5-1

Safety Risk Management in the Training Management Cycle

The TMC as established in FM 25-100 and 25-101 is depicted at figure 5-2. To achieve maximum effectiveness in training safety, it is desirable to integrate various SRM actions throughout the cycle. The text at Appendix A

FIGURE 5-2

suggests 16 points (Figure A-3) in the TMC at which various SRM considerations can be integrated. Figure A-4 illustrates how accident analysis data can highlight various mission essential tasks that require more risk control work. Figure A-5 uses the standards from an example mission essential task taken from FM 25-100 to illustrate how standards and derivative procedures can be reviewed to determine if risk issues are adequately covered. Finally, Figure A-6 provides standards of good practice for SRM in training. These standards cover procedures needed to assure quality integration of SRM in the overall training process. The following pages in this chapter illustrate how SRM can be integrated in the TMC with powerful results in training safety, training realism, and combat safety. The example that will be used is the "tirehouse."

The results of the application of the SRM process will be compared to the safety procedures developed for one of the earliest tirehouses built. The procedure will be to track this training facility and the training conducted within it through its entire life cycle. Points of potential SRM integration will be highlighted and, in most cases, examples will be provided. The result will be a convincing argument that SRM has the potential to improve training safety by 50% or more over the traditional risk management procedures originally used to support safety in the tirehouse.

Familiarization With The Tirehouse

The first step is to become familiar with the concept of the tirehouse and the safety controls developed for the facility using traditional experience and intuition-based risk management. Appendix B is the tirehouse floor plan and SOP. This SOP was developed using traditional risk management techniques and is the baseline against which our SRM application will be compared. Review the SOP for the tirehouse.

Establish the Mission Essential Task List (METL)

How would the need to have a tirehouse and train with live fragmentation grenades arise? The answer is an interesting application of risk management in itself. Light divisions typically have a mission essential task (MET) entitled "Assault." A typical battle task associated with this MET might be "Assault Urban Areas." Using the processes described in FM 25-101, you eventually would arrive at the soldier task(s) related to effectively using fragmentation grenades. At some level, a reasonable commander while conducting his training assessment, might arrive at the conclusion that soldiers in his unit are not fully capable of using the grenade effectively in urban combat. He might further conclude that the problem is not an issue of skills or tactics, it is a matter of confidence. The procedures generally used to train soldiers in grenade skills (especially in basic training and on most grenade ranges) are not designed to produce a confident user. Just the opposite, they often produce a soldier afraid of the weapon. This is an excellent case of training safety procedures seriously impeding soldier battlefield effectiveness. To overcome this deficiency, the effective field commander feels compelled to create training designed to eliminate the weakness. The result, after some staffing and presumably after overcoming some obstacles, is the idea for the tirehouse. The tirehouse is not intended primarily to provide grenade handling skills or urban combat techniques. These can be accomplished in the tirehouse, but they also can be effectively achieved using training grenades and actual buildings. No, the reason for a tirehouse and use of live grenades is <u>confidence.</u> This in turn raises the question whether the training conducted in basic training and on typical grenade ranges could be modified within the constraints of time and resources that bind this training. These modifications would be aimed at producing a soldier confident with the grenade, not just someone who has thrown one. Returning to the main issue, the commander, faced with the need to overcome the confidence issue,

puts his S-3 to work. The S-3, a bold and innovative individual, further develops the idea of the tirehouse.

Integrating SRM to a Training Operation - The Tirehouse

It is at this point, conception and planning, that risk management begins (excluding consideration of the decisions already made in the style of training conducted in basic training) . The commitment to the tirehouse has installation level implications since most division units, and very likely Reserve Component units, will use it periodically. The group that develops the tirehouse should include installation representatives such as the supporting safety office as well as the range officer, DEH, and other relevant support functions. The safety office will provide or guide the in-depth risk management necessary to develop the standards needed to build and operate the tirehouse at acceptable levels of risk. This will involve deliberate or in-depth risk management procedures. The desired output will provide standards for minimizing accident risk and fratricide in the assault of urban areas. These are the standards that will be used in combat or training. Additional safety standards, not useful in combat, would only be used when absolutely needed as validated by a Training Realism Assessment. This SRM approach will involve the following actions:

1. Analyze the operation. This involves breaking the operation down into its various significant parts. Figure 5-3 illustrates how this might be done for the tirehouse. Note how the breakout includes facility development and maintenance as well as operations issues.

OPERATIONS ANALYSIS

TIREHOUSE DEVELOPMENT PHASE

NOTE: D = Ready for Operational Training

D-200 - Integrate safety considerations into development plans

- Initiate the hazard log.
- Selection of location. Place on the edge of an impact area with depth to contain 5.56 and 7.62 weapons. This will permit unrestrained assault on the exterior of the facility and extend the training value of the facility.
- Assess risk to exposures in a 3600 ring around the facility out to distance X (AR 385-63) of the maximum range of all weapons used.
- Assess risks of proposed floor plans for all feasible tactical scenarios.
- Assess proposed construction techniques for bullet/grenade containment, maintainability, stability, and related factors.

D-170 - Assure final risk decisions on final plans

D-160 - Periodically monitor actual construction for adherence to plans.

D-70 - Conduct pre-test survey.

D-65 - Conduct operational readiness tests with blanks and practice grenades.

D-60 - Conduct full operational tests with live ordnance.

D-30 - Conduct operational tests using a troop unit.

D-15 - Final authority review and approval of tirehouse tactical scenarios and operational SOPs. Resolution of all items on the hazard log.

D-O - Operational - close monitoring of initial operation.

Tirehouse M0UT Training

Phase D-5 to DO - Garrison Preparation

- Prepare weapons and ammunition
- Prerequisite training
- Prepare transportation
- Training preparation

0600-0800 - Deployment to the Training Area

- Movement of personnel
- Movement of grenades

0800-0930 - Introductory Training in Bleachers

0930-1200 - Tirehouse Dry-Fire and Bank-Fire Operations

- Concurrent training - No live ammo
- Interior clearance procedures - blank fire

1300-1800 - Tirehouse Live-Fire Operations

- Concurrent training - No live ammo
- Operational tirehouse training
- Employment of grenades
- Employment of small arms

1900-2100 - Recovery and Return to Garrison

- Transport unused grenades

2100-2200 - After-Action Activities

· Secure weapons
· Secure ammunition

NOTE: The purpose of the operations analysis is to assure that all aspects of the operation are considered. Often, it is found in accident investigations that the attention of leaders was focused on one aspect of the operation to the exclusion of other potentially hazardous areas. Normally an operations analysis has already been conducted simply to effectively lead the operation. Therefore no effort will be expended to creating one just for risk control purposes.

FIGURE 5-3

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2. Develop a preliminary hazard analysis (PHA). Hazards are discovered for each stage of the operation involving any significant risk. This is done using a variety of techniques. The example PHA at figure 5-4 has been modified to indicate the technique that would have revealed the hazard. Each technique is discussed briefly in figure 5-5. In many low to medium risk operations that are not especially complex, the PHA may be all the analysis that is needed. In the case of the tirehouse, the risk is clearly critical. It is necessary to complete more detailed analyses of the unusual grenade and automatic weapons fire aspects of this operation to fully understand and control this risk.

PRELIMINARY HAZARD ANALYSIS

NOTE:The Preliminary Hazard Analysis (PHA) systematically considers the hazards of <u>all</u> phases of the operation. Those areas that exhibit higher risk can then be spotted and targeted for more detailed review such as cause and effect or logic diagrams.

<u>OPERATIONAL PHASE</u> <u>POTENTIAL HAZARDS</u>

- Garrison Preparation Improper temporary storage of grenades or ammunition

- Theft due to lack of security--Experience
- Improper storage--Regulations (incompatible or otherwise unsafe)
· Unnecessary risk of fire
· Stored with incompatible materials
· Personnel unnecessarily exposed
· Lacking or improper signs/placards

Inadequate vehicle readiness--Accident Data for operations

- Inadequate maintenance--Technical Manuals of key safety systems (fuel, brakes, steering, tires)

- Inadequate capacity for personnel and ammo

- Drivers are not qualified or competent

- High risk vehicles used

- Deployment to Training Area — Vehicle accident producing injury, death, damage
  - Improper driving technique

  - Vehicle malfunction *(Accident data)*

  - Struck by other vehicle

- Initial Onsite Training — Bleacher Collapse of bleachers *(Scenario thinking)*
  Troops fall off bleacher *(Scenario thinking)*

  Cold injury *(Experience)*

- Tirehouse Dry Fire Operations — Trips and falls *(Accident data)*
  Instructor falls from Tirehouse walls *(Scenario thinking)*

- Tirehouse Blank Fire Operations — Same as for dry fire
  Injury from improper use of blanks *(Experience)*

- Tirehouse Live Fire Operations — Injury from grenade effects
  - Intentional use *(Scenario thinking)*

  - Unintentional use
  - Inside and outside Tirehouse

  Hearing impairment *(Experience)*

  Injuries from small arms effects

  - Intentional use

  - Unintentional use in Tirehouse *(Scenario thinking)*

  - Inside or outside Tirehouse

- Recovery and Return to Garrison — Personnel retain grenades and/or ammo *(Experience)*
  Weapons not properly cleared *(Experience)*

  Vehicle accident on return trip *(Experience)*
  (see deployment)

- After Action — Inadequate security of weapons *(Standards)*

Inadequate security of grenades *(Standards)*

SUMMARY: With the exception of the live ammunition aspects, this is a routine troop training exercise involving moderate risk from vehicular sources, noise, falls, etc., experienced in most training. With the addition of the live ammunition and grenades in the usual Tirehouse environment, risk becomes very high, rivaling the highest-risk activities the Army undertakes. This operation will require detailed risk management for safe, successful conduct.

FIGURE 5-4

SUMMARY OF HAZARD DETECTION PROCEDURES

1. Experience. SRM does not decrease the emphasis that exists in traditional risk management on experience. It broadens it to include systematically coordinating with other associates and operational personnel. *(They will surprise you with their insights.)*

2. Experts. Consult with acknowledged experts in the area of concern. These may be safety experts, maintenance experts, or technical experts of various kinds. When they are available, they are an obvious source to be consulted.

3. Regulations. When regulations have been properly developed, they contain the lessons learned from past accidents and experience. The standards they contain often supply hard data on safe distances, weapons ranges, etc. that is essential for effective risk management. All relevant regulations and manuals should be used.

4. Accident data. The Army accident database located at the U.S. Army Safety Center, Ft. Rucker, AL, contains over 250,000 accidents. Each accident is a lesson learned the hard way. Leaders should not undertake a new or unusual operation without determining if the database has information on hazards. The database can be accessed through a terminal located at every Army safety office *(including your installation safety office)*. Skilled users can pinpoint the areas of interest and quickly get to the issues at hand.

5. Scenario thinking. This is a technique in which the user mentally visualizes the expected flow of events in an operation. As the expected events are imagined, the user applies his creativity to picture the things that could go wrong with the operation and cause an accident. These hazards are listed. Then the scenario thinker visualizes the flow events one more time. This time he deliberately envisions the operation with various unexpected events occurring as they might possibly happen with ***Murphy*** in charge. These hazards are also recorded.

FIGURE 5-5

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3. More detailed analyses. These more detailed analyses can range from the relatively simple to the very complex. Over the next few pages, examples of various diagrams and matrixes will be presented. Each is presented as a potential ***tool***. There is no requirement to use each tool in conducting an in-depth analysis. What tools will be used should always be situationally dependent.

a. A good example of a simple, but highly effective, procedure is logic

diagrams. Figures 5-6 and 5-7 illustrate logic diagrams that develop hazards by working backward from an accident event - in this case grenade or small arms weapons effects. Figure 5-8 examines the "dropped armed grenade" hazard developed in figure 5-6 by evaluating the results of the hazard.

b. Figure 5-9 is an example of a Cause and Effect diagram also examining the dropped grenade. The cause and effect diagram graphically illustrates the relationship between a given outcome and all the factors that influence this outcome. Cause and effect diagrams provide a structured approach to determining the root causes of a problem, an objective, or some other effect.

FIGURE 5-6

FIGURE 5-7

FIGURE 5-8

CAUSE AND EFFECT DIAGRAM

GRENADE INJURY

FIGURE 5-9

RISK ASSESSMENT MATRIX

HAZARD SEVERITY

CATEGORY I: CATASTROPHIC
Death or permanent total disability, systems loss, major Property damage.

CATEGORY II: CRITICAL
Permanent partial disability or temporary total disability in excess of three months, major systems damage, significant property damage.

CATEGORY III: MARGINAL
Minor injury, lost workday accident, or compensable injury or illness, minor systems damage, minor property damage.

CATEGORY IV: NEGLIGIBLE
First aid or minor supportive medical treatment, minor systems impairment.

ACCIDENT PROBABILITY

LEVEL A: FREQUENT
Likely to Occur frequently in life of system, item, facility, etc. Continuously experienced.

LEVEL B: REASONABLY PROBABLE
Will occur several times in life of item

LEVEL C: OCCASIONAL
Likely to occur sometime in life of item. May occur a few times depending upon exposure.

LEVEL D: REMOTE
Unlikely, but still can reasonably be expected to occur. Though unlikely, may occur once in life of item.

LEVEL E: IMPROBABLE
So unlikely it can be assumed occurrence may not be experienced.

FIGURE 5-10

c. Figure 5-10 is a typical risk assessment matrix. It is an aid in determining the level of risk associated with a particular hazard by weighing the hazard's probability of occurrence against the hazard severity.

There are other more detailed analytical tools. These techniques are briefly outlined at figure 5-11.

OTHER ANALYTICAL TECHNIQUES

- **MAP ANALYSIS.** Using maps to determine exposures to hazards and similar potential interface problems.

- **TERRAIN ANALYSIS.** Very useful in live fire operations to determine the protection provided by terrain from direct and indirect fire.

- **ENVIRONMENTAL. ANALYSIS** Explicitly designed to determine the potential and likelihood for environmental impact on operations. Consider cold, heat, precipitation, wind, dust, trafficability, etc. as they may affect risk.

- **SIMULATION.** For example, going out on a piece of terrain to be used for training and walking through the scenario looking for undesired interfaces between units, fratricide potential, terrain hazards, etc. If practical, you can't beat seeing the real turf.

- **INTERFACE. ANALYSIS** Considers all exchanges of material, energy, personnel between two neighboring operations looking for potential hazards.

FIGURE 5-11

4. Assess risks. Hazards are the raw material from which "risks" are determined. The risk assessment process involves determining the potential severity of a hazard and the probability that it will occur. The extent of the risk will determine the extent of efforts and the priority with which the risk is addressed. The best way to assess risk is through the use of simple matrices that use descriptive terms rather than numbers. Many number systems have been used to assess risk but they tend to create more problems than they solve. One possible solution is to use a Control Options Matrix (FIGURE 5-12). This is a typical descriptive system for assessment hazards associated an operation.

CONTROL OPTIONS MATRIX

Control Option / Level	Operating Level	Leader Level	Command Level	Level
Engineer (l,2,3,4,5)				
Limit Energy				
Substitute Safer Form				
Prevent Buildup				
Prevent Release				
Provide Slob Release				
Rechannel separate in time/space				
Guard (7.8.0. 10)				
On Source				
Barrier between				
On human or object				
Raise threshold				
Limit Exposure				
Number of people or items				
Time				
Selection of personnel				
Mental / Emotional Capability				
Physical Capability				
Train and Educate				
Safety Related Tasks				
Leader Tasks				
Emergency Tasks				
Warn				
Signs				
Color Coding				
Audio/Visual Alarms				
Motivate				
Job Standards				
Positive incentives				
Negative incentives				
Policy emphasis				
Reduce Effects (11)				
Emergency medical care				
Emergency Equipment				

(Showers, exiting)
Rescue
Emergency Procedures
Damage Control Plan

Rehabilitate (12)
Personnel
Facility/Equipment

FIGURE 5-12

Applying a control options matrix, like the one above, to the tirehouse is relatively simple. FIGURE 5-13 demonstrates a practical application of the matrix using the tirehouse scenario.

CONTROL OPTIONS MATRIX

CONTROL OPTION	
ENGINEER	
limit/substitute	Use concussion grenades in tirehouse.
GUARD	
barrier between	Periodic inspection of tire walls for construction and deterioration.
on humans	Wear helmets and fragmentation vests and other personnel protective devices such as ear plugs and ballistic glasses. SOP must require protective gear be worn.
LIMIT EXPOSURE	No concurrent training site within 150 meters of tirehouse. Restrict or limit other personnel around tirehouse within 150 meters unless directly involved in conducting training in tirehouse.
SELECTION OF PERSONNEL	Assess training level of soldiers as well as physical and mental condition (tired, confused, number of iterations soldier can do in a day before performance deteriorates, etc) . Train leaders to be alert for strange or substandard performance in soldiers.
TRAIN & EDUCATE	Crawl, walk, run training process. Demonstrate with training grenades (to include emergency procedures like accidentally dropped hand grenades). Use concurrent training sites to train some problem areas (doors in buildings, fratricide, etc) Practice techniques that will help reduce fratricide in building without "bullet proof" walls.
WARN	
signs	Mark danger area around tirehouse. Mark "no fire above" line in tirehouse to train soldiers to fire low and prevent rounds from leaving tirehouse.
audio	Have a separate, intense safety reminder/briefing before soldiers enter tirehouse for live fire. Include emergency "cease fire" signals.
MOTIVATE	
negative	Demonstrate live grenade effects and small arms fire through non-bullet proof walls (fratricide potential). Quickly crush any attempts at "horseplay" while at tirehouse training site.
positive	Ensure complete understanding of procedures including emergency actions (such as dropped hand grenade).
REDUCED EFFECTS	
emergency medical	Have MEDEVAC procedures and equipment/personnel on hand before live fire training starts. Ensure procedures are in SOP. Run routine drills in training cycle prior to first live fire of day.
REHABILITATE	
personnel	Have policy to put soldiers back into training cycle as soon as possible after accident/incident. Include consideration to alleviate fears of others who may have witnessed an accident (eg. dropped grenade fatality) to instill confidence in procedures/equipment again.
facility	Formalized procedures for inspection and repair of facility by DEH in the event of accident and as a routine part of preventative maintenance.

FIGURE 5-13

5. Develop control options. Risk management is designed to produce standards. These standards have the specific objective of satisfactorily controlling risk. The method is

simple. Each risk is addressed in order of priority. Risk control alternatives are developed for each risk. This is done by using experience and creativity aided by the control option matrix at figure 5-12. Consider the options suggested by each space in the matrix. For example,

RISK CONTROL OPTIONS

(THIS LIST COVERS ONLY THE SMALL ARMS/GRENADE ASPECTS)

1. Grenade Effects.

a. Grenade fragments penetrate the structure.

#1 In training - use tires for walls.
* Properly construct to standard
* Properly maintain to standard
#2 Close coordination and synchronization of assault teams and within a team.
#3 Explicit training of troops in this fratricide issue.
#4 Wear helmet, protective vest, ballistic glasses.
#5 Troops in backup assault role maintain prone, covered positions.
#6 Minimize the number of troops in immediate assault area to those essential only.

b. Personnel outside the room directly exposed.

#1 Items 1a (2) , (3) , (4) , (5) , (6) above apply.

c. Personnel exposed to effects of properly thrown grenade.

(1) "Dud"/slow grenade

#1 Train troops in proper procedure.
#2 Properly care for grenades
#3 Ensure no suspended lots are used.

(2) Friendlies not under cover

#l Emphasize to troops
#2 Analyze assault procedures for coordination issues (between teams, within a team)
#3 Use a reduced energy weapon (offensive grenade, grenade simulator).
#4 Limit clearance teams to two personnel.
#5 Limit the number of rooms cleared by each team (thereby reducing the number of grenades thrown).
#6 Special procedures, training, and practice for emergency situations.
#7 On-site emergency treatment capability suitable for grenade/small arms injuries.
#8 Rapid MEDEVAC capability.

(3) Loud noise (Hearing loss)

#1 Use hearing protection
#2 Enter personnel in audiometry program.

d. Malfunctioning ("quick") grenade.

(1) Manufacturing defect

#1 Avoid suspended lots

(2) Storage deficiency or abuse

#1 Provide quality storage and transport for grenades.

#2 Motivate troops not to abuse grenades.

e. Personnel exposed to effects of improperly thrown grenade - response inadequate.

(1) Armed grenade dropped

#1 Develop and thoroughly rehearse procedures for dropped grenades.
#2 Designate a chain of command team member to back up person dropping a grenade. Practice procedure.
#3 Wear protective vest, helmet, ballistic glasses.
#4 Evaluate weather factors impacting handling - wet, cold.
#5 Use concussion or offensive grenades.

(2) Grenade thrown in wrong direction - Thrower confused.

#1 Rehearse thoroughly. Validate readiness for live fire.
#2 Establish procedures for errant grenades practice.

(3) Rebounding grenade (walls, doors, interior objects)

#1 Rehearse throwing technique thoroughly.
#2 Rehearse reaction to rebounded grenade.

(4) Improperly "cooked off" grenade.

#1 Eliminate cooking off.
#2 Practice technique thoroughly with practice grenades.

f. Exposed to secondary effects of grenade.

(1) Gas leak and explosion
#1 Turn off gas before attacking if possible.
#2 Warn the troops of the danger.
#3 Train and rehearse procedures for dealing with gas leaks.

(2) Fire

#1 Develop procedures for dealing with fire. Train troops.
#2 Have contingency plans for larger fires.

(3) Hazardous materials (asbestos, etc.)

#1 Consider masking selectively
#2 Connect HAZMAT training to recognition of these materials in combat.
#3 Train troops to minimize contact.

(4) Electrical energy

#1 Train to recognize and avoid.
#2 Consider turning off (if not already)

g. Exposed to effects of an inadvertently armed grenade.

(1) Pin falls out, clip fails.

#1 Vigor enforcement of weapons safety standards.
#2 Periodic inspection of grenades.

(2) Horseplay

#1 Zero tolerance of this behavior.

h. Deliberate exposure of friendlies - murder (fragging)

(1) Mental defective

#1 Stress management training for leaders.
#2 Maintain high standards of discipline and esprit.

(2) Evil person

#1 Get rid of them.
#2 Maintain high standards of discipline and esprit.

2. Small Arms Effects.

a. Round leaves the structure

(1) Ceilings/walls/floors

#1 See 1a#1-#6

(2) Friendlies exposed

#1 Determine personnel exposures in surface danger zone (360 degrees, out to 3700 meters). Limit exposure. Obtain waivers as needed.
#2 Warn/protect personnel as judged appropriate.
#3 Place a high fire line 3 feet above floor.
#4 Use blanks or frangible rounds
#5 Plan the assault to minimize friendly exposure.

b. Round aimed improperly strikes participant

(1) Soldier confused (the one firing)

#1 Rehearse procedures thoroughly. Validate readiness for live fire.

(2) Poor automatic weapons technique

#1 Practice firing automatic in standing/assault mode.
#2 Check all weapons for safe condition/operation in automatic mode.
#3 Limit rounds in magazines to 6 or 10.
#4 Fire on semiautomatic.
#5 In training - fire blanks only.
#6 Practice immediate action for "run-away gun".

c. Round aimed properly but person moves in line of fire.

(1) The soldier is confused.

#1 Rehearse procedures thoroughly. Validate readiness for live fire.

(2) Can't see the other soldier

(a) Too dark
(b) Too foggy/smokey
(c) Too dusty

#1 Develop decision guidelines for suspension of training in periods of reduced visibility.
#2 Develop and validate tactics for continuing operations in reduced visibility.

d. Round accidentally fired strikes a friendly.

(1) Careless handling technique.

#1 Review and practice handling procedures.
#2 Motivate careful handling by enforcing high standards.

(2) Poor weapons safety procedures.

#1 Establish procedures for loading, chambering rounds, placing weapon off safe, pointing, etc.

e. Ricochet strikes personnel

(1) Walls or objects in room generate ricochets

#1 In training - build walls of tires.
#2 In training - Keep ricochet producers out of the room.
#3 Full protective equipment.

f. Exposed to secondary effects of bullets.

(1) Hearing loss

#1 Wear hearing protection.

(2) Hazardous materials (gas, toxics, asbestos, etc.)

#1 If (I) -(4) apply

g. Deliberate exposure of friendlies - murder.

#1 1h (1)-(2) apply

FIGURE 5-14

review the options developed for the weapons related hazards of the tirehouse at figure 5-14. There are over 60 options to consider for the weapons aspects of the tirehouse alone.

6. Conduct a Training Realism Assessment (TRA) . The TRA is designed to assure that the risk control options selected have the maximum battle focus and least possible adverse impact on realism. The procedures for the TRA and an example application for the tirehouse are outlined in detail in Chapter 6.

7. Make risk decisions. Based on steps 5 and 6 above, there will normally be a rich variety of risk control options available. Some of these will have a price in terms of adverse impact on realism. Others will demand extensive resources in dollars, time, or other resources. If the previous steps have been effectively accomplished, the decision making step is not technically difficult. The responsible individual simply selects those options that produce the best overall outcome considering safety, mission, and resource considerations. The difficult part of the decision making process is actually balancing the various factors involved. While we avoid explicitly expressing it, we are in fact making judgments about the value of human life. Just how much of our limited training money are we willing to expend to pay or some safety consideration? That safety consideration may only have a 1 in 10, 1 in 100, or 1 in 1000 chance of actually preventing an accident. How great a risk in training are we willing to accept to provide the soldier with skills that he may never be called upon to use in combat? Answering these kinds of questions and making decisions is what command and leadership are all about. It is the art aspect of SRM. A tool to assist in risk decision making is the decision level matrix. An example of such a matrix is at figure 5-15. This tool ensures that the more difficult decisions are at least reviewed at a level of command that assures an appropriately senior, and therefore mature, experienced view. An example of the decision making process that might have taken place regarding the control options developed for the tirehouse is at figure 5-16.

A SAMPLE DECISION MAKING MATRIX

RISK LEVEL	DECISION AUTHORITY*
Extreme Risk	MACOM/Corps Commander
Critical	Installation/Division Command Group
High	Brigade Commander
Medium	Battalion Commander
Low	Company Commander

** Each level of command should make a decision. The decision authority is the level of final review and approval.*

FIGURE 5-15

TYPICAL RISK DECISIONS - TIREHOUSE

1. **Control option** - use reduced energy grenades. Rejected. The primary purpose of the tirehouse training is to develop confidence. This can not be achieved with anything other than the actual weapon.

2. **Control option** - place a high fire line on the tirehouse wall. Accepted. The line is not realistic (real buildings will not have such a line) however it is an effective reminder to keep automatic fire low in accordance with good tactics. It will also dramatically reduce the number of rounds fired out the top of the tirehouse reducing danger to the surrounding area.

3. **Control option** - place troops in reserve positions in prone, covered positions. Accepted. A basic rule is to train troops to always seek covered positions when in range of enemy weapons (to include artillery and aircraft).

4. **Control option** - use special procedures when visibility is restricted (define restricted) . Accepted. Restricted visibility conditions will require special procedures in combat. These conditions increase risk in training by at least an order of magnitude.

5. **Control option** - special refresher training in use of automatic fire. Accepted. Troops have not fired automatic fire from the standing position for over 4 months. Improper technique is a high risk to cause injury to other members of the clearance team or allow bullets out the top of the facility.

FIGURE 5-16

8. Implementing control options. After the decisions are made, the control options are implemented just as any other standard. Those that are permanent changes to the way of doing business are integrated in SOPs and other long term unit directives. Other controls that are developed for a particular operation are incorporated in OPLANS, letters of instruction (LOI), job

aids and checklists, or similar operational directives. One especially important consideration is to ensure that controls that are adopted, but will be used in training only, not in combat, are clearly labeled as training only. This reduces the possibility that those involved in the training will confuse the training only standards with those that are to be used in combat. Some examples from the tirehouse situation are identified in figure 5-17.

TYPICAL "TRAINING ONLY" STANDARDS

1. **Tirehouse walls.** Real buildings often do not have bulletproof and grenade fragment proof walls. From a cost and safety point of view such walls are essential in training. Leaders and soldiers should be trained in the following to compensate for this unrealistic characteristic of the tirehouse.

   a. Which construction techniques are likely to create serious risk (drywall, block, prefab, etc.) and how to recognize these types of construction.

   b. The tactical adjustments that may be necessary when walls are penetrable.

2. **The absence of utilities.** Real buildings have utilities such as gas, electricity, water. The tirehouse does not for obvious reasons of cost and economy. Leaders and soldiers should be trained in the following characteristics of real buildings.

   a. Some utilities pose serious potential hazards to assault teams. The assault process can lead to ruptured gas lines. The enemy may actually use such utilities as weapons. For example picture a high rise building being assaulted from the top down after a helicopter landing on the roof. Either as an accidental result of the assault or because of deliberate enemy action the lower floors are flooded with gas. The explosion and fire that could result could destroy the entire attacking force. Leaders must be aware of this threat and consider it in planning MOUT operations. Actions to take on detecting gas odor should be established and contingency guidance provided.

   b. Electric facilities should be treated much like booby traps. Even if power is off, there is no certainty when it may be turned on again.

FIGURE 5-17

The actions outlined above have now created a tirehouse facility and operations within the tirehouse that are optimum in terms of safety. The facility will be built to the standards established. All the necessary standards, job aids, and procedures are in place to minimize risk while training as closely as possible to how we will fight. Now units will begin to use the facility.

How Units Use SRM in Training

The objective of training is to develop battle focused skills in leaders and troops. These skills should include SRM skills. Gaining these skills requires that the leaders involved in a training operation develop the same safety risk controls that they would have to develop if the operation were conducted in combat. In the case of the tirehouse, this means that the leader should be trained in the risk control standards and procedures developed above. When the leader arrives at the tirehouse to conduct training, the leader should have to determine, based on this previous training, the proper solution to the risk control issues presented by a MOUT scenario. This solution should be an integrated part of his overall responsibility to solve the problem of successfully assaulting the facility. Here is how it might work in the tirehouse.

1. A unit schedules training in the tirehouse as part of the long range training calendar. This action follows from the METL development process and training assessment which indicate a need to practice MOUT skills.

2. As planning moves into the short range planning time frame the unit makes a risk assessment of the scheduled tirehouse training. Such an assessment would use the same procedure previously outlined in paragraph 4 of this chapter. The conclusion would certainly be that the tirehouse training is "critical" risk.

3. Based on the critical risk rating, leaders will be alerted to the risks involved. Specific training preparation actions will be taken to assure that leaders at all levels are provided the standards and other guidance developed from the initial SRM application described above. The commander (in this case probably at battalion level) will address the special risk issues involved in this training. He may incorporate some special direction in his commander's guidance. Needed leader training may be scheduled to upgrade specific skills related to the tirehouse training. A summary of Army accidents in tirehouses or MOUT-related combat will certainly be obtained and distributed.

4. As near term planning begins, the usual preparations for training continue, with suitable emphasis on the risk control issues of MOUT training. If this is the first use of the tirehouse, these procedures may be relatively extensive.

5. The unit arrives at the tirehouse. Normal refresher training on basic grenade employment skills is conducted if it hasn't already been accomplished. The training leader makes an on site application of the "hasty" risk management process to determine if there are any unforseen problems that may create unanticipated risks. For example, environmental conditions such as fog, rain, or dust may increase risk and require evaluation and special controls.

6. Unit leaders are given the tactical scenario on which the tirehouse training will be conducted. This could consist of a fragmentary order (FRAGO). The FRAGO may be given to them a day or so in advance to allow the greater preparation time consistent with what would be expected in combat.

7. Each unit leader is required to solve the tactical problems associated with the frago and associated scenario to include the details of actions he will take to control risk of accidents and fratricide. The leader is allowed to use the procedures he develops in the dry fire phase of training. In the AAR mode, his leaders then critique the effectiveness of the risk control solutions developed. Procedures are compared to the optimum procedures resulting from the in-depth SRM review.

8. The leader and troops then practice the optimum procedures in the blank fire stage of training. These procedures are then strictly enforced in the live fire stage which only begins when proficiency is demonstrated in the blank fire phase. Any standards used in training which would not be used in combat would be explicitly identified to all participants as "Training Only".

9. What kind of specific safety supervision may be appropriate for the tirehouse operation? The usual "safety officer" role should be integrated into the normal control procedures that would be used in combat. This means that fire team leaders, squad leaders and platoon sergeants/leaders function as safety officers as part of their leadership roles. If it is judged essential, a separate safety officer, independent of the chain of command, may be established. This individual should not be

involved in the tactical scenario and should be positioned back from the operation in a position to see and make essential corrections, but not so close as to become directly involved in the operation. The safety officer could also be one of the observer/controllers who will conduct the after action review (AAR).

10. The AAR is then conducted. As part of the overall discussion, the success of risk control procedures is discussed with emphasis on their application in combat. The ideas to improve the procedures are actively sought from soldiers and junior leaders.

This training approach provides leaders with initial training in the correct MOUT risk control procedures. It allows the leader to develop and use the procedures he personally creates based on his previous training in the dry-fire phase. In the AAR learning mode, the leader learns from his mistakes and then practices the proper procedures in the blank fire stage. Proficiency is demonstrated in the live fire stage for both tactical and risk control skills. Confidence is established.

A second example of the application of SRM to training safety is at Appendix C. This example concerns an everyday type activity - marching or running. Using a deliberate SRM approach, a lieutenant adds significantly to the safety of a planned training operation.

Summary

The application of SRM in long term mission planning can appear to be time consuming. However, the methodical application of the various tools and procedures will save time in the long run. It will help identify potential problems before they happen, thus reducing the need for "*crisis management*," not to mention any time consumed having to repair accidental damage, retrain injured soldiers, loss of fiscal resources, etc. Actually, the proper use of selected tools at the right time will also aid in unit efficiency.

CHAPTER 7

IMPROVE COMBAT SAFETY

Introduction

In training, safety risk management is tied to the training management cycle. In combat, it is tied to the Army's operational process. By building safety into the processes used to conduct combat operations, the Army will be able to reduce its combat losses substantially. These losses have long represented a considerable portion of all combat losses. In Viet Nam, accidents produced about 20% of all deaths and injuries (excluding fratricide incidents) . In the last three combat operations (Grenada, Panama, and Desert Shield/Storm), accident losses have approached 50% of all losses. Material losses in combat in such areas as aircraft, vehicles, and weapons systems have always been 40% or more from accidents. These losses can be dramatically reduced. As mentioned in an earlier chapter, the 4th Infantry Division in Viet Nam cut losses year to year by 50% while continuing the same basic OPTEMPO. This success was achieved by focusing on safety basics in the vehicle, weapons handling, aircraft, and similar high loss areas. Desert Shield/Storm also demonstrated the potential or reducing accidents. While many accidents occurred in this operation, overall accident losses were substantially reduced from those encountered in previous wars. This improvement was the direct result of attention given to accident prevention by leaders at all levels. It also reflects the improvements made in integrating safety in combat training in recent years. While much can be done during combat to reduce accidents, success really depends on the integration of safety in training. FIGURE 7-1 outlines how two factors - training safety and combat safety - combine to produce greater safety in combat operations. As outlined in chapters 2 and 3, much more can be accomplished in training safety and realism. A reasonable goal for reducing accidents in combat is a 50% reduction over the best results previously achieved.

SAFETY RISK MANAGEMENT'S CONTRIBUTION TO FORCE PROTECTION IN COMBAT

· **ENTER COMBAT WITH:**

- BATTLE FOCUSED SAFETY STANDARDS
- RISK MANAGEMENT TRAINED LEADERS
- MORE REALISTICALLY TRAINED TROOPS
- ADEQUATE BATTLE FOCUSED SAFETY STAFF

· **CONDUCT SAFER OPERATIONS:**

- SAFETY RISK MANAGE OPLANS
- DETECT/CORRECT HAZARDS EARLY
- CORRECT ACCIDENT CAUSES EARLY

FIGURE 7-1

Integrating Safety Risk Management in Combat

The basis for integrating SRM in combat is the model at FIGURE 7-2. This operational/decision making process is taken from FM 101-5, Staff Organization and Operations. The process rests on the foundation established by the use of SRM in training. If that foundation has been well laid, the unit will enter combat with established safety procedures that are completely practical in combat. On this foundation, SRM in combat consists mainly of identifying the unique aspects of risk in a particular operation and developing and implementing the additional risk controls that may be needed. The right hand column of FIGURE 7-2 illustrates the various techniques that may be appropriate at different stages in the operational process. These processes are exactly the same as those used in training. Typically combat operations are more sustained and faster in tempo than training operations. SRM procedures will have to be accelerated as well, with more use of hasty and deliberate SRM procedures, less of in-depth procedures. More use will be made of change analysis to detect the need for modifications to those risk controls already in place for training.

RISK MANAGEMENT IN COMBAT

MISSION PHASE	OPERATIONAL ACTIVITY	SAFETY ACTIVITY
Commanders Mission	* Initial estimate * Evaluate mission options * Develop operational alternatives * Decision.making	* Mission analysis * Hazard assessment * Risk assessment * Risk matrices * Risk reduction options
Preparation of Operation Plans and Orders	* Mission briefing * Company level plans/orders	* Safety input to briefings,orders, and SOPs * Special safety briefings and training
Preparation for Operations	* Prepare equipment * Prepare troops * Make necessary changes	* Safety checks * Special training * Higher-level support
Conduct Operations	* Lead tactical and logistical operations * Change plans as	* Enforce compliance with safety guidance

	required	* Review changes for risk implications
After Action	* Assess performance strengths and weaknesses	* Assess risk management effectiveness

BASIC OPERATIONAL PROCESS

FIGURE 7-2

SRM in a Typical Combat Operation

Let's assume that our unit (a division) recently completed training in the tirehouse based on the "Improve Training Safety" and "Improve Training Realism" procedures. We have since been deployed to combat. A warning order has been received alerting the unit to be prepared to conduct an assault on an urban area occupied by a determined enemy that can't be dislodged by supporting fires alone. This is tirehouse for real. The assault is scheduled to begin in 48 hours. Lets follow the application of SRM in this situation step-by-step.

1. *The warning order is passed to the operational planning cell in the division main command post (CP). Units are selected to conduct the attack and are given warning orders. The planning cell then begins its preparation for the battle. As a part of the estimate, the safety risks of the operation are identified at the same time threat risk is considered. This is accomplished by one of the planners or by the supporting safety staff. The lessons learned data base is used, as is the accident database developed during similar attacks conducted by other units. A major tool used is change analysis. What in this MOUT operation makes it in any way different from the operations practiced in training? For example, supporting fires may have produced large amounts of rubble from which the enemy is conducting his defense. What safety issues are posed by this situation? A hasty or possibly deliberate SRM application would be used to assess this issue. Such unique factors are considered along with previously recognized actors in developing the alternative operational plans. For example, the possibilities of fratricide from direct and indirect supporting fires are considered in developing axis of attack and unit boundaries. Specific actions are taken based on the procedures and SOPs that resulted from the SRM procedures applied in training. For example, consideration may be given to*

shutting off gas and electrical utilities. Units involved in the assault will be directed to conduct refresher training in MOUT assault procedures to include all those developed as a result of SRM application. Rehearsals and dry runs will be conducted in the limited preparation time available. "Training only" standards will be dropped and some procedures such as "cooking off not used in garrison training may by rehearsed.

2. *As the attack is initiated, the leaders involved at all levels will be using the SRM techniques they have been trained in and have practiced. As the attack unfolds and they encounter unusual situations, leaders conduct hasty risk assessments to evaluate various courses of action and develop risk controls.*

3. *During the course of the attack, casualties occur and are reported through normal channels. Some of these casualties are the result of accidents and fratricide incidents. Leaders and staff at all levels note and analyze the causes of these losses. Action is taken as appropriate to alert the entire attacking force to unanticipated sources of accident losses or to losses requiring additional controls beyond those developed in training. These new or additional controls are developed and provided down the chain of command.*

4. *After the attack, a rigorous after action review is conducted at all levels. An integrated aspect of these AARs is evaluation of the effectiveness of the SRM procedures used in the attack. All personnel are actively encouraged to provide ideas to improve risk controls, training procedures, etc. The lessons learned are passed upward and eventually reach the "lessons learned" data base where they can be assessed by other units conducting such attacks.*

Safety Support for Combat Operations

Effective SRM can produce very important benefits for the combat commander. Even a moderately effective program can cut accident losses in half and total personnel losses by 10-25%. Accidental material losses can be cut by 50% which would reduce total material losses by 20% or more. In a close battle, such reductions in losses could be the decisive factor in victory or defeat. It follows that a modest investment in

effective SRM has obvious merit. In the last two major conflicts (Viet Nam and Desert Shield/Storm) the Army has provided safety staffing to combat units down to division level. This support has been provided on an ad hoc basis involving volunteers and ad-libbed staff procedures. The lesson has been learned. The Army is currently in the process of developing a formal staff structure and associated procedural guidance designed to ensure that the field commander has access to trained, military safety expertise in future conflicts. The major features of this plan are still evolving. The personnel in this structure would provide a complete program of safety staff services to the field commander. These personnel would be prepared to provide safety services from the predeployment stages all the way to final return to CONUS bases. This start to finish program should assure that accident losses in future conflicts are at an absolute minimum.

CHAPTER 8

IMPROVE TOTAL COMBAT PERFORMANCE

In the last three chapters, we have looked at three major aspects of SRM. These are: *Improve Training Safety, Improve Training Realism,* and *Improve Combat Safety*. Each of these benefits of SRM is impressive in its own right. Collectively their impact on the combat capabilities of the Army is even greater than the sum of their individual parts. Consider this impressive list of contributions.

-Reduces accident losses in training by large percentages (50%+ potentially), making more assets available for combat.

-Enhances Army credibility with the Congress, the public and the troops. SRM assures that the risk decisions that are made are supportable and defensible against the repeated public and Congressional reviews of the last several years. Soldiers can be confident of the measures taken for their protection.

-Training realism is significantly enhanced. Where realism is restricted by legitimate safety controls, these controls are clearly labeled "training only."

- Leadership skills are enhanced. The requirement for leaders to use SRM in conducting training operations assures that they can use the same procedures in combat.

- Tactical risk management skills are enhanced. The basic concepts of risk management are the same whether accident risk or tactical threat) risk is being managed. Therefore, improving leaders' ability to manage safety risk improves their ability to manage tactical risk. Practicing one is practicing the other.

- The climate for innovation and bold creative training is enhanced. SRM provides junior leaders with the tools needed to develop bold innovative training that can be conducted with safety. It provides the basis for protecting innovators against retribution if a reasonable risk actually produces a loss.

- Combat accidents are reduced. The most critical time to preserve resources is in combat when they are most

needed. SRM provides the tools needed to potentially reduce accident losses in combat by 50% or more.

- Valuable safety tools are gained that are useful in areas other than tactical training and combat. Some of these tools are described throughout this reference guide.

- The benefits of SRM concepts will spill over to applications in the management of garrison safety problems. For example, chapter 9 covers the application of SRM to the serious problem of preventing POV accidents. SRM procedures have potential application to everything from post boy scout activities to Armed Forces Day celebrations.

CHAPTER 9

OTHER SAFETY RISK MANAGEMENT APPLICATIONS

Safety Risk Management (SRM) has application in non-tactical aspects of Army operations. This chapter illustrates this potential by showing how SRM can be applied to the very serious problem of POV accident fatalities and injuries. The same assumptions apply to the POV problem that apply to all other SRM applications. These include the following:

-The risk of POV accidents can never be reduced to zero.

- Since the risk cannot be eliminated, a decision must be made regarding how low to reduce the risk versus the resources required to reach a given level.

- The problem then is to select an optimum program of POV accident prevention procedures that is sustainable within practical resources.

Such a program is outlined in FIGURE 9-1. The focus is on three specific problems. The risk controls to be applied to these three problems are described in FIGURE 9-2. These controls are to be vertically integrated into an installation wide program that shares responsibility between the installation and the units. Each does the things it does best and most efficiently. The "Commander's Guide" outlines the design of this approach. The result is the following.

- Efficient allocation of prevention elements.
- Focused prevention programs.
- Limited responsibilities, but stronger accountability.

Programs of this kind have resulted in POV fatality reductions of over 50% when tested at Army installations. They have contributed significantly to the overall reduction in Army POV accidents in the last several years.

POV SAFETY RISK MANAGEMENT

· ANALYZE CAUSES

- INDIVIDUAL FAILURES
- LEADER FAILURES
- TRAINING FAILURES
- ETC.

· DEVELOP COUNTERMEASURES

- SPECIFIC TASKS
- REASONABLE EFFORT
- SUSTAINABLE
- ACCOUNTABLE
- INTEGRATE UNIT AND INSTALLATION EFFORT

· SUMMARY: CONCENTRATE ON WELL TARGETED COUNTERMEASURES

FIGURE 9-1

COMMANDERS' GUIDE TO THE POV ACCIDENT PREVENTION PROGRAM

Some say it's none of the Army's business and even if it were, there really isn't anything that can he done about it. The subject? Soldiers' deaths and injuries in POV accidents.

Is it the Army's business? After all, the soldier is off duty, usually off post, in his own car. Can we be expected to control every aspect of a soldier's behavior, even his off duty behavior? One is inclined to say no. After all, soldiers are adult men and women and adults are responsible for their own actions. It's not quite that simple, however. When a soldier dies in his car, the government pays. The Army has to recruit and train a replacement. There are burial costs, death benefits, and a lengthy list of other costs that altogether have been estimated at $30,000 to $70,000 on the average. Therefore, in addition to a commander's concern for the health and welfare of his soldiers, the problem can be viewed in straightforward economic terms. If we can prevent POV injuries and fatalities for less than the cost of the injuries and fatalities, then we can save the Army's and the taxpayers' money. At the same time, we meet our command responsibilities for troop safety and welfare.

What about the charge that there is little if anything we can do about our POV accidents? The facts have proven that contention wrong. In 1977, over a 12 month period, Fort Campbell achieved a more than 50 percent reduction in POV fatalities. Several years ago at Lackland AFB and more recently at Fort Knox, similar reductions were achieved over sustained periods. It can and has been done-cost effectively. If it can he done cost effectively, then beyond a doubt it should be done.

How is it done? Many different approaches have been tried. Most have failed. The ones that have succeeded have had two common characteristics. First, they have had solid command support up and down

the chain of command. Second, they have focused on a very few key cause factors-the rifle concept, not the shotgun. It follows that if an installation or unit can find these key causes and support the programs to control them, POV injuries and fatalities can be sharply reduced.

WHAT ARE THE CAUSES?

At one installation the causes of most POV accidents can he summed up in three brief sentences.

◦Soldiers die because they are drunk and run off the road.

◦Soldiers die because they fall asleep and run off the road.

◦When soldiers run off the road and hit something, they are not wearing seatbelts.

The vast majority of fatalities occur at night and involve running off the road. To succeed in preventing such accidents, we must convince soldiers to avoid driving while drunk or sleepy, or (in the case of the latter) at least show them how to do it with the least possible risk.

We believe there is a program that can accomplish this. Implementation of the program involves responsibilities from DA-level down to the company/battery commander, and indeed, the individual soldier. Your responsibilities as a unit commander are simple and specific. Meeting those responsibilities is critical to the success of the program. let's look at them.

1. Assure troops attend mandatory training related to this program.

2. Assure distribution of printed material and display of posters.

3. Assure your troops can pass a simple skills and knowledge test on key safe driving behaviors (see Appendix A). *(**NOTE:** THE ANNOTATED "APPENDIXES" ARE NOT INCLUDED AS PART OF THIS RISK MANAGEMENT REFERENCE GUIDE AND COURSEBOOK)*

4. Review records of personnel involved with fault in injury producing POV accidents. Judge their suitability for retention.

5. Counsel troops involved in injury-producing POV accidents (with fault) and refer them to supporting agencies.

6. Counsel troops involved in major moving traffic citations.

7. Complete and sign a simple checklist form to accompany each POV-related accident report.

8. Foster an atmosphere that if a soldier is late and can't get back, he will call unit and notify them rather than risk an accident by speeding or driving when tired.

There are no time consuming training requirements or burdensome administrative requirements. With proper delegation, the average unit commander should spend a couple of hours a year on the program almost all of which is devoted to counseling traffic violators, something that should be done anyway. Since the tasks are simple and not time consuming, a high degree of compliance is the expected standard. The degree of task completion will be frequently measured during command, IG, and safety inspections using troop interviews and other reliable measures. To succeed, this program must have your support in accomplishing these tasks. The degree of support you provide will be of special interest to higher headquarters.

HERE'S HELP

The remainder of this guide is in the form of appendices designed to make it as easy as possible to

accomplish your tasks. Let's look at those tasks again, one at a time.

1. Assure troops attend mandatory training. No problem. The training is provided by a higher headquarters. Simply deliver your troops at the place and time prescribed.

2. Assure distribution of printed and promotional material. This too is simple. The material is provided. Simply get it to the troop or post it as prescribed.

3. Assure the troop can pass a simple skill and knowledge test. This may require some supervision. The classes and promotional material should enable most troops to pass the test. There will be some who need extra help. This is where the chain of command can be effectively used. The test is simple. With a little effort each squad leader/supervisor should be able to bring his troops up to Speed. Just have them teach the troops to pass the test shown at Appendix A. Extra copies are available from III Corps Safety Office. Use of the short talk topics at Appendix B may be useful.

4. Review records of troops involved with fault In injury producing accidents. Judge suitability for retention. Simply sign the preprinted form you'll be provided and designate one for each addressee. Evaluate the replies in light of your overall estimate of the man's worth and initiate action under the applicable ARs, if appropriate.

5. Counsel troops involved with fault in injury-producing POV accidents and refer to supporting agencies. Use the counseling guide at Appendix C. It is important to cover the key points outlined in the counseling guide. After counseling, assure that an appointment is made with one of the two agencies indicated below for further counseling.

- A case involving alcohol: Call Alcohol/Drug Prevention Counselors
- Other cases involving fault by Army driver: Call Mental Health Clinic, MEDDAC
- No fault by Army driver: No counseling

6. Counsel troops involved in major traffic violations. The violations which require counseling are at Appendix D. Key points to be covered in the counseling session are at Appendix C.

7. Complete and sign the checklist you will be provided for each POV accident involving Army driver fault. If you have reliably and consistently performed all your above assigned tasks, then simply check all yes answers and append the form to DA Form 285, Accident Report, for the accident. If you have not accomplished all tasks indicate the appropriate no answers and be prepared to explain why. For many accidents, separate evaluations will be conducted by the IG or safety office to verify task accomplishment,

SUMMARY

This program can save soldiers' lives and taxpayers' dollars if it receives your support. Do your part!

FIGURE 9-2

APPENDIX A

SAFETY INTEGRATION IN ARMY FIELD TRAINING

In peacetime the Army exists to train and prepare for war. Because of the high risks associated with much Army training and the large number of soldiers involved, there are many accidents. Accordingly, a priority for any Army safety office supporting military training is to control risks in that training.

Effectively controlling training risks necessarily involves participating in the processes used to manage training. These processes are established in FM 25-100, Train the Force, and FM 25-101, Battle Focused Training. The basic model of the training process is at FIGURE Al.

FIGURE A1

_____ It is called the Training Management Cycle (TMC). Note that the TMC parallels the five step risk management process. METL development can be considered the equivalent of hazard identification. The training assessment can be considered data analysis. Planning can be linked to countermeasure development. Execution is the equivalent of implementation in the risk management cycle. Finally, assessment is related to supervise. FIGURE A2 shows how the risk management cycle can actually be graphically linked to the TMC. Note how the second ring, depicting the risk management process, places the primary risk management activities in conjunction with TMC actions.

_____

FIGURE A2

Of course, many risk management actions can be occurring at any point in the TMC, the second ring simply reflects the most frequent risk management actions at that point.

FIGURE A3 focuses on FM 25-100 and systematically lists the various points at which risk considerations can be integrated. There are 16 total points including points at all stages of the TMC. Note that each point is keyed by page number to a particular page of FM 25-100. These references will enable you to evaluate in more detail the procedures for integration.

INTEGRATING SAFETY IN THE TRAINING PROCESS

FM 25-100, Training the Force, and FM 25-101, Battle Focused Training, are the two manuals that provide detailed procedures for the conduct of training. It is important that commanders integrate safety in the actions they take to train their organizations. Following are a number of suggested points of integration for safety in the training process. Page references are to FM 25-100.

1. Review the principles of training. (page 1-4). Consider the safety implications of these tenets and how they impact on safety and training objectives. In the case of "Train as you Fight", and "Train to Challenge", it will be necessary to do some balancing of training risks, Senior commanders must provide practical guidance to subordinates. The should not demand "tough realistic training" in one minute, then announce that "safety is paramount" the next. Instead, they should provide practical risk management guidance and command intent regarding risk acceptance.

2. Senior leaders and Training, (page 1-7). The directive, to "Foster a command climate that is conducive to good training..." requires "...rewarding subordinates who are bold and innovative...," It must also consider punishment for the leader who chooses to gamble with soldier's lives and welfare - even when the gamble pays off. Finally, it must protect the bold risk taker who takes a prudent risk, but encounters an accident.

3. The Training Management Cycle (page 1-9). Consider overall points of integration in the cycle. See enclosure 1.

4. Integration of Safety in Task Standards (page 2-7). Include safety standards in the METL standards. Alternatively, assure safety is included in the "established procedures" referred to in a standard. See enclosure 2.

5. Incorporate a Safety Consideration in the Training Assessment (page 3-1). Past accident problems arising from training could be mentioned in the assessment as target areas and motivators. See enclosure 3.

6. Commander' Guidance (page 3-5). Incorporate risk management guidance and the commander's

intent regarding risk-taking in the Commander's Guidance. This is certainly a good place for the commander to establish a clear policy in favor of bold, but prudent risk management practices in training.

7. Training Events (page 3-9). Use the calendar of training events to spot high risk events that may require special priority. Begin to allocate the resources that will be needed to support higher risk events.

8. Short Range Planning (page 3-12). Require preliminary hazard analyses (PHA). Firm up the extent and type of safety activity that is appropriate based on the PHA. Consider early countermeasure action, especially targeting leadership groups.

9. Incorporate Safety Issues in the Short-Range Training Briefings (page 3-17). The senior commander can use these briefings as a perfect place to mentor by reviewing and evaluating risk management activities conducted by subordinates.

10. Near-Term Planning (page 3-18). See that in-depth risk management is completed for all training operations involving significant levels of risk. Monitor operations closely for last minute changes and conduct change analyses as needed.

11. Near Term Planning (page 3-19). Verify that leaders are building safety in training plans and training OPPLANS/orders.

12. Execution - Presentation of Training (page 4-2). Leaders monitor training for adherence to standards, including safety standards. Include safety issues in the criteria used by controllers and umpires to monitor and manage training. Leaders monitor training to spot and eliminate situations in which safety considerations may be unnecessarily impeding training.

13. Execution - Challenge The Risk Management Skills of Leaders (page 4-3). Ensure that leaders are not force-fed safety procedures. Require them to develop and tailor standards needed to fit the particular training environment. Leaders who are spoon fed safety will never gain useful risk management skIlls.

14. Assessment - Alter-Action Reviews (AARs) (page 5-1). Ensure that accidents and safety related standards problems are covered in the mission"standards focus of the AAR format.

15. Assessment - The Four Part AAR Process (page 5-2). Apply this four step process to the evaluation of safety related standards failures. Let those involved in the training participate in the evaluation. Have the group use risk management techniques to improve processes and procedures

16. Assessment - Senior Leader Role (page 5-3). See that safety issues (raised as a result of accidents, near misses, standards performance shortcomings) are included in the periodic organizational assessment.

SUMMARY: Safety is a vital consideration in training because the success or failure of leaders and units to control accidents and perform to standard in training will determine their success in combat. In combat, accidents have always caused at least 20% of all casualties, and often more than half. Equipment losses are in the same range. With numbers like these, the ability to reduce accidental losses in combat to a minimum can be the edge that produces victory on future battlefields. That battlefield safety success must be won in training.

FIGURE A3

FIGURE A4 shows how accident data and accident analysis can help pinpoint risk problems that deserve attention during training operations. Note how the METL for an armor company has been placed in a matrix with frequent crew error problems. As outlined in FIGURE A5, the X's indicate where the database (either from training or combat) has pinpointed problems. Given these points, it is possible to review the standards or procedures that guide operations in these areas and determine their adequacy. After an operation, it is also possible to review the accidents, incidents, and near misses that have occurred and identify targets for risk control in the next outing.

METL Safety Performance Assessment

X marks the spot where a human error problem area has caused accidents in METL task performance during peacetime and DS/DS.

Identify systemic sources of human error by asking these questions about each x

> Are required equipment/material/facilities/services available to perform the task? Are they properly designed/maintained to perform the task?
>
> Do standards east for the task? Are they clear/practical?
>
> Have assigned personnel received training necessary to perform the task to standard? CTT/MOS/sustainment?
>
> Are assigned leaders ready - willing - able to supervise task performance and enforce performance to standard?
>
> Are assigned individuals sufficiently self-discipline to perform the task to the standard they know and have been trained to?

If the answer to any of these questions is "no," a systemic failure exists that may lead to human error accidents in peacetime and combat.

How is this risk going to be managed to efficiently, effectively and safely perform the METL task and accomplish the mission in peacetime and combat?

FIGURE A4

FIGURE A5

FIGURE A6 builds on the relationship between mission essential tasks (MET) and the standards and procedures involved in these tasks. Generally safety requirements will not be considered as mission essential tasks by themselves. More commonly, safety requirements deal with how well the task is performed. In other words, they are standards or procedures. Accordingly, one of the most productive places to integrate safety is at the point of MET standards. In some cases, integration may occur at the point of procedures for standards.

FM 25-100

MISSION ESSENTIAL TASK: Move to Assembly Area (AA) and assemble the force.

CONDITION: Divisional units have conducted the POMCUS draw (72 hours) and prepared to move forward (road/rail) to AA. Equipment shipped has arrived in SPOE and must be moved to AA. Personnel traveling by air have arrived in theater.

STANDARDS: 1. Divisional units prepare and submit to MACG movement representative all required movement documents.

2. Divisional units prepare all equipment for road/rail movement in accordance with established procedures.

3. Fail loaded equipment is completely uploaded according to established procedures and time tables.

4. All convoys are organized and marked according to established procedures.

5. All divisional units move forward to according to established movement directives, meet Start Point (SP) and please Point (PP) times, travel on designated routes only, and assemble as directed.

6. All convoy commanders maintain control of their convoys and maintain capability to divert convoys to alternate routes while in transit.

7. 100 percent of required reports must be submitted to higher headquarters.

8. 100 percent of the Division's personnel and equipment are moved to assigned -A and assembled under Division or higher headquarters control LAW assigned theater time schedules.

FIGURE 2-6. Example Training Objective for a Mission Essential Task

Analysis of the mission essential task in FIGURE 2-6, FM 25-100 above, establishes eight standards. In several of the standards (e.g., 2, 3,4) there is reference to "established procedures." Good risk management would require that these established procedures include appropriate reference to safety standards (as in handling of hazardous materials, material handling procedures, etc.). Further, in most specific training or combat missions, it will be necessary to establish some special safety standards to deal with unique aspects of that particular operation.

FIGURE A6

Once well integrated in the TMC, risk management contributes importantly to the safety of training and, perhaps more importantly, to combat safety and effectiveness. The final step is to evaluate the integration. FIGURE A7 is a set of sample evaluation criteria that may be used to determine if the integration of SRM has been properly accomplished.

SAFETY IN CONDUCT OF FIELD TRAINING
EVALUATION CRITERIA

1. Develop the METL

a. Safety considerations are integrated appropriately in METL task statements and in conditions and standards.

Not at all To some degree Thoroughly

b.The METL is used to focus safety function plans and preparations to support the command.

Not at all To some degree Thoroughly

2. Planning - Long range

a. Safety input is provided for the training assessment process.

Rarely or never Occasionally Nearly always

b.Training is systematically reviewed to detect realism deficiencies induced by unnecessary safety restrictions.

Rarely or never Occasionally Nearly always

c.Effective safety input is provided for integration in the commanders vision and the associated organizational goals and priorities.

Rarely or never Occasionally Nearly always

d.The long range plan and calendar are routinely used as the basis for safety office planning and resource prioritization.

Rarely or never Occasionally Nearly always

e.Relevant safety related factors are routinely provided for integration in the command training guidance.

Rarely Occasionally Nearly always

f.Administrative safety functions are scheduled to coincide with the "red" status rotation, never "green."

Rarely Occasionally Nearly always

g.The training calendar is used to target training events that offer maximum productivity in terms of improving safety and training realism.

Rarely Occasionally Nearly always

3. Planning - Short range

a.The short range calendar is used to target higher risk training and initiate risk management processes.

Rarely Occasionally Nearly always

b.Safety is consistently covered as an appropriate topic for training briefings and focal issues are suggested.

Rarely Occasionally Nearly always

4. Near term planning

a.Important training events are used to focus safety function efforts to enhance risk management and upgrade safety in unit battle focused standards and standard procedures.

Rarely Occasionally Nearly always

b.Safety completes risk identification/assessment procedures when risk complexity dictates professional review.

Rarely Occasionally Nearly always

c.Key safety issues for various events are provided for incorporation in training schedules per FM 25-100.

Rarely Occasionally Nearly always

d.Training schedules are used to guide safety function work plans and assure rational prioritization of effort.

Rarely Occasionally Nearly always

5. Executing Training

a.Preparation for major training operations includes application of operational readiness techniques to assure fully effective management of risk.

Rarely Occasionally Nearly always

b. Senior leaders are routinely provided issues to focus their visits to training sites and involve them effectively in the management of risk.

Rarely Occasionally Nearly always

c.The safety function sample the conduct of training to assess adherence to established standards and procedures.

Rarely Occasionally Nearly always

d.Significant accidents/incidents are investigated in the field to detect risks and assess performance readiness.

Rarely Occasionally Nearly always

6. Assessment of Training

a.Safety provides input into after action reviews and reports at selected levels of training to assure considerations of training risk management (safety and realism) issues.

Rarely Occasionally Nearly always

b.Safety effectively uses various evaluation source data as outlined in FM 25-100 (page 5-5) to evaluate risk management effectiveness.

Rarely Occasionally Nearly always

c. The safety function used collective evaluation information to provide effective input to the next periodic training assessment.

Rarely Occasionally Nearly always

FIGURE A7

APPENDIX C

"SO YOU'RE GOING TO RISK MANAGE AN OPERATION"

The dialogue and narrative that follow illustrate how any junior officer or senior NCO might be expected to risk manage a training operation. The operation in question, forced marching (or running in formation, etc.) in fact produces many unnecessary Army injuries every year. Note a very important fact. Once the hazards are detected, risk assessed, and controls in the form of standards are adopted and integrated in SOPs, etc., all that needs to be considered in the future is changes. The risk management process is not repeated every iteration. Implementation of any significant number of the proposed risk controls would certainly reduce accidents in such training by at least 50% over current levels. Most proposed controls would produce little or no adverse impact on the training objectives. The process requires little time, and contributes to the development of a confident leader who can apply the same process to the tough risk decisions that must be made on the modern battlefield. This kind of analysis works even better with groups or teams. The entire group sharpens its risk management skills and all learn from each other in a team-building context.

SO YOU'RE GOING TO RISK MANAGE AN OPERATION

CPT Jones: Lieutenant Smith, as you know, we're going to conduct that 10 mile forced march late next week.

LT Smith: Yes sir. It will really challenge the troops.

CPT Jones: That is just what I want. What I don't want are any accidents or injuries during this operation. When I was a platoon leader, not so many years ago, the first platoon went on a march just like this. One man fell out and later was struck and killed by a car. We are not going to have anything like that happen, are we?

LT Smith: No sir!

CPT Jones: Just to be sure, I want you to conduct a quality risk assessment of the entire operation and advise me of needed risk controls. Can you handle that?

LT Smith: Yes sir.

CPT Jones: Good, have it done by Friday. Come in and brief me on your procedures, results, and recommendations.

LT Smith: Yes sir.

LT Smith (closing the door to the Captain's office behind him): How do I do that!?

Lt Smith is not the first junior officer or NCO leader to be told "Risk manage that operation". More and more smart commanders are realizing that a training operation isn't a quality operation until risk has been fully managed. Many commands are requiring risk assessments and implementing follow up controls. How can anyone justify~ exposing soldiers to the tough, realistic training that peak combat readiness demands, without using up-to-date risk management techniques? No one can justify second rate protection of soldiers and gambling with their lives.

In this case, LT Smith will complete the risk assessment and provide his commander a first class product by applying a set of standardized risk management actions. The effort will be highly effective and will require a minimum amount of time. FIGURE 1-8, in the first chapter of this book, depicts these actions. Let's look at them in more detail.

The first action is an operations analysis of the training event. Usually somebody has already done this. How can you lead an operation if you haven't considered the planned sequence of events? In this case, the start-to-finish flow of events for the forced march is depicted at FIGURE C1. The key points to remember are to start at the beginning of the operation and don't stop until all events are listed. Use sufficient detail in outlining events so you clearly understand the operation. A good outline will help assure that no phase of the operation is overlooked in the risk assessment.

EXPECTED SEQUENCE OF EVENTS
FORCED MARCH

1.	Event 1.	Troop formation in usual place.
2.	Event 2.	March to start point.
3.	Event 3.	Forced march to checkpoint Alpha.
4.	Event 4.	Forced march to checkpoint Bravo. (Road crossing)
5.	Event 5.	Forced march to checkpoint Charlie. (Heavy brush)
6.	Event 6.	Forced march to checkpoint Alpha. (Stream crossing)
7.	Event 7.	Return march to barracks.
8.	Event 8.	Troop formation and dismissal.

FIGURE C1

The next action is detecting the hazards associated with each step of the operation. This can be done with a simple pencil and paper worksheet as shown at FIGURE C2. How do you detect the hazards? First, ask the installation/ division safety office for information on accidents in similar operations.

Preliminary Hazard Analysis
The Forced March

General: Hazard Sources and Risk Assessment: Forced march

Stress fractures (High)
Soldier-vehicle collision (in formation, stragglers) (High)
Heat injury (Critical)
Fracture/strain from fall, etc. (High)
Muscle-skeletal injury (Medium)
Blisters or foot infection (Medium)
Cardiovascular events (Medium)
Cold injury (Low)
Respiratory disease (Low)
Animal attack (Low)

Risk Assessment Legend

	Likelihood	Severity
A.	Likely to occur immediately or very soon	1. Death or permanent total disability
B.	Probably will occur in time disability or serious temporary disability	2. Permanent partial
C.	Possibly will occur in time	3. Lost workday case
D.	Unlikely to occur	4. First aid

SPECIFIC:

1.	Eventq. -	Previously analyzed*
2.	Event2. -	" "
3.	Event3. -	" "
4.	Event4. -	Crossing state road 154
5.	Event5. -	Heavy brush - struck by branches or falls
6.	Event6. -	Stream crossing, past waist deep water
7.	Event7. -	Previously analyzed*
8.	Event8. -	" "

*These events occur repetitively in a variety of training operations and have been risk assessed and managed

previously. Standard risk controls are in place and will be used in this case.

FIGURE C2

Also ask for information about publications containing safety-related information or standards for the operations you are reviewing. Review these items carefully. Then construct a "mental movie" or scenario of the flow of events. As you construct the events in your mind, use your experience, judgement, and the accident data to systematically visualize the kinds of hazards listed at FIGURE C3. A review of the METT-T factors will often help spot hazards. The "enemy" in this METT-T application is hazards and accidents. Next, review the operation again trying to visualize hazards based on possible breakdowns in the planned flow of events.

HAZARD TYPES

"Struck by" as in bullets, trucks, hammers, etc. The motion impacts on the individual.

"Caught in or between" as in ground guide crushed against obstacle by vehicle, or individual with fingers caught in pulley.

"Struck against" as in individual hitting his head against an obstacle. The motion comes from the individual.

"Fall from same height" as in an individual slipping and falling on ice or a slippery floor.

"Fall from height" as in an individual falling into a maintenance pit or off a ladder.

"Abraded, Punctured, Scratched" as in stepping on a nail, or stuck by scissors, or scratched by a nail.

"Overexertion" as in heat exhaustion or in liKing overly heavy loads.

"Contact" as in touching acids, electrical current, laser light, etc.

FIGURE C3

The next action is to consider the root causes of the hazards you have identified. Again, you can use a simple pencil and paper worksheet to make a list like the one at FIGURE C4. As you proceed, you should seek out the ideas of other personnel, especially subject matter experts, regarding possible hazards of the operation and their probable causes.

Consideration of Cause Factors

Forced March/Running Accidents

Heat Injury	Major cause factors appear to be deviations from established standards regarding temperatures, acclimatization, etc. However a significant number of injuries appear to result from operations within standard limits to individuals who are unusually susceptible to heat injuries; e.g., sick or otherwise weakened.
Cold injury	Key cause factor is failing to prescribe a uniform consistent with conditions. This is often the result of unexpectedly cold conditions. A second key factor is the tendency of trainees to conceal early frostbite symptoms from the cadre, fearing negative consequences.
Respiratory disease	A key factor may be unnecessary heating up of troops and then chilling without directing uniform variations. Stress fractures There are multiple causes. Most important are running in new boots, running on hard surfaces, poor running techniques by trainees, and failure to use interval training techniques. Many troops conceal injury until it's aggravated.
Cardiovascular events	If training is conducted IAW procedures, these events are rare and involve individuals with inherent heart problems. Special care must be taken with individuals returning from profile after extended layoffs. Cases may result from improperly supervised punishment running.
Soldier-vehicle collision	Usual cause is that the driver failed to see the troop formation. Generally involves periods of limited visibility and improper troop marching procedures. Also selection of high-risk routes; e.g., heavy traffic blind spots, curves, etc. Stragglers are also vulnerable.
Muscle-skeletal injury	Key causes are improper warm up and improper running technique. Faulty equipment may aggravate. Troops often fail to report serious injuries.
Fracture/strain from fall	Caused by rough or rutted terrain when running in formation. Troops often fall over each other causing injures.
Blister or foot infection	Improperly fitted boots or shoes are usually involved. Often involves improper foot care. Normally serious only when infections result. Trainees often attempt to self-treat.
Animal bite	Uncontrolled dogs or snakes, other rabid animals. Troops careless, no repellant.
Struck by vehicle SR 154	Lack of proper traffic control, improper road guard procedures, obscured vision (fog, rain, etc.).

Struck by brush	Horseplay or careless troops, lack of eye protection.
Drowning	Improper crossing procedure (see SOP A 7, high water, lack of recovery technique).

FIGURE C4

A good project officer will go beyond the basic risk assessment and complete one more worksheet listing risk control recommendations for the boss to consider. A list of risk control options for this operation is at FIGURE C5. Citing references as part of the recommendations may be very useful to leaders, enabling them to get more information easily.

Risk Reduction Options
Running Activities

INJURY SOURCE OPTIONS	RISK REDUCTION
Heat	- Use wet globe index as basic guideline.
	- Special training & guidelines for NCOs.
	- Full use of acclimatization procedures.
	- Special training for troops guidelines for dropping out.
	- Uniform and water use guidelines and training.
	- First-aid refresher training.
Cold	- Use wind chill index.
	- Special training, guidelines and accountability procedures for NCOs.
	- Special training and guidelines for troops.
	- Uniform procedures.
Respiratory disease	- Special guidance for NCOs on uniform procedures.
Stress fracture	- Bone stress conditioning (3rd week limitations).
	- Guidelines for NCOs on route selection.
	- Footwear procedures.
	- Guidelines for NCOs on stress fracture detection.
	- Training for troops on proper marching/running technique and stress-fracture symptoms.

Cardiovascular events
- Refresher training for NCOs in cardiopulmonary resuscitation and emergency notification procedures.

- Progressive training.

- Controls on punishment running or marching.

Soldier-vehicle collision
- Route selection guidelines for NCOs.

- Complete SOP for road running or crossing, specifying detailed road guard positioning guidance (SOP A-4).

- Detailed SOP for restricted visibility conditions (night, fog, etc.). Includes provisions for and required use of reflective gear.

- Publicity on installation guidelines for driving in the vicinity of troops.

- Guidelines for NCOs on supervision of dropouts and stragglers. Possible vehicle pickups.

- Training for troops on dropout procedures.

Muscle-skeletal injury
- Warm up and stretching guidelines for NCOs.

- Progressive training procedures.

- Properly fitted boots.

Fractures/strains from falls
- Training for troops (what to do when someone falls).

- Route selection guidelines for NCOs.

FIGURE C5

Finally, the appropriate leader or commander ensures the necessary standards for the operation are transmitted to key subordinates for action. Some newly developed risk controls that have continuing application beyond a specific operation, may be permanently added to unit SOPs to assure continuity.

Lets see how the dialogue between CPT Jones and LT Smith might conclude after his briefing of CPT Jones.

LT Smith: In summary sir, those are the risks and their causes. You have my recommendations for controlling them.

CPT Jones: Excellent work, LT Smith. You have surfaced a number of risks that we really hadn't covered very well. And I like your recommendations. Ill pass the needed actions on to LT Everett and 1SG Williams. Ill tell them that I have asked you to conduct a final review of the operation for me next Thursday to make sure everything is in place.. You report any weaknesses directly to me. Good job!

LT Smith: Thank you sir.

APPENDIX D

OPERATION EXTEND
IMPROVING TRAINING REALISM

The example that follows is based on a situation that actually occurred at a major installation a few year ago. The installation had experienced a couple of serious accidents involving Infantry Fighting Vehicles (IFVs). The commander reacted to the problem by imposing a temporary speed limit of 25 MPH on all vehicle in the training area (tracked and wheeled). The limit was actually enforced by MP using "radar" guns. The intent had been to solve the problem, and then return to normal training. For some reason the limit was never lifted. This is a classic case of reducing risk in training only to dramatically increase risk in future combat. That combat risk includes the likelihood of accidents and the likelihood of destruction by enemy operations as a result of withered driving skills. The example demonstrates how a battalion staff might overcome such a problem using sound risk management practices. FIGURE D1 illustrates some of the advantages to be gained by increased training realism.

IMPROVED TRAINING REALISM

- REMOVAL OF STANDARDS WITH NO BATTLE APPLICABILITY
- REMOVE UNNECESSARY SAFETY RESTRICTIONS
- CLARIFY "TRAINING ONLY" SAFETY REQUIREMENTS
- CHALLENGE LEADERS TO CREATE STANDARDS
- CREATE POSITIVE CLIMATE FOR BOLD INNOVATIONS
- GUARD AGAINST "TRAINING TRAPS"

FIGURE D1

"OPERATION EXTEND"

OBJECTIVE: Achieve a 50 percent or better improvement in combat mobility capabilities without an increase in risk or associated accidents.

CONCEPT: The primary objective of the speed limit is to reduce accidents. However, it may do little to prevent accidents except to substitute for competent driver training. It does induce negative training (for example, operating equipment consistently short of

its capability) and, therefore, substantially increases combat risk. The concept of this operation is to extend operational capabilities by 50 percent or more, thus approaching the operational limits of the vehicle. This will be achieved without significantly increasing accident risk. These improved capabilities will be achieved through application of a holistic risk management approach using a range of leadership, training, and maintenance techniques.

PROCEDURES: Achieving this expanded capability requires six steps. They are as follows:

1. Define the risks. Characterize the risks associated with extended envelope operations and quantify insofar as possible. For example, five basic sources of risk are apparent:

   a. Material failure (track failures, loss of lateral control).

   b. Driver error (incorrect terrain interpretation, poor technique).

   c.Crew battering (improper riding technique, poor stowage procedures).

   d. Leader operational control.

   e. Vehicle collision (weak combat team execution).

2. Define the "operational envelope." Experts on each of the unit's major pieces of equipment would devise a practical set of guidelines on maximum vehicle capabilities (speeds) given well maintained equipment and well trained drivers. These guidelines must consider terrain characteristics and special environmental factors (NVG, precipitation, etc.). For training purposes, suggest that several terrain types be defined--a basic type and four or five progressively more difficult types. Then maximum practical speeds would be defined for each of these.

3. Maintenance enhancement. A significant factor in tracked vehicle accidents is sudden loss of steering due to failing lateral control or a broken or thrown track. The unit must devise a simple but effective set of special maintenance checks of critical components related to lateral failure and track loss. These checks, called Extended Operations Checks (EOCs), would be mandatory before extended envelope operations. Properly conducted, these checks should dramatically reduce such failures and the attendant accident risk. The special maintenance checks and procedures for critical combat vehicle components (for example, laterals, tracks. etc.) would result in improved and safer performance with fewer material failures even though operating at higher speeds. These checks are limited to key steering-related components only and do not include a major investment in time or effort.

4. Driver training. Vehicle operators should be put through a training course that progressively extends their capabilities toward optimum speed. The same course should instruct on terrain analysis and appreciation (for example, the right speed for given terrain characteristics). Drivers should be required under controlled conditions to demonstrate proficiency at progressively more difficult skill levels, to include terrain analysis judgments. Only specially qualified operators would be authorized extended envelope operations. Drivers who are qualified through this training might be given some designation such as "Battalion/Company Pace Drivers," "Battalion/Company Point Drivers," or some other designation to set them apart from the other drivers. This driver training could be conducted as a company then battalion competition, like a skill driving rally (for speed, accuracy, and handling skill over the course). Again, the focus of this particular training is exclusively speed and terrain appreciation skills.

5. Leader training. Leaders must receive terrain analysis and appreciation familiarization and be provided with a basic risk management concept. Risk limits must be closely defined. The concept of a "lead" or "pace" vehicle may be effective. The best vehicle team from the competition would be the "pace" team for the company and/or battalion.

6. Field application and assessment. A test unit company or battalion should put these concepts into field application. Lessons learned should be applied to other units. Use the test to weigh the impact of risks, test results, training improvements, improved esprit, etc. If warranted, "Operation Extend" could be applied throughout the installation.

OPERATION EXTEND
REALISTIC TRAINING AND COMBAT ADVANTAGES

1. Reduced move time with greater combat capability and reduced exposure to enemy fire.

2. Improved ability to keep pace with other combined arms team combat assets.

3. More shoot time, less move time.

4. Improved training realism and a more realistic training tempo.

5. Turns administrative time into training time--moving down range becomes a training objective.

6. Improved crew confidence, skill, esprit, and unit tactical execution.

OPERATION EXTEND SUMMARY

SOURCE OF RISK	RISK REDUCTION APPLICATIONS
Material failure	* Extended Operations Checks (EOCs)
	* Special maintenance of critical components
Driver error	* Driver training without crew
	* Incremental extension training
	* Terrain analysis familiarization
	* "Pace" or Lead" driver concept
	* Company/battalion tactical driver competition
Leader operational control	* Pace/Lead vehicle concept
	* Terrain analysis familiarization
	* Risk threshold criteria
	* Leader recon and check station
	* Unit incremental extension training
Crew battering	* Crew training on accident causation and inJurIes
	* Communications and control discipline
	* Adherence to proper procedures
	* Crew incremental training
Vehicle collisions	* Extended Operations Checks (EOCs)
	* Pace/Lead vehicle concept
	* Leader recon and check station controls

* Special maintenance of critical components

* Unit incremental training

APPENDIX E

AVIATION RISK MANAGEMENT EXAMPLE

Following your return from SRM training, your commander directs you to apply your newly developed risk management skills to a mission requested by the local Pathfinder unit. The commander has been awaiting your return for advice on this mission. You are to assist the supported unit's safety officer in performing a risk analysis for the next mission. Apply the risk management process to this operation.

The Pathfinder unit wants your UH-60 unit to do one and two man aerial extraction training with their personnel. This training consists of rigging one or two Pathfinder soldiers on the ground in extraction harnesses to lift them from an area where the aircraft is unable to land. The pathfinders have proposed using a small clear-cut area near their field training site. Your unit has performed the mission several times in the past two years, the last time about three months ago, but your commander is worried about it. He feels this has the potential to be an "accident waiting to happen."

Several of the Pathfinder personnel will be sent on detachment to Honduras and their unit commander wants his personnel to have this training before deployment.

1.IDENTIFY SOURCES OF INFORMATION FOR THE HAZARD IDENTIFICATION STEP OF THE SRM PROCESS.

2.DEVELOP AN OPERATIONS ANALYSIS (OA) FOR THIS PROPOSAL.
Remember, this mission has been performed by the unit in the past with no adverse results thus far.

3.PREPARE A PRELIMINARY HAZARD LIST (PHL) IDENTIFYING POTENTIAL HAZARDS.

4.CONDUCT A RISK ASSESSMENT FOR THE HAZARDS IDENTIFIED.
Use the risk assessment matrix (FIGURE 5-10). In addition to showing the level or risk, show both the HAZARD SEVERITY and HAZARD PROBABILITY. (eg. MARGINAL severity with OCCASIONAL probability would be shown as 3C MEDIUM risk).

5.DEVELOP RISK CONTROL OPTIONS FOR THE OPERATION.
Remember, even if this is a "medium risk" operation and your SOP allows you to perform it with the BN CDR's "OK", the object is to reduce risks, not simply get permission.

AVIATION RISK MANAGEMENT EXAMPLE

POSSIBLE SOLUTIONS

1. Possible sources of information include the appropriate TMs and FMs, previous unit SOP (you have been doing this for two years, something must be standardized by now), members of the unit who have conducted the operation, accident data from the USASC data base and the Pathfinder instructors at Ft. Benning, GA. to include their "branch safety office,"

2. The OA sequencing could be:

   Premission coordination
   Site recon/selection
   Mission briefs and preparation
   Aircraft rigging
   Aircraft arrives at site
   Aircraft drops rope
   Individual on ground hooks up for lift
   Aircraft lifts individual(s) from area
   Flight to drop off/landing site
   Lower individual to ground
   Individual release/rope release
   Aircraft lands/departs for next mission

3. A Preliminary Hazard Analysis could be:

   Aircraft tree strike (1C)
   Improperly rigged aircraft drops soldiers (1C)
   Soldier on ground struck by dropped rope bundle (2B)
   Rope snagged on tree/entanglement/aircraft crashed or damaged (1B)
   Rope entanglement/soldier strikes obstacle/dragged through trees (1A)
   Soldier dragged across ground into stumps/trees (1C)
   Rope breaks during flight (1C)
   Improperly rigged soldier falls (1C)
   In-flight emergency requires release of load (1D)
   Unanticipated violent environmental factors-wind, visibility, lightning (3D)
   Inadvertent release of load (1D)
   Cold injury (3A)
   Soldier hard landing or dragged during landing (2B)

AVIATION RISK MANAGEMENT EXAMPLE
POSSIBLE RISK CONTROL OPTIONS

INJURY SOURCE	RISK REDUCTION OPTIONS
Aircraft strikes tree	Select area adequate for pick up - clear of obstacles. Alternate site. Crew coordination.
Aircraft drops soldier	Ensure procedures and equipment are adequate. Use trained personnel to prepare and inspect aircraft and equipment.
Soldier struck by rope bundle	Crew member ensures area clear. Ground personnel briefed on hazard.
Rope entanglement with obstacle. Aircraft crash/ site.	Select area adequate for pick up - clear of obstacles. Alternate soldier injury Establish procedures/actions in case of entanglement.
Soldier entanglement in rope	Advise of hazard in procedures and preparation training.
Soldier (load) strikes tree	Aircraft crew practice loads at area prior to live loads. Vigilance by aircraft personnel. Establish site selection criteria.
Soldier dragged across ground	Select clear area. Appropriate crew selection/mix. Practice loads. Soldier on ground prepared, facing direction of takeoff. Helmet on and secured.
Rope breaks during flight	Rope inspection procedures before and after use, same as repelling.
Soldier improperly rigged	Verify TM procedures for extraction harness. Inspection by ground controller prior to take-off.
In flight emergency	Clearly establish procedures for a variety of scenarios.
Environmental factors	Establish flight envelope parameters.
Inadvertent release of load	Crew chief experience/training. Crew member coordination. Discuss possible scenarios.

Cold injury	Limit exposure time. Provide cold weather gear. Establish temperature parameters. Use wind chill chart and proposed airspeed.
Soldier hard landing or dragged	Select crew. Practice before live loads. Select clear site. Crew chief vigilance.

APPENDIX F

TOOLS

Brainstorming

1. Description. Brainstorming is used to ensure fairness to all team members when they submit ideas on the possible causes of a nonconforming situation. All of the charting techniques are aids to thinking. They focus the attention of the user on the truly important dimensions of a problem. It is equally important, however, to expand our thinking to include all of the dimensions of a problem or solution. Brainstorming is used to help a group create as many ideas as possible in as short a time as possible.

Brainstorming can be used in two ways:

a. Structured - in this method, every person in a group must give an idea as their turn arises in the rotation or pass until the next round. It often helps even shy people to participate, but can also create a certain amount of pressure to contribute.

b. Unstructured - in this method, group members simply give ideas as they come to mind. It tends to create a more relaxed atmosphere but also risks domination by the most vocal members. We use the unstructured method the most, and it works well with the storyboard process.

For both methods the general "rules of the road" are the same.

a. Never criticize ideas.

b. Write down every idea on a flipchart or blackboard, if possible. With the storyboard process, the participants write their ideas on cards as they announce them to the group.

c. Everyone must agree on the topic or issue being studied by means of brainstorming. This may be dictated by the ranking soldier when time is critical.

d. Do the brainstorming quickly, 10 to 20 minutes is a good target time. Any more and the issue being studied becomes sidetracked.

2. Purpose. Brainstorming is used to develop a complete picture of all possible causes of the problem and possible solutions.

Cause and Effect Diagrams

1. Description. Cause and Effect Diagrams are constructed to clearly illustrate the various causes affecting a process. Brainstorming is used to draw out all possible causes. The causes are organized into major categories. From this well defined list of possible causes, the most likely are identified by the team and selected for further analysis. When examining each cause, look for things that have changed, deviations from targets, or patterns. Look to cure the cause and not the symptoms of the problem.

2. Purpose. The cause and effect diagram is used when we need to identify, explore, and display all of the possible causes of a specific problem or condition.

3. Steps in constructing a cause and effect diagram.

a. Decide on the problem or situation which is to be improved.

b. Write the problem on the right side of the diagram. Draw a broad arrow from the left side to the problem.

c. Write the main categories of causes to form branches from the main arrow.

d. The team uses brainstorming to generate all possible causes and records them on the diagram.

e. The diagram is analyzed to look for related causes that appear repeatedly. The team should agrees to which important causes will be investigated.

Flowcharts

Flowcharts are step-by-step, schematic pictures used to plan stages of a project or describe a process being studied. As an outline of a sequence of actions, a flowchart can provide team members with common reference points and a standard language to use when talking about an existing process or project. Various types of flowcharts have proven useful in highlighting different aspects of a process or task. Based on the type and detail of information required for the study, the analyst must decide which flowchart technique will meet his needs and provide the team with the most effective visual tool for describing what happens in a proces.

Master Risk Assessment Record

This is simply a record keeping tool used for historical purposes. Local variations of the record are as varied as the office maintaining them.

Miscellaneous Tools

As with the risk assessment record, there are numerous worksheets available. Some use numbers and some use terms to describe the various levels of risk. Be aware that high risk hazards may be camouflaged by averaging out numbers. Additionally, some matrixes show four levels of risk and some only display three. TRADOC guidance is to use four levels of risk as illustrated in FIGURE 5-10. More advanced worksheets will include recommended risk reduction methods or a place for annotating if the hazard has been controlled. It provides a quick reference sheet or checklist. Examples of fratricide reduction measures follow at the end of this APPENDIX.

APPENDIX G

SAFETY RISK MANAGEMENT ESTIMATE

The following is an example of the SRM, or ***FORCE PROTECTION*** Estimate. It is fashioned after those estimates provided in FM 101-5, *STAFF ORGANIZATION AND OPERATIONS*. The first estimate provides information concerning the type of information that should be gathered to make the estimate. It must be completed in cooperation with the staff officers compiling the Personnel, Civil Affairs, etc. estimates.

(Classification)

Headquarters
Place
Date, Time, and zone

FORCE PROTECTION ESTIMATE NO ___

References: *Maps, accident data, surveys, or other documents.*

1. MISSION
The restated mission determined by the commander.

2. THE SITUATION AND CONSIDERATIONS *This portion of the estimate emphasizes hazard identification and hazard assessment.*

a. Intelligence Situation. *Include information obtained from the intelligence officer. When the details make it appropriate and the estimate is written, a brief summary and reference to the appropriate intelligence document or an annex of the estimate may be used.*

(1) Characteristics of the area of operations. *Describe the general characteristics of the area of operations identifying significant hazards which may impact safe operations or soldier's health. Any hazard negatively impacting on safety should also be addressed in the Logistic Estimate, CMO Estimate and Personnel Estimate, as appropriate.*

(2) Weather considerations. *Discuss the effects of weather on broad courses of actions with regard to accidents.*

(3) Enemy capabilities. *Discuss the impact of enemy actions on individuals and leaders performance (stress and fatigue related accident potential) as well as facilities and equipment (unusual wear and tear, inability to perform adequate PMCS, similarity of enemy material to allied material (fratricide consideration), etc). Hazards resulting from enemy capabilities should also be addressed in the Personnel Estimate and the Logistic Estimate.*

b. Tactical Situation. *Information obtained from the commander's planning guidance and from the operations officer is presented. Subparagraph should be a general and concise statement of tactical intentions.*

(1) Present dispositions of major tactical elements. *Information concerning hazards affecting units in their locations should be emphasized.*

(2) Possible courses of action to accomplish the mission. *These courses of action are carried forward through the remainder of the estimate.*

(3) Projected operations. *If known, list projected operations and other planning factors required for coordination and integration of staff estimates.*

c. Personnel Situation. *Include information obtained from the personnel officer.*

(1) *Information on current personnel accident losses. This information should include those losses from environmental exposures (heat/cold injuries, smoke inhalation and other medically related, non traumatic/non enemy action losses).*

(2) *Projected losses based on trend analysis and analysis of accident data from similar operations. Again, include projected losses for non traumatic injuries and factors impacting projected losses such as fatigue, medical evacuation capabilities, etc.*

d. Logistic Situation. *Include information obtained from the logistics officer.*

(1) *Information on material losses resulting from accidents. Current impact on mission from these losses.*

(2) *Information on projected material losses and the impact on supporting logistical portion of the mission. Include information on recovery and repair of accidentally damaged equipment.*

e. Civil Military Operations (CMO) Situation. *Include information obtained from the CMO officer.*

(1) *CMO considerations that will impact on accidental losses, including involvement of friendly personnel in indigenous accidents (refugees on supply routes, public health, etc.)*

(2) *Information on projected CMO actions impacting on safety (availability*

of public safety assets such as police, firefighters, hospitals, etc.).

f. Force Protection Situation. *In this subparagraph, the current status of readiness factors is reflected under the appropriate subheadings. In the case of detailed information at higher levels of command, a summary may appear under the subheading with reference to an annex to the estimate.*

(1) Individual. *Provide a general statement about present soldier (focusing on units, not actual individuals) personal readiness. Should include appraisal of soldiers' self discipline to follow standards, effects of fatigue or stress, etc. This gives an indication of the potential for human error accidents attributed to indiscipline. Sources of this type of information include reported atrocities, UCMJ actions, alcohol and drug related incidents, etc.*

(2) Leader. *Provide an overall statement about leaders' abilities or willingness to enforce standards (normally focusing on first line supervisors). Factors could include newness of leaders, control and communication problems, lack of time to reinstill discipline in demoralized troops, inability to advise troops of unanticipated hazards (eg. entering buildings severely damaged by shell fire and subject to collapse), etc.*

(3) Training. *Provide an overall assessment of the skills of the unit and the in identifying, assessing and reducing/removing hazards, identification of friendly versus enemy material/personnel (fratricide reduction), etc.*

(4) Standards. *Provide an overall appraisal of standards and procedures impacting on the unit. Factors could include recently instated emergency procedures, procedural changes in SOPs resulting from unanticipated environmental fluctuation, confusion about commander's intent, poor, incomplete or impractical standards provided with plans or equipment, etc.*

(5) Support. *Summarize the present ability to provide facilities, equipment, personnel, maintenance and services to standards. Focus on items that could result in unnecessary loss of material or personnel (lack of brake light bulbs for ammunition hauling trailers, military police to support traffic control on main supply routes (MSR), ineffective lot of antimalarial medication, inability of engineers to adequately maintain MSRs, nonexistent flight following along air corridors, etc).*

g. Assumptions. *Any assumptions required as a basis for initiating planning or preparing the estimate. Assumptions are modified as factual data when specific planning guidance becomes available.*

3. ANALYSIS OF COURSES OF ACTION

Based on analysis of the readiness factors identified in paragraph 2.f. and their effect on mission accomplishment as well as the potential cost in lost resources (men, material, time, confidence, etc). This section should also involve analysis and detection of the specific hazards associated with the alternative courses of action. This may involve anything from hasty to deliberate risk management assessment as the situation dictates. Analysis should consider the impact of countermeasures in hazard reduction and attempt to identify any unnecessary risks that may be eliminated (such as reducing the potential for fratricide). Advantages/disadvantages and actions that must be taken to implement each course of action emerge during the analysis.

4. COMPARISON OF COURSES OF ACTION

a. *Based on the preceding analysis, determine the effectiveness of current and proposed risk reduction measures and list advantages and disadvantages, if any, with respect to accomplishment of the mission for each course of action.*

b. *Prioritize the courses of action from the most successful with least cost to least successful with most cost.*

5. CONCLUSIONS

a. *Indicate whether the mission stated in paragraph 1 above can be accomplished.*

b. *Indicate which course(s) of action can best be supported with the least cost in accidental losses.*

c. *List the major risk factors that must be brought to the commander's attention. Include specific recommendations concerning the methods of eliminating or reducing the effect of these deficiencies.*

/s/_____

Annexes (*as required)*

On the following page is an example of how the SRM/Force Protection estimate may look in actual use:

(Classification) Copy no 4 of 25 copies
HQ, 1/52nd Mech
FRANKFURT (MA7551),GERMANY
251700A Jul 19_

FORCE PROTECTION ESTIMATE NO ___

References: Readiness Assessment Surveys (date*(NOTE: The Readiness Assessment Survey is a locally designed survey.)*), Map, series USACGSC 50-229, EUROPE, sheet 1 (FRIEDBERG-FRANKFURT), edition 1974, 1:50,000.

1. MISSION

Conduct a tactical road march along route Blue and relieve the 2/13th AR in place NLT 0400 hrs (next day).

2. THE SITUATION AND CONSIDERATIONS

a. Intelligence Situation.

(1) Characteristics of the area of operations. Primary routes of travel for convoy operations are limited to two lane, hard surface roads. The roads wind through hilly, forested terrain. Cratering from enemy action makes passage difficult. The unusually high dud rate among MLRS and other US submunitions along the routes are proving as devistating as any enemy minefield and are requiring extensive engineer support to clear lanes.

(2) Weather considerations. Dense fog is anticipated within the next six hours. When coupled with the 5% illumination, visibility will be severely limited. The 30 degree fahrenheit ambient temperature and high moisture content is icing portions of the route making driving extremely treacherous, especially for wheeled vehicles.

(3) Enemy capabilities. Enemy special operations forces have been operating behind our lines, increasing soldier apprehension and has resulted in several fratricide incidents. Soldiers have had minimum rest and are not operating at even moderate levels of alertness. Fatigue among leaders is resulting in several examples of questionable decisions being made while under pressure. The last 25KM of Route Blue are under intermittent enemy indirect fire and will require driving under

blackout drive increasing risk of vehicle collisions.

b. Tactical Situation.

(1) Present dispositions of major tactical elements. Movement from each company's assembly area to the start point along route Blue (*should be annotated on an overlay)* is relatively short. However bad roads begin even before the units hit the SP. All roads have been severely damaged, both by previous enemy fire and by constant tracked vehicle use. Engineer units have been unable to keep up with road repairs. Some sections of the road can be expected to give way at unexpected times and can be exceptionally hazardous in the hills. Additional "wear and tear" on the equipment will result in earlier material failures of tires and throwing of tracks. Although there has yet to be a fatality, the numerous "fender benders" have resulted in the loss of several wheeled vehicles and the supplies/equipment they were carrying. Time delays will result on the road march because of these accidents (at choke points). Convoy speeds in the past have averaged only 10 MPH, at best.

(2) Possible courses of action to accomplish the mission.

CA1 - Slip date to relieve 2/13 AR by at least one day.

CA2 - Request alternate route that are better and more secure.

CA3 - Stagger the relief over several days.

CA4 - Use internal assets to support operation as best as possible.

CA5 - Continue with mission with no special preparation.

(3) Projected operations. After occupying 2/13 AR's battle positions, the BN will defend in place.

c. Personnel Situation.

(1) Of the 20% in personnel losses suffered by the BN over the past month, a full 10% have been the result of accidents, mainly crew battering and wheeled vehicle accident injuries. However there has recently been a large number of fratricides, cold injuries and several smoke inhalation injuries.

(2) At the going rate, we can expect to lose at least one soldier by accident for each lost to enemy action. With the projections provided by

the S1, we can anticipate 50% of the soldiers lost in the course of the operation to be preventable losses.

d. Logistic Situation.

(1) As with the personnel situation, the BN should expect to lose one vehicle by accident for each lost to enemy action. This does not include the "PMC" status due to "minor" accidents. Fortunately the heavy vehicles and tracks are designed to withstand lots of punishment; from the enemy action, lack of PMCS, or the rigors of the terrain. However, we are putting a heavy strain on all our vehicles.

(2) Recovery facilities are having a difficult time keeping up with the requirement for repair parts or with 3rd echelon and higher maintenance. The battlefield conditions are increasing material failures and are rapidly consuming the units' PLL. Replacement parts are slow in coming and the units are resorting to cannibalization of questionable repair parts from heavily damaged and destroyed vehicles. The availability of vehicles at the end of this operation is anticipated to be 69%, with a full 12% being lost to accidents.

e. Civil Military Operations (CMO) Situation.

(1) The presence of refugees on the routes is limited, but small bands of civilians and family groups (mainly consisting of old people, women and children) will be encountered. Some of these groups will be traveling in the remnants of their family vehicles. They will be moving mainly at night with little or no light for fear of being identified by enemy artillery observers and fired upon. Some are armed with discarded weapons, both US and enemy small arms, as protection from raiding bands of displaced civilians. One group of refuges inadvertently triggered an ambush set up by a sister battalion resulting in the death of 18 civilians, mainly women and children. This prompted the battalion commander to require a "positive identification' before initiation of any ambush. The requirement was quickly rescinded by the brigade commander. An increase in collateral damage to civilian refugees is anticipated on the road march due to the blackout conditions of both the refugees and soldiers. The majority of the refugees are ill, due to the contamination of the local water supplies through suspected enemy biological warfare, hazardous wastes being dumped indiscriminately, and contamination through putrefying dead in the streams and rivers, etc.

(2) There are no civil hospitals or fire departments operating within the

area. All police forces were called to active duty and reassigned to military operations. Some auxiliary police can be found, but they are isolated to small villages and are usually old men or women. Most are armed with captured or abandoned small arms. There is little room for treatment of civilian casualties in the field hospitals. Captured stocks of medical supplies turned over to the local makeshift treatment facilities found in some villages are inadequate to stop the spread of diseases or illnesses.

f. Force Protection Situation. The ability of the units to prevent accidental losses to themselves and collateral damage to other units and civilians is waning.

(1) Individual. The soldiers are reaching a level of chronic fatigue inflamed by the stress of 8 days of interdictive enemy fire and insurgent actions. There has been only two reported cases of soldiers refusing to go into combat and in one case the peer pressure made him change his mind and go. There has been no reports of looting, but this may be because the enemy forces may have already taken everything of value left behind by the local population. There have been no reported cases of rape, murder of enemy prisoners, alcohol related incidents or other indicators of indiscipline among our soldiers. The soldiers continue to follow orders and are maintaining their equipment as best as they can with the limited supply parts available. The realization that their lives depend on the ability of their equipment to function has encouraged returning to basics in preventative maintenance and by the book operations.

(2) Leader. Leaders are suffering from the same stress and fatigue as the soldiers. There have been some indications of poor tactical decisions being made, assumedly because of the poor quality of rest. However, these decisions have been overcome by our shear weight of numbers, quality of equipment, and training of our soldiers. Upper levels of command have initiated a sleep cycle in their planning sections that is being generally maintained. It seems to be increasing the quality of their operational plans as evidenced by the reduced number of FRAGOs required during a maneuver. There has been no reported breakdown in the hierarchy of command and leaders are enforcing standards of maintenance, security, etc., as they realize it increases the survivability of their soldiers. There have been some communications problems in relaying orders to maneuvering units. One incident resulted in a near fratricide as one company inadvertently crosses a phase line too soon and was temporarily mistaken as a retreating enemy force. Quick action by the radio operators of the units brought the situation to their commanders'

attention who halted the fires before any personnel were lost.

(3) Training. Soldier skills for original members of units are actually improving at a fantastic pace. Replacements, however, are often lost before they can become incorporated into their units and gain the battlefield savvy necessary for survival. Some wounded soldiers in the aide stations cannot even remember the squad, platoon or company they were assigned too as they were wounded almost immediately upon arrival. Small unit leaders are stressing the unrealistic training received by replacements prior to arriving is the culprit. The Division is organizing a crew training area for units undergoing rest and refit processing. This should decrease the replacement losses significantly by allowing them to be assimilated into their crews. They are still some potential fratricide issues with the crew served weapons sighting units. The painting of markings and displaying of orange panels on the sides and tops of vehicles has proven ineffective. Currently, we are able to control the possible fratricide issues only through strict adherence to maneuver control measures such as phase lines, boundaries and no fire areas. This is having an impact on the freedom of action commanders crave, but it has reduced the fratricide incidents.

(4) Standards. Unit SOPs are being disregarded out of hand as being impractical, unyielding, and generally unsuited for combat. The S3's shop is still working on the new battalion tactical SOP. As directed, it will be smaller, cover only critical areas, and instead of reflecting what we think may work - it will take what is working and routinize it throughout the battalion.

(5) Support. The lack of repair partes and increased wear and tear being placed on the vehicles is severely impacting the maintenance services. Most forward repairs are temporary and cannot take prolonged combat exposure before breaking again. Luckily, there have been no accidental injuries associated with the material failures. Almost all major work must be evacuated to rear repair facilities. This results in increased accidents on the already overcrowded main supply routes as other transports try to pass the slow moving evacuation vehicles. The lack of replacement bulbs for blackout drive fixtures and brake lights have also resulted in several vehicle collisions. Units are resorting to putting "chem lites" on their vehicles for visibility.

g. Assumptions. It is assumed that enemy offensive actions will not intensify, thus increasing the fatigue of the soldiers and the resulting lowering of standards. It is also assumed that the supply, personnel and civil affairs

situation will not worsen appreciatively over the next 48 hours.

3. ANALYSIS OF COURSES OF ACTION

CA1 - Slip date to relieve 2/13th Armor by at least one day. Allows time for additional planning and coordination of the relief. Impacts on 2/13th Armor as they will continue to be exposed to direct and indirect enemy fire and operations. 2/13th Armor is moving to a rear assembly area for a partial repair and refit of equipment and does not have a follow on mission for almost a week. Division has no future operations that will be impacted by a one day delay. Provides additional time to make the road march as well as additional maintenance on vehicles, rest for soldier, coordination of fires, etc. Would also include the actions in CA2 and CA4. Should result in major reduction of losses through accidents.

CA2 - Request alternate routes that are better and more secure. Would mean shifting other units to less trafficable routes and transfer accident potential to them. If better routes are used by units moving forward and the less acceptable routes used for withdrawing units, accident exposure would be transferred to units leaving battle lines and would help preserve fighting strength of those going to the front. Would also include actions in CA4. Should have substantial reduction in vehicle losses and damage on road march, both from enemy action as well as accidents. Could reduce accidental losses by as much as 5%.

CA3 - Stagger the relief over several days. Would reduce the traffic on the MSR. Would also require stringent command and control procedures to be worked out and mixed units would be on the front line. Although has potential to reduce the accidental losses from the road march, potential losses from enemy actions or fratricide are increased.

CA4 - Use internal assets to support operation as best as possible. Have units organize quartering and check point parties. Have maintenance personnel run an intensive repair program for critical vehicles and weapon systems. Maintenance party could follow after unit replaces 2/13th Armor and the maintenance section could get some rest. Mess personnel could also follow with maintenance section, allowing them to work up to the last minute preparing a class B ration prior to the movement as well as coffee and other items to improve morale and increase soldier stamina and awareness while on the road march. Will have positive impact on accidental losses from both road march and relief. Still anticipate at least 7% losses due to accidents.

CA5 - Continue with mission with no special preparation. Would result in the

10% vehicle and soldier losses, as well as collateral damage to displaced civilians. May increase fratricide exposure if special coordination is not made with unit being replaced or quartering/checkpoint parties are not used.

4. COMPARISON OF COURSES OF ACTION

a. CA1 is the best if it can be slipped several days without impacting on the Division's mission. It provided additional time for rest, preparation and coordination which will reduce accidental losses.

b. CA2 could and should be implemented with any other CA as it complements all of them.

c. CA4 is the most probable CA base don the current tactical situation. It still implements some reasonable measures to reduce accidental losses, fratricide and collateral damage to civilians.

d. CA3 and CA5 are not conducive to a reduction in accidental losses and may result in increase accidents as well as fratricides.

5. CONCLUSIONS

a. The mission can be accomplished.

b. The best course of action is to delay the operation so additional planning, coordination and maintenance can be accomplished. However, if the operation cannot be delayed, CA4 can be initiated to keep accidental losses to a minimum.

c. The major safety threats are from vehicle accidents and collateral damage to displaced civilians. There will undoubtedly be some civilian losses resulting from the night movement. The vehicle accidents, which are anticipated to be numerous, should not result in major loses of equipment due to slow speeds on the road march. Regardless, coordination must begin now to preclude any possible fratricides during the relief.

/s/_____

Annexes (*as required)*

APPENDIX H

NEXT ACCIDENT ASSESSMENT (INDIVIDUAL)

At the following pages is the individual Next Accident Assessment. It has been located at the rear of this book to facilitate its removal for duplication. The scale located at the end of the assessment is based upon actual accident percentages. It is not based on a set of arbitrary numbers as one may find on a locally produced "risk assessment matrix."

This assessment is public domain and permission to reproduce it or to improve upon it (tailor it to your unit), is encouraged. Recommendations for improving the Next Accident Assessment may be provided to the Research, Analysis and Studies Division, Programs Directorate, ATTN: CSSC-PRS, Fort Rucker, AL 36362-5363, or by calling (DSN) 558-3842/5916 or (commercial) 205-255-3842/5916.

"And there I was, smack in the middle of a good free-for-all discussion; and, while I just knew I was right, I couldn't remember the reference!" How many times has that happened to you when challenged to "go to the book"? Such a situation is what led Al Cargen, then the Air Safety Specialist, Aviation Division, Headquarters, 5th U.S. Army to put together the original quick reference listing of subjects to directives. This edition is believed to the be fourth update of that original listing and, while it may not contain every possible subject you may run into, it's a good start in that direction. And now, properly armed, it's back to the "campfire" to dazzle your buddies--unless, of course, they also have a copy.

Al Cargen is currently owner of the Aviation Safety Organization headquartered in San Antonio, TX. His organization compiled the basic information and provided it free of charge to the United States Army Safety Center.

NOTE: The information is intended to serve as a quick reference. Because of the changing nature of publications, only the basic reference is noted in most cases (annotations to page and paragraph numbers have been omitted unless considered critical or to avert possible confusion)

Alcohol, Blood test for-AR 600-85
ALSE Inspection Requirements-FM 1-508 series
Alternative to Army Aircraft-AR 750-1
Altitude Training-AR 40-8
Analysis,Teardown-DA PAM 385-95; DA PAM 738-751
Ammunition,Care,Handing,Preservation and Destruction
-TM 9-1300-206
Ammunition on Aircraft Gun-TM 9-1901-1
Annual Aviator Proficiency and Readiness Test (AAPART)-AR 95-1
Annual Physical-AR 40-501
Annual Requirement and Qualification-AR 95-1; appropriate ATM
Armament Systems for Helicopter :
a. M28A1-TM 9-1090-203-12
b. XM156-TM 9-1090-204-12
c. M23,M24,M41-TM 9-1005-262-13
d. Tow MK45-TM 9-1370-201-12
Army Adopted Other Item-SB 700-20
Army Airfield//Heliport Operational and Maintenance Facilities-
TM 5-823-4
Army Aircraft PM Inspection System-TM 1-1500-328-23(Transfer
Inspection)
Army Aircraft, Use of-AR 95-1
Army Respirator Protection Program-AR 11-34
Army Training-AR 350-1
ASO Required as Unit Level-Appropriate TOE Requirement &
AR 385-10
ASO Represent the Commander-AR 385-95;AR 385-10
Assistance of USASC-AR 385-95
Authorized use of Army Aircraft-AR 95-1
Authorized Personnel to Operation Army Aircraft-95-1
Automatic Sprinkler Systems (fire suppression) Aircraft Hangars-
AR 420-90
Aviation Life Support Equipment (ALSE)-TM 1-1500-204-23-1, AR 95-
1
Aviation Officer Responsibilities-AR 385-95
Aviator Safety Responsibilities-AR 395-95
Avionics Equipment Storage in Newly Assigned Aircraft-SB11-620
authorized for requisition
Avionics Float Equipment-AR 750-1
AVUM//AVIM Personnel-AR 570-2
AVIM Requirements-TM 55-1520-237-23-7
Award, Broken Wing-AR 672-74
Award, Safety-AR 672-74
Awarding of Aeronautical Designations(Wings)-AR 600-106;
AR 600-105, AR 672-74

Batteries,Lead Acid Aircraft-TB 11-6140-219-35//1
Batteries,Nicad-TM 11-6140-203-14-2
Battery Disconnected During Maintenance-National Fire Code
Bearing-TM 55-1500-322-24(Maintenance of Aircraft Anti Friction Bearing), page 3-59
Blood Donations,Drugs,Shots,Grounding of Aircrewman-AR 40-8
Blood test for Alcohol or Drugs-AR 600-85
Boards,Flight Evaluation-AR 600-8-1, AR 600-105, AR 15-6
Brakes-TM 55-1500-204-23-1 or appropriate organizational maintenance TM for specific wheeled/track vehicle
Briefing,Flight-Chp. 8, appropriate-10,FM 1-300, AR 95-1
Broken Wing Award-AR 672-74

C

Calibration Pro APU Test Stand-TB 55-4920-327-50
Calibration Series-TB 55-4920-Series
Calibration Schedule-TB 43-180
Cannibalization-AR 750-1
Category and Types of Aircraft ID-AR 70-50(AFR 82-1)
CH-47 (Chinook) Internal and External Loads-FM 55-450-2, -3, -4, & -5
Changing the Flight Plans-AR 95-1
Charging of Aircraft Accident-AR 385-40
Checklist Aircrew-AR 95-1
Checklist for Medical Information on Aircraft Mishap-AR 40-21
Civilian Flight Time-AR 95-1
Civilian Medevac,Local Installation Commander-DOD 4515.13-R
Civilian VIP Passenger-AR 95-1; DOD 4515.13R
Classification of Aircraft Mishap and Ground Accidents-AR 385-40
Cleaning Procedures for Army Aircraft-TM 55-1500-344-23
Clearance Authority-AR 95-1
Clearance Files DD Form 175(Maintain for 3 months)-AR 25-400-2
Clearance, Parked Fixed Wing Tips-TM 5-803-4
Climate and Terrain Training-AR 95-1
Closing, Flight Plans-AR 95-1
Clothing Protective-AR 95-1; AR 385-10; AR 670-1; DA Pam 385-3 FM 21-18
Collateral Investigation (will be conducted whenever an accident investigation is conducted)-AR 385-95; AR 15-6
Color and Marking of Military Vehicles,Construction Equipment and Materials Handling Equipment-TB 43-0209
Color Coding of Hazardous Power Sources-AR 385-30
Color Coding of Physical Hazards-AR 385-30
Command of Aircraft and Passengers-AR 95-1
Command Safety Director Responsibilities-AR 385-10; AR 385-95
Commander's Responsibility of Army Aircraft-AR 95-1; AR 385-95
Commander's Responsibilities (Army Aircraft accident prevention, investigation and reporting is a command responsibility)-AR 385-95
Commercial Communication (Western Union)-AR 385-40
Community Relations-AR 360-61
Compasses,Mag & RMI,Calibration Schedule and Procedures-TM 11-4920-292-15
Component Repair Kits-TM 1-1500-328-23
Component Replacement-TM 1-1500-328-23(aircraft component and replacement and reuse procedures)
Component-TM 1-1500-328-23,Sec.7(to be installed and retained with uninstalled aircraft engine):DA PAM 738-751 (components requiring maintenance management and historical data)
Components Removed from Crash Damaged Aircraft-TM 1-1500-328-23
Composite Flight Plan-AR 95-1:FLIP
Computing Flight Time-AR 95-1

E

Equipment Improvement Recommendation (EIR) TM 38-750
Ejection Seat Pyrotechnics-TM1-1500-204-23-a
Electrical Hazards, Appropriate Color Codes-AR385-30
Emergency Deviation of AR 95-1
Engine Conditioning-TM1-1500-204-23-1
Enlisted Safety Council-AR 385-95
Exogenous Factors-AR 40-8

F

Fuel Disposal-FM 10-68
Fuel Expanding Due to Temperature Change-TM 5-678
Fuel Leaks, Vehicles-AR 385-55 (No Army Vehicle Will be operated unless it is entirely free of fuel leaks)
Fuel Reserve, VFR and IFR-AR 95-1
Fuel Sampling-FM 10-68, Aircraft Checklist
Fuel Spills - AR 200-1, FM 10-71 change 2, AR 420-90
Flying Club Aircraft-AR 215-1
Flying Time, Logging of AR 95-1

G

Jacks-TM 55-1730-202-14, Hed Tripod, Type B-5

Q

U

X-Y-Z