



DACS-SF

7 June 1990

MEMORANDUM FOR EXECUTIVE SECRETARY ARMY SCIENCE BOARD

SUBJECT: Ad Hoc Subgroup Report on Human Dimensions in Army Safety

1. INTRODUCTION

Background. For many years, "human error" has been a factor in 70 to 80 percent of all Army accidents. Each year hundreds of soldiers die needlessly, and thousands more are injured due to unnecessary, tragic mistakes. In addition, millions of dollars of damage and equipment replacement costs are paid out each year as a result of human error accidents. In May 1988, the Assistant Secretary of the Army for Research, Development and Acquisition approved an Army Science Board study to analyze the human dimensions of the Army Safety Program and recommend actions which could improve Army Safety (Appendix A)

2. DISCUSSION

The initial study was expected to be completed by 30 November 1988, but due to a series of events, it was extended through July 1989. Although a wrap-up meeting was scheduled for 28-29 August 1989, the last meeting was held at the Army Safety Center, Fort Rucker, Alabama, 29-30 June 1989, with the specific purpose to identify the report parameters and task out responsibilities. This last meeting was cut short by the study chairperson after initial brainstorming. The study chairperson was to identify the specific issues and task the study members for input; this never took place. The August meeting was cancelled due to scheduling problems of subgroup members and lack of funds. The final meeting was never rescheduled since the chairperson's tenure with the Army Science Board subsequently expired. No new chairperson was appointed.

3. Throughout the study, the subgroup never really seemed to be able to focus or narrow down the scope of what they were trying to accomplish. As you can see from the list of presenters/briefers, they interviewed (or were briefed by) personnel from three Services (Army, Navy and Air Force); one foreign country (Canada); National Transportation Safety Board (NTSB); National Highway Traffic Safety Administration, and Public Services Research Institute); ARSTAF members, the Human Engineering Lab Army Research Institute and three Army MACOMs (Appendix D). I believe the subgroup received a good overall understanding of the Army Safety Program through their briefings

DL  
A3

B4

LTR  
A4

B5



and written material from the various organizations, agencies and individuals. A bibliography of written material provided to the subgroup is listed at Appendix C. I also believe they had ample opportunity to compare the Army Safety program with the safety programs of the other Services and to a limited degree, with industry.

4. Since privately owned vehicle accidents claim nearly 60 percent of soldier accidental deaths each year, the subgroup requested and received excellent briefings on traffic safety and alcohol impairment in accidents from representatives of the NTSB and National Highway Traffic Safety Administration. The subject of "Human Factors" was frequently discussed between subgroup members, however, as with the other subjects they were briefed on, they never put their thoughts/findings down on paper.

5. The one exception to the lack of written comments was a memorandum from General Sennewald to Ms. Sally Warner, Administrative Officer ASB (Appendix F). General Sennewald makes some good comments in his memorandum, and a number of his suggestions have been or are in the process of being examined and/or adopted by the Army. General Sennewald's comments are somewhat general in nature and only very lightly address the "Human Factors in Safety" issue.

6. The lack of progress by the committee was discussed on several occasions between COL Malcolm, and COL Jim Pongonis, HQDA Staff Assistants, and COL Rich Entlich, Executive Secretary of the Army Science Board. COL Malcolm and COL Pongonis, met with COL Entlich on one occasion to discuss the lack of focus by the subgroup. It is our understanding that COL Entlich in turn spoke to Mr. Gil Decker on this issue.

7. Following the cancellation of the final meeting of subgroup members, the Office of the Executive Secretary, ASB requested we contact the subgroup chairperson concerning the submission of a report. I attempted to contact the chairperson on several occasions but my calls were not returned.

8. From an administrative standpoint, this study was difficult because several planned meetings were cancelled or cut short due to the lack of participation by sub-committee members. This caused us to have to cancel arrangements, re-submit meeting announcements for the Federal Register and make new arrangements in lieu of the postponed meeting. Colonel Pongonis concurs with this report, however, it has not been provided to any member of the sub-group.



JERRY D. MALCOLM  
Colonel, GS  
Army Science Board  
Staff Assistant



DEPARTMENT OF THE ARMY  
OFFICE OF THE CHIEF OF STAFF  
WASHINGTON, D.C. 20310-0200



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DEPARTMENT OF THE ARMY  
OFFICE OF THE ASSISTANT SECRETARY

WASHINGTON, DC 20310-0103

05 MAY 1988



Mr. Gilbert F. Decker  
Chair, Army Science Board  
Penn Central Federal Systems Company  
1800 Diagonal Road  
Suite 500  
Alexandria, VA 22314-2840

Dear Mr. Decker:

You are requested to appoint a panel of five to nine Army Science Board members to study the Human Dimensions in Army Safety. The study should address as a minimum the Terms of Reference (TOR) described below; however, the panel should consider the TOR as guidelines and not be inhibited from considering other issues regarding the Human Dimensions in Army Safety that they may deem important.

I. Background.

Accidents resulting from human error continue to be a major problem. Seventy to eighty percent of all accidents have human error as at least one causal factor. Each year we kill the equivalent of a battalion of soldiers in accidents; we lose the equivalent of an entire mechanized infantry brigade for more than 6 weeks because of accidental injuries. The \$300 million direct cost of one year's accidents would put 150 M1 tanks in the field or 40 Attack Helicopters (AH-64) on the flight line. The cost of accidents is high, increases each year, and in one form or another must be paid for out of our readiness posture. Once lost through accidents, combat power is forever lost for the battle. Accidents are a drain on combat readiness the Army simply cannot afford.

II. Study Objective/Terms of Reference.

A. Overall Objective.

The overall objective of this study is to analyze the human dimension of the Army Safety Program and recommend actions which could improve Army safety.

APPENDIX A



**B. Terms of Reference.**

1. What is the role of human error in accidents?
  - a. Is the rate or percentage of major accident categories increasing or decreasing? Is human error, as a contributing factor, increasing or decreasing?
  - b. Assess the relative contribution of skill, knowledge and decision making deficiencies vs. willful violations of regulations, policies and procedures as causal factors in accidents.
  - c. Are data bases, accident taxonomies, and analytic capabilities adequate to ensure feedback to the field and to developers for correcting causal factors?
2. Are there selected concepts or approaches available in other organizations (NTSB, FAA, civilian industry, Air Force, Navy, etc.) that may be of benefit in improving Army safety?
  - a. Do any of these techniques have potential for near or mid-term application?
  - b. Are such techniques "packagable" for ready field use?
  - c. Can techniques being developed for aviation be applied to ground systems?
3. How can the safety program be better integrated with combat developments, system acquisition, testing and training?
4. How can an Army unit's leadership and the unit's climate (attitudes, morale, etc.) be used to improve safety?
5. What is the influence of Army management regarding risks in training, deployment plans, and operations upon human error accident causation? What is the role of risk-level management in reducing human error accidents?
6. Assess the requirements for personnel working in the Army Safety Program to include number and types of skills.

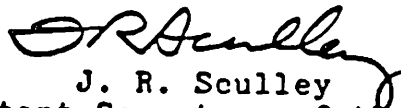
The study is not expected to be classified but will require trips to and briefings from the Army Safety Center and other installations as appropriate.

LTG Claude M. Kicklighter, the Director of the Army Staff, will be the sponsor for this study. The Cognizant Deputy will be MG August M. Cianciolo, Deputy for Systems Management, OASA(RDA). The senior advisor will be COL (P) Marvin E. Mitchiner, Jr., Director of Army Safety. The Department of Army Staff Assistant will be COL James A. Pongonis, at the U.S. Army Safety Center and his assistant will be COL Jerry D. Malcolm, Chief, Office of Director of Army Safety, Pentagon.

It is not expected that your inquiry will go into any "particular matters" within the meaning of Section 208, Title 18, of the United States Code.

Please complete this study and report by 30 November 1988.

Sincerely,



J. R. Sculley  
Assistant Secretary of the Army  
(Research Development and Acquisition)

Enclosure

3 May 1988

PARTICIPANTS LIST

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on  
HUMAN DIMENSIONS IN ARMY SAFETY

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## BIBLIOGRAPHY

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2. A-GG-040-002/AG-001, DND General Safety Program, Accident Coding System
3. Applying Measurement Concepts to the Appraisal of Safety Performance, William E. Tarrant
4. AR 385-40, Accident Reporting and Records, 1 Apr 87
5. Army Safety Survey
6. Army Science Board Information Brief Book, 13-14 Sep 88
7. Command Safety Policy Memo, HQ, 24th Inf Div (Mech), Fort Stewart, GA 1 Feb 89
8. Department of Labor, OSHA, 29 CFR Part 1960, 2 Oct 85
9. DOD Instruction 6055.1, 26 Oct 84
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11. Elements of a Comprehensive Accident Prevention Program, Dr. William E. Tarrant
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15. Human Factors Research and Nuclear Safety, National Academy Press, Washington, DC, 1988
16. Incidence, Cost and Factor Analysis of Pilot-Error Accidents in U.S. Army Aviation, U.S. Army Agency for Aviation Safety
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21. Public Law 91-596, 29 Dec 70

22. Risk Assessment/Human Performance Brief, Naval Safety Center, 9 Nov 88
23. System Safety Risk Assessment Manual, Naval Safety Center, July 1988
24. Training Risk Assessment Policy Statement, TRADOC, 17 Oct 88
25. USN Flight Surgeon Aircraft Mishap Investigation Pocket Reference, April 1988, Naval Safety Center Aeromedical Division
26. INPO An Approach to Safe Operation of Complex Systems, 9 February 1988, Dr. Edward Jones
27. NTC Desert Lessons Learned, Installation Safety, Fort Stewart, GA
28. Field Training Safety, 24th Infantry Division
29. General Safety in the Canadian Land Forces
30. Mobile Command General Safety Accident Statistical Information FY 1986/1987
31. Contractor and Maintenance Safety Rules and Procedures, Xerox Corporation
32. Your Guide to Pedestrian Safety in the Workplace, Xerox Corporation, Oct 88
33. Xerox Hazard Communication Program - Employee Handbook, Xerox Corporation, Aug 86
34. Xerox (U.S.) Safety Rules and Guidelines, Xerox Corporation, Aug 87
35. 1986 Xerox Occupational Injury/Illness Experience and Costs, 15 Jun 87, James F. O'Brien, Xerox Corporation
36. BP & SG Manufacturing Operations Injury Performance Report, 19 Dec 88, Maryanne Bebies, Xerox Corporation
37. Army Back Complaint Program, 13 May 88, Office of the Surgeon General
38. Commanders' Crusade Against Human Error Accidents, 18 Mar 88, U.S. Army Materiel Command, Field Safety Activity

39. Statistical Summary of Accident - FY 1988, U.S. Army Materiel Command, Field Safety Activity
40. FY 1989 Resident Safety Training Program, 6 Jun 88, Army Materiel Command, Field Safety Activity
41. Supervisory Responsibilities for Preventing Accidents, 31 May 88, Army Materiel Command, Field Safety Activity
42. AMC Command Overview, Army Materiel Command, Field Safety Activity



BRIEFERS - TOPICS

- Colonel Dick Levy, Air Force Safety Center - "Air Force Safety Program"
- Colonel Joel Gaydos, Chief Preventive Medicine, OTSG - "Back Injuries and other Prevention Programs"
- Mr. Darwin Taras, AMC HQs and Mr. John Campbell FSA, Army Materiel Command - "The AMC Safety Program."
- Mr. Wayne C. Loamis, Operations Safety Manager, East Cost Xerox Corp. - "Xerox safety program."
- Dr. John K. Lauber, National Transportation Safety Board - "Human Component in Transportation Accidents"
- Mr. Corona, Human Engineering Lab - "Use of Accident Data in stimulating human factors Research"
- Mr. Leedham, and Dr. LoFar, Army Research Institute - "MANPRINT/ Systems Safety and Reduction of Human error Accidents"
- Mr. Joe Cribbins, Special Assistant to the DCSLOG for Aviation and Safety Matters - "Safety in Aviation Matters."
- Dr. William E. Tarrant, Program Analyst, National Highway Traffic Safety Administration, Wash D.C. - "Human Aspects of Accident Prevention."
- Dr. R.B. Voas, Director Alcohol Programs Public Services Research Institute - "Alcohol Impairment and Accidents"
- Mr. Rene LaRose, Mobile Command Safety, Canadian Armed Forces - "General Safety in the Canadian Land Forces"

COL John David, Aviation Safety Officer, Canadian Armed Forces -  
"Aviation Safety"

Mr. Jay Henson, U.S. Forces Command, Systems Safety Working Group  
"FORSCOM System Safety Efforts"

Dr. Ed Jones, Panel member, ASB subgroup Human Dimensions in Army  
Safety - "IMPO, an Approach to Safe Operations of Complex  
Systems."

Mr. E. M. Willcher, Ofc of Sec Army General Counsel - "Conflict  
of Interest Briefing"

## VISITS

U.S. Army Safety Center, Fort Rucker, AL - Briefing on: The Army Safety Program, Information Analysis, Countermeasure Implementation and System Safety

U.S. Navy Safety Center, Norfolk, VA - Briefing on: The Navy Safety Program, Systems Safety, Aircrew Coordination Training Program, Use of Hypnosis in A/C accident investigations

HQs TRADOC, Hampton, VA - Briefings and discussions with the TRADOC staff, Army Research Institute, Human Engineering Lab and Army Staff members

HQs 24th Inf Div and Ft. Stewart, GA.

Discussions with the Div Cdr, selected Bde and Bn Cdrs, Ft. Stewart/Div Safety Officers Unit Training Visit (range firing)

Washington, D.C. (three separate visits) - Briefings and discussions with personnel from AMC, the Office of the Army Surgeon General, industry personnel, Air Force Safety, National Transportation Safety Board, and Army Staff members.






Memorandum from ...

GEN Robert W. Sennewald, USA Ret.  
*Senior Associate*

20 October 1989

Dear Sally --

Per our conversation I am providing some thoughts reference the ASB study on Army Safety. They may be a starting point for a study wrap-up. Most are uneducated guesses, but at least a start. I would be happy to discuss with you or the new chairman of the Safety Review Committee.

  
SENNEWALD

- The Army safety record has consistently improved over the last five years. About 80% of the mishaps are now classified as human error. The real payoff at this point seems to rest on better understanding and defining human error. Human error may be an equipment design problem, a training problem or a lack of manprint application. It may be a leader problem .

- The Army Safety center was once the aviation center. In every facet of safety -- reporting, analysis, accident investigation and follow-up -- Army aviation leads the ground side.

- Only aviation accident investigation is done worldwide by the Safety Center. On the ground side, Safety Center people must be invited to participate by the Army command in Europe.

- No commissioned officers career path for safety. NCO ASI for ground side.

- Much of the accident data collected, especially on ground side may be suspect. Accident investigators are not always fully trained (a 2d LT is safety officer as an additional duty) and must make subjective causal judgements.

- Data bases must be complete and accurate to produce meaningful trends/data upon which decisions are based.

- There is little or no coordination with the USMC on safety matters despite being a similar force.
  
- ARI has little or no specific involvement in the Army's safety program.
  
- Safety comes back to values -- care of the soldier.
  
- Very difficult to recruit and retain qualified safety engineers. Grade level authorized, especially in the field makes this a problem.
  
- High-risk, high-stress study done by MG Mullens may have safety implications. Need to get copy and analyze.
  
- USAF links accident investigation with IG system. Does the Army have the correct system and does the Army Safety Center have the organizational clout?
  
- Stress and emotional problems are similar to drug/alcohol in terms of accidents. All of us have stress -- then must design equipment which will accommodate to stress and fatigue.
  
- Human factors in accidents is a complex issue. Not soluble with simplistic catch phrases. We need to tell the commanders and the field what we know about human factors. In many cases human factors



means "someone" failed. Question is to study how to gain knowledge and how to distribute this knowledge.

- WPN system acquisition procedures are developed to acknowledge safety elements. Do the procedures work?

- What is the definition of how to measure a successful safety program? -- zero accidents? Too much command pressure on safety can reduce readiness. No accidents if equipment/people are not used.

- Does the Army B.G. Safety Center head have a Big Daddy in Washington? The CSA and the DAS are too busy to be the day-to-day contact point for the Safety Center CG.

- Current accident Reporting form is inadequate for AMC (the developer) use:

-- doesn't fully identify system.

-- doesn't identify parts which fail.

-- doesn't reference EIRs/ODRs.

-- accident causes improperly identified.

- Safety Center's role not well-defined in system safety during acquisition.

- Commander or manager must send signals to field that safety is serious business. Signals include:

-- statements/involvement.

-- manning.

-- funding.

- Need more and better training for safety officers.

- Army civilian job performance forms do not emphasize safety.

-Not sure Safety Center and MACOM safety officers are acquainted with the current intellectual activities surrounding the topic of safety. There must be an academic underpinning to our safety program.

- How well is the subject of accidents and accident-prevention taught in the Army's Officer and EM school system?

- Dr. William E. Tairant's two-hour lecture to the study panel was something all officers should receive at the Ft. Leavenworth CG&S level.

- Canadian Armed Forces have a reporting category called incidents -- these are "free" and have seen a large increase in number of incidents reported. Gives an opportunity of predicting without having expensive accident. Should be looked at.

- Canadians don't use dollar values to classify accidents. There is merit in this approach.

- Workload at Safety Center precludes gathering data on "near misses".

- Safety Center not involved with fire or analysis of civilian motor accidents.

- POV accidents -- how does our data compare with civilian counterparts?