

---

October 1998

# MILITARY SAFETY

## Analysis of DOD's On-duty Non-aviation Accident Fatalities



---

---

**National Security and  
International Affairs Division**

B-280749

October 16, 1998

The Honorable William S. Cohen  
The Secretary of Defense

Dear Mr. Secretary:

This report provides our analysis of Department of Defense (DOD) military personnel fatalities during 1988 through 1996 as a result of on-duty, non-aviation accidents.<sup>1</sup> Specifically, we assessed (1) the causes of non-aviation fatalities, (2) the types of activities involved in these fatal accidents, and (3) trends in DOD and service on-duty accidental fatalities. In July 1997, you requested that the DOD Inspector General evaluate all noncombatant deaths involving DOD personnel. Because we had already gathered data for on-duty accidental deaths, we agreed with the Inspector General's office to report on these accidents while it reported on off-duty accidents that occurred during the same time period. In June 1998, the DOD Inspector General issued its report.<sup>2</sup>

---

**Background**

On-duty accidents involve DOD military personnel who are performing officially assigned duties in noncombatant situations.<sup>3</sup> These duties include training, travel, activities that are incidental to assignments on DOD installations, compulsory physical training and sports activities, and all activities aboard vessels. Each of the services has a safety center that investigates fatal and other serious accidents. These centers are the Naval Safety Center, Norfolk, Virginia, which also serves the Marine Corps; the Air Force Safety Center, Kirtland Air Force Base, New Mexico; and the Army Safety Center, Fort Rucker, Alabama. The services also maintain their own databases of information on aviation and non-aviation accidents. Aviation accidents are flight or flight-related mishaps; non-aviation accidents include ground and afloat mishaps.<sup>4</sup>

---

<sup>1</sup>We have previously reported on aviation-related accidents. See *Military Aircraft Safety: Serious Accidents Remain at Historically Low Levels* (GAO/NSIAD-98-95BR, Mar. 23, 1998) and *Military Aircraft Safety: Significant Improvements Since 1975* (GAO/NSIAD-96-69BR, Feb. 1, 1996).

<sup>2</sup>Accidental Off-Duty Deaths in DOD, Report number 98-153, June 15, 1998.

<sup>3</sup>Off-duty accidents involve DOD military personnel who are not in an on-duty status, are on leave, have departed their work location, are driving to and from work, or are participating in voluntary sports activities. According to the DOD Inspector General's report, 4,698 DOD military personnel died between 1988 and 1996 as a result of off-duty accidents.

<sup>4</sup>Non-aviation accidents also include those aircraft-related mishaps in which the fatalities or injuries were caused by another service's aircraft.

---

Between 1988 and 1996, 2,092 DOD military personnel died in on-duty accidents. Of these fatalities, 984 (47 percent) occurred due to aviation accidents and 1,108 (53 percent) resulted from non-aviation accidents. Of the non-aviation accidents, 941 (85 percent) occurred on the ground, and 167 (15 percent) were afloat.<sup>5</sup>

---

## Results in Brief

Military vehicles were the leading cause of the 1,108 DOD military personnel fatalities that were attributable to on-duty, non-aviation accidents from 1988 to 1996.<sup>6</sup> Vehicle accidents accounted for 466, or 42 percent, of these fatalities and resulted in more on-duty deaths than any other type of accident in each of the services except the Navy. Furthermore, Army vehicle accidents were responsible for 333 deaths, or 30 percent of DOD's non-aviation fatalities and 71 percent of DOD's vehicle accident fatalities. The causes for the remaining 642 fatalities included accidents with explosives and weapons, parachuting, physical training, and other ground and sea activities.

Military training activities were involved in 500 of the 1,108 on-duty accidental fatalities. Of these fatalities, 454 resulted from accidents involving individual or unit training, combat exercises, or afloat operations. The remaining 46 fatalities involved students in the services' training school programs, such as initial recruit, infantry, and airborne training, as well as Navy Seal and Army Ranger qualification training. The other 608 on-duty accidental fatalities occurred in other activities, such as peace operations and maintenance and repair of vehicles and equipment.

DOD's on-duty, non-aviation accident fatality rate declined about 42 percent between 1988 and 1996, from 4.3 to 2.5 deaths per 100,000 non-aviation military personnel. This decline is largely due to a decrease in the DOD vehicle accident fatality rate, from 1.9 to 1.0 deaths per 100,000 non-aviation military personnel. The annual number of fatalities fluctuated over the period but declined overall, from 139 in 1988 to 58 in 1996. The overall fatality rate and the annual vehicle fatality rate decreased for the Army, the Navy, and the Marine Corps, but increased for the Air Force.

Appendixes I through III present detailed information on the results of our analysis.

---

<sup>5</sup>These percentages have been rounded.

<sup>6</sup>Military vehicles include tactical vehicles, such as M1 Abrams Tanks, Bradley Infantry Fighting Vehicles, High Mobility Multipurpose Wheeled Vehicles, and 2.5- and 5-ton trucks, and nontactical vehicles, such as buses, vans, and cars.

---

## Agency Comments

In written comments on a draft of this report, DOD stated that it was pleased with our in-depth analysis of its safety performance, and noted that our analysis substantiated what the Department's internal oversight has observed over the years. The Department also stated that it is proud of its accomplishments to date but recognizes that there is much yet to do because even one accident is too many. DOD's comments appear in their entirety in appendix IV.

---

## Scope and Methodology

To analyze DOD on-duty accidental deaths, we obtained computer-processed accident and injury data from Army, Air Force, and Navy safety centers for 1987 through 1996. Each center provided computer records of all on-duty accidents that involved active or reserve Army, Air Force, Navy, or Marine Corps military personnel and resulted in a fatality, permanent total or permanent partial disability injury. We excluded from our review all accidents that (1) involved only property damage; (2) occurred in 1987 because detailed records for that year were incomplete or not readily available; and (3) were classified as nonreportable mishaps, as defined in DOD Instruction 6055.7.<sup>7</sup>

To validate the number of accidents and fatalities, we conducted a computer-assisted analysis of 1,469 accidents. For each of the 1,469 accidents, we reviewed the services' accident narrative descriptions and other information and independently derived (1) the primary factors causing or contributing to the accidents and resulting fatalities and (2) the types of training and nontraining activities at the time of the accidents. From this information we determined accident causes and the activities involved when the accident occurred. We counted accidents as training-related if they were directly or indirectly related to unit training activities, required physical training, combat exercises, or service training school programs. We also counted as training-related all Navy afloat fatalities.

We calculated non-aviation fatalities per 100,000 military personnel based on data obtained from DOD's Defense Manpower Data Center. The data we used to calculate non-aviation fatality rates consisted of each service's total active and reserve yearly end strength for 1988 through 1996, less air crew personnel. DOD established the Manpower Data Center to collect and maintain accurate, readily available DOD-wide manpower and personnel data. The data are used to support the management information needs of customers both inside and outside DOD.

---

<sup>7</sup>Examples of nonreportable mishaps include hostile or terrorist acts, nuclear substances, and suicides.

---

We conducted our review from April 1997 to June 1998 in accordance with generally accepted government auditing standards.

---

We are sending copies of this report to interested congressional committees and Members of Congress; the Secretaries of the Army, the Navy, and the Air Force; and the Commandant of the Marine Corps. We will also make copies available to other interested parties on request.

Please contact me on (202) 512-5140 if you or your staff have any questions concerning this report. Major contributors to this report are Carol R. Schuster; Reginald L. Furr, Jr.; Kevin C. Handley; and Gerald L. Winterlin.

Sincerely yours,



Mark E. Gebicke  
Director, Military Operations  
and Capabilities Issues

---

---

---

# Contents

---

<b>Letter</b>		1
<b>Appendixes</b>	Appendix I: Causes of On-duty Military Fatalities Related to Non-aviation Accidents	8
	Appendix II: Non-aviation Fatalities in Training-related Accidents	15
	Appendix III: Trends in DOD On-duty Fatalities Due to Non-aviation Accidents	18
	Appendix IV: Comments From the Department of Defense	25
<b>Tables</b>	Table I.1: On-duty Fatalities in Non-aviation Accidents by Service, 1988-96	9
	Table I.2: Army On-duty Fatalities in Non-aviation Accidents, 1988-96	10
	Table I.3: Navy On-duty Fatalities in Non-aviation Accidents, 1988-96	12
	Table I.4: Marine Corps On-duty Fatalities in Non-aviation Accidents, 1988-96	13
	Table I.5: Air Force On-duty Fatalities in Non-aviation Accidents, 1988-96	14
	Table II.1: Service Fatalities in Non-aviation Training-related Accidents, 1988-96	17
	Table III.1: Rates of On-duty Fatalities From Non-aviation Accidents by Service	20
	Table III.2: Rates of On-duty Fatalities in Military Vehicle Accidents by Service	23
<b>Figures</b>	Figure I.1: DOD On-duty Fatalities in Non-aviation Accidents, 1988-96	8
	Figure II.1: DOD Non-aviation Fatalities Related to Training and Nontraining Activities, 1988-96	16
	Figure III.1: Annual Number of DOD On-duty Fatalities From Non-aviation Accidents, 1988-96	18
	Figure III.2: DOD Rate of On-duty Fatalities From Non-aviation Accidents, 1988-96	19
	Figure III.3: Annual Number of DOD On-duty Fatalities in Military Vehicle Accidents	21
	Figure III.4: DOD Rate of On-duty Fatalities in Military Vehicle Accidents	22
	Figure III.5: Annual Number of DOD Non-aviation Fatalities in Training and Nontraining Accidents	24



---

**Contents**

---

---

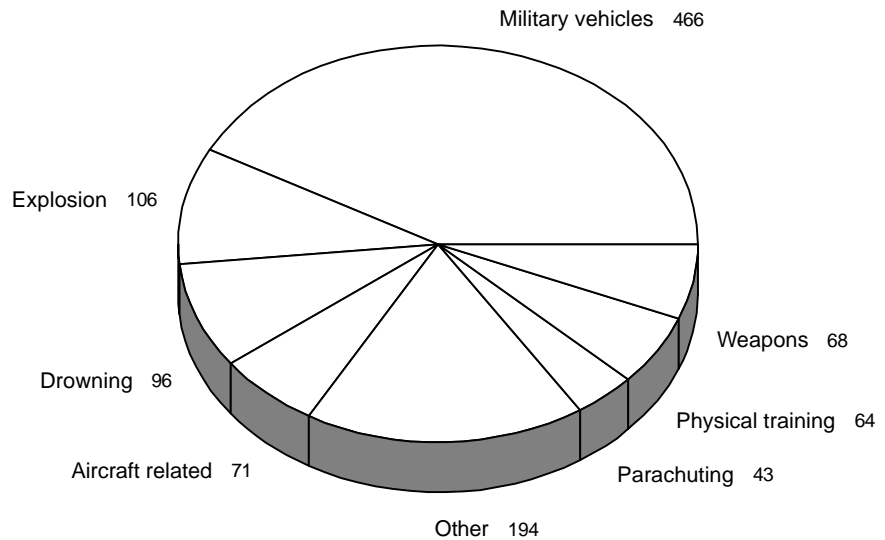
**Abbreviations**

DOD      Department of Defense

# Causes of On-duty Military Fatalities Related to Non-aviation Accidents

Between 1988 and 1996, there were 1,108 Department of Defense (DOD) on-duty fatalities that resulted from non-aviation accidents. Military vehicles were the leading cause of these fatalities, causing more on-duty fatalities than all other types of accidents in all but one of the services.<sup>1</sup> Of the 1,108 fatalities, 466, or about 42 percent, resulted from accidents involving tactical and non-tactical tracked and wheeled vehicles. The second leading cause of DOD on-duty accidental fatalities were explosives or explosions, which accounted for 106, or about 10 percent, of the fatalities. Other causes of the fatalities included drowning; aircraft-related mishaps; and accidents involving weapons, physical training, and parachuting. Figure I.1 shows the overall number and causes of DOD on-duty accident fatalities for 1988 through 1996, and table I.1 shows this information by military service.

**Figure I.1: DOD On-duty Fatalities in Non-aviation Accidents, 1988-96**



Note: Other includes fire and steam mishaps, equipment-related accidents, electrocutions, falls, and maintenance and repair activities.

<sup>1</sup>The DOD Inspector General's report stated that motor vehicle accidents were also the leading cause of DOD off-duty accidental deaths, accounting for 81 percent of the 4,698 fatalities between 1988 and 1996.

**Appendix I  
Causes of On-duty Military Fatalities Related  
to Non-aviation Accidents**

**Table I.1: On-duty Fatalities in  
Non-aviation Accidents by Service,  
1988-96**

<b>Cause</b>	<b>Army</b>	<b>Navy</b>	<b>Marine Corps</b>	<b>Air Force</b>	<b>Total</b>	<b>Percent</b>
Military vehicle	333	30	64	39	<b>466</b>	42.1
Explosion	34	53	15	4	<b>106</b>	9.6
Drowning	22	65	9	0	<b>96</b>	8.7
Aircraft-related	60	4	0	7	<b>71</b>	6.4
Weapon	31	2	34	1	<b>68</b>	6.1
Physical training	5	27	32	0	<b>64</b>	5.8
Parachuting	37	2	3	1	<b>43</b>	3.9
Fire or steam	0	26	0	2	<b>28</b>	2.5
Equipment	14	9	2	2	<b>27</b>	2.4
Electrocution	7	8	3	7	<b>25</b>	2.3
Fall	3	14	2	2	<b>21</b>	1.9
Maintenance/repair	13	2	0	1	<b>16</b>	1.4
Other <sup>a</sup>	43	24	7	3	<b>77</b>	6.9
<b>Total</b>	<b>602</b>	<b>266</b>	<b>171</b>	<b>69</b>	<b>1,108</b>	<b>100.0</b>

Note: Percentages have been rounded.

<sup>a</sup>Other causes and activities include lightning, sporting events, hypothermia, swim training, snow skiing, scuba diving, and water vehicles.

**Army**

Of the 602 fatalities in Army on-duty accidents during 1988 through 1996, 333, or 55.3 percent, resulted from military vehicle accidents. In fact, Army vehicle accidents were responsible for 71 percent of DOD's 466 total military vehicle fatalities and 30 percent of DOD's 1,108 total non-aviation on-duty accident fatalities. Other leading causes of Army on-duty accidental fatalities included aircraft-related mishaps and parachuting. Table I.2 shows the Army's on-duty accident fatalities for 1988 through 1996.

**Appendix I  
Causes of On-duty Military Fatalities Related  
to Non-aviation Accidents**

**Table I.2: Army On-duty Fatalities in Non-aviation Accidents, 1988-96**

<b>Cause</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>Total</b>	<b>Percent</b>
Military vehicle	40	41	45	70	30	34	17	44	12	<b>333</b>	55.3
Aircraft related	1	11	2	1	5	1	37	1	1	<b>60</b>	10.0
Parachuting	4	8	8	2	2	2	4	3	4	<b>37</b>	6.1
Explosion	3	5	3	14	2	2	1	1	3	<b>34</b>	5.6
Weapon	5	1	6	7	2	5	3	2	0	<b>31</b>	5.1
Drowning	2	4	2	6	2	3	2	1	0	<b>22</b>	3.7
Equipment	8	1	1	0	1	1	2	0	0	<b>14</b>	2.3
Maintenance/repair	3	3	1	0	2	0	2	0	2	<b>13</b>	2.2
Electrocution	3	0	3	0	1	0	0	0	0	<b>7</b>	1.2
Lightning	0	3	0	2	0	0	0	1	1	<b>7</b>	1.2
Physical training	2	0	1	0	0	0	0	1	1	<b>5</b>	0.8
Hypothermia	0	0	0	0	0	0	0	4	0	<b>4</b>	0.7
Fall	1	0	1	0	0	1	0	0	0	<b>3</b>	0.5
Sporting event	0	1	0	1	0	0	0	1	0	<b>3</b>	0.5
Snow skiing	0	0	0	0	1	0	1	1	0	<b>3</b>	0.5
Other	4	1	4	7	1	4	3	0	2	<b>26</b>	4.3
<b>Total</b>	<b>76</b>	<b>79</b>	<b>77</b>	<b>110</b>	<b>49</b>	<b>53</b>	<b>72</b>	<b>60</b>	<b>26</b>	<b>602</b>	<b>100.0</b>

Note: Percentages have been rounded.

The Army considered 60 of the 602 fatalities to be non-aviation, aircraft-related accidents rather than aviation accidents because of the circumstances of the accidents. For example, 48 Army fatalities occurred in three accidents involving Air Force aircraft. In 1989, 11 Army personnel en route to boarder patrol operations died as their Air Force helicopter crashed in Arizona. In 1994, a midair collision between two Air Force aircraft killed 24 Army parachuters preparing to board an aircraft, and two Army helicopters were mistakenly shot down and destroyed by an Air Force aircraft in Southwest Asia, resulting in 13 Army fatalities. For these accidents, the Army counted its fatalities and injuries as non-aviation related because Air Force aircraft were responsible. Army parachuting accidents accounted for 37 of DoD's 43 parachuting fatalities. Other leading causes of Army fatalities were explosions or explosives, weapons, drowning, equipment, and maintenance/repair.

---

**Appendix I**  
**Causes of On-duty Military Fatalities Related**  
**to Non-aviation Accidents**

---

**Navy**

Ashore accidents accounted for 99 of the 266 Navy on-duty accidental fatalities, and afloat activities aboard Navy vessels accounted for 167 of the fatalities. Military vehicle accidents accounted for about 30 percent of all ashore fatalities but only 11 percent of the total number of Navy on-duty accident fatalities. Other ashore fatalities included 26 due to heart-related problems resulting from physical training activities, such as exercising and running, and 14 due to drowning.

Three accidents accounted for 78, or almost one-half of all 167 afloat fatalities. The 1989 gun turret explosion aboard the Navy battleship Iowa resulted in 47 deaths, 21 sailors drowned in 1990 when their boat capsized, and a steam leak accident also in 1990 caused 10 fatalities. Explosions resulted in a total of 52 afloat fatalities, drowning caused 51 fatalities, and fire or steam-related accidents accounted for 26 fatalities. Table I.3 shows Navy ashore and afloat accident fatalities for 1988 through 1996.

**Appendix I  
Causes of On-duty Military Fatalities Related  
to Non-aviation Accidents**

**Table I.3: Navy On-duty Fatalities in Non-aviation Accidents, 1988-96**

<b>Cause</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>Total</b>	<b>Percent</b>
<b>Ashore</b>											
Military vehicle	9	3	2	2	4	4	0	4	2	<b>30</b>	30.3
Physical training	3	2	1	4	5	1	2	3	5	<b>26</b>	26.3
Drowning	2	2	1	4	0	2	2	0	1	<b>14</b>	14.1
Fall	0	1	0	1	0	0	2	0	1	<b>5</b>	5.1
Aircraft related	1	0	0	1	2	0	0	0	0	<b>4</b>	4.0
Electrocution	1	1	1	0	0	0	0	1	0	<b>4</b>	4.0
Sporting event	0	0	1	0	0	1	0	0	2	<b>4</b>	4.0
Swim training	2	2	0	0	0	0	0	0	0	<b>4</b>	4.0
Parachuting	0	1	0	1	0	0	0	0	0	<b>2</b>	2.0
Water vehicle	0	0	0	1	1	0	0	0	0	<b>2</b>	2.0
Explosion	0	0	0	0	0	0	0	1	0	<b>1</b>	1.0
Fire or steam	0	0	0	0	0	1	0	0	0	<b>1</b>	1.0
Other	2	0	0	0	0	0	0	0	0	<b>2</b>	2.0
<b>Subtotal</b>	<b>20</b>	<b>12</b>	<b>6</b>	<b>14</b>	<b>12</b>	<b>9</b>	<b>6</b>	<b>9</b>	<b>11</b>	<b>99</b>	<b>100.0</b>
<b>Afloat</b>											
Explosion	3	47	0	0	1	1	0	0	0	<b>52</b>	31.1
Drowning	4	10	24	2	5	0	4	0	2	<b>51</b>	30.6
Fire or steam	0	9	14	1	2	0	0	0	0	<b>26</b>	15.6
Fall	0	0	2	2	1	2	0	0	2	<b>9</b>	5.4
Equipment	1	2	0	1	1	1	0	2	0	<b>8</b>	4.8
Electrocution	1	0	1	0	0	0	1	1	0	<b>4</b>	2.4
Water vehicle	2	0	1	0	0	0	0	0	0	<b>3</b>	1.8
Maintenance/repair	0	1	0	0	0	0	0	1	0	<b>2</b>	1.2
Scuba diving	0	0	0	0	0	0	1	1	0	<b>2</b>	1.2
Weapon	0	1	0	1	0	0	0	0	0	<b>2</b>	1.2
Physical training	0	0	0	0	0	0	0	0	1	<b>1</b>	0.6
Other	1	0	0	0	6	0	0	0	0	<b>7</b>	4.2
<b>Subtotal</b>	<b>12</b>	<b>70</b>	<b>42</b>	<b>7</b>	<b>16</b>	<b>4</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>167</b>	<b>100.0</b>
<b>Total</b>	<b>32</b>	<b>82</b>	<b>48</b>	<b>21</b>	<b>28</b>	<b>13</b>	<b>12</b>	<b>14</b>	<b>16</b>	<b>266</b>	<b>100.0</b>

Note: Percentages have been rounded.

**Appendix I  
Causes of On-duty Military Fatalities Related  
to Non-aviation Accidents**

## Marine Corps

Vehicle accidents resulted in 64, or 37 percent, of the 171 Marine Corps on-duty fatalities. Weapon-related mishaps, including live weapon fire training exercises, accidental weapon discharge while cleaning, horseplay, and mishandling of weapons, caused 34 fatalities. Another 32 fatalities were due to heart-related problems associated with physical training activities, including exercising, running, and marching. Accidents involving explosives, drownings, and various other causes accounted for the remaining fatalities. Table I.4 shows the Marine Corps on-duty accident fatalities for 1988 through 1996.

**Table I.4: Marine Corps On-duty Fatalities in Non-aviation Accidents, 1988-96**

Cause	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total	Percent
Military vehicle	8	5	3	23	8	4	4	3	6	<b>64</b>	37.4
Weapon	5	5	4	7	3	5	0	4	1	<b>34</b>	19.9
Physical training	5	3	4	5	2	4	2	6	1	<b>32</b>	18.7
Explosion	4	0	2	6	0	0	2	1	0	<b>15</b>	8.8
Drowning	1	2	0	2	2	0	1	1	0	<b>9</b>	5.3
Electrocution	1	0	0	0	1	1	0	0	0	<b>3</b>	1.7
Parachuting	1	0	2	0	0	0	0	0	0	<b>3</b>	1.7
Equipment	0	0	0	0	1	1	0	0	0	<b>2</b>	1.2
Fall	0	0	1	0	0	0	0	0	1	<b>2</b>	1.2
Lightning	0	0	0	0	0	0	0	1	0	<b>1</b>	0.6
Other	2	0	0	1	0	1	2	0	0	<b>6</b>	3.5
<b>Total</b>	<b>27</b>	<b>15</b>	<b>16</b>	<b>44</b>	<b>17</b>	<b>16</b>	<b>11</b>	<b>16</b>	<b>9</b>	<b>171</b>	<b>100.0</b>

Note: Percentages have been rounded.

## Air Force

Vehicle accidents were responsible for 39, or 56 percent, of the 69 Air Force on-duty non-aviation fatalities. Aircraft-related accidents and electrocutions caused seven fatalities each. The remaining 16 fatalities resulted from explosions, equipment-related accidents, and various other causes. Table I.5 shows the Air Force on-duty accident fatalities for 1988 through 1996.

**Appendix I  
Causes of On-duty Military Fatalities Related  
to Non-aviation Accidents**

**Table I.5: Air Force On-duty Fatalities in Non-aviation Accidents, 1988-96**

<b>Cause</b>	<b>1988</b>	<b>1989</b>	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>Total</b>	<b>Percent</b>
Military vehicle	3	7	3	3	5	5	6	3	4	<b>39</b>	56.5
Aircraft related	0	2	1	0	0	3	1	0	0	<b>7</b>	10.1
Electrocution	0	2	0	4	0	1	0	0	0	<b>7</b>	10.1
Explosion	0	2	0	1	0	1	0	0	0	<b>4</b>	5.8
Equipment	0	0	0	0	1	0	1	0	0	<b>2</b>	2.9
Fall	0	0	0	0	0	1	0	0	1	<b>2</b>	2.9
Fire	1	0	0	0	0	0	0	1	0	<b>2</b>	2.9
Lightning	0	0	0	0	0	0	0	0	1	<b>1</b>	1.4
Maintenance/repair	0	0	0	0	0	0	0	0	1	<b>1</b>	1.4
Parachuting	0	0	0	1	0	0	0	0	0	<b>1</b>	1.4
Weapon	0	0	0	1	0	0	0	0	0	<b>1</b>	1.4
Other	0	0	0	0	0	2	0	0	0	<b>2</b>	2.9
<b>Total</b>	<b>4</b>	<b>13</b>	<b>4</b>	<b>10</b>	<b>6</b>	<b>13</b>	<b>8</b>	<b>4</b>	<b>7</b>	<b>69</b>	<b>100.0</b>

Note: Percentages have been rounded.



---

# Non-aviation Fatalities in Training-related Accidents

---

Of the 1,108 DOD on-duty accident fatalities between 1988 and 1996, 500 occurred during training activities. In these accidents, 287 personnel died during individual physical training, unit-level training activities, or combat exercises, and 167 died in Navy afloat operations. The other 46 personnel who died in training were students in the services' training school programs, including initial recruit, infantry, and airborne training; Navy diving and swim training; and Navy Seal and Army Ranger qualification training. The remaining 608 fatalities occurred in activities that are not related to training, such as peace operations, routine maintenance and repair, and vehicles transporting personnel and material.

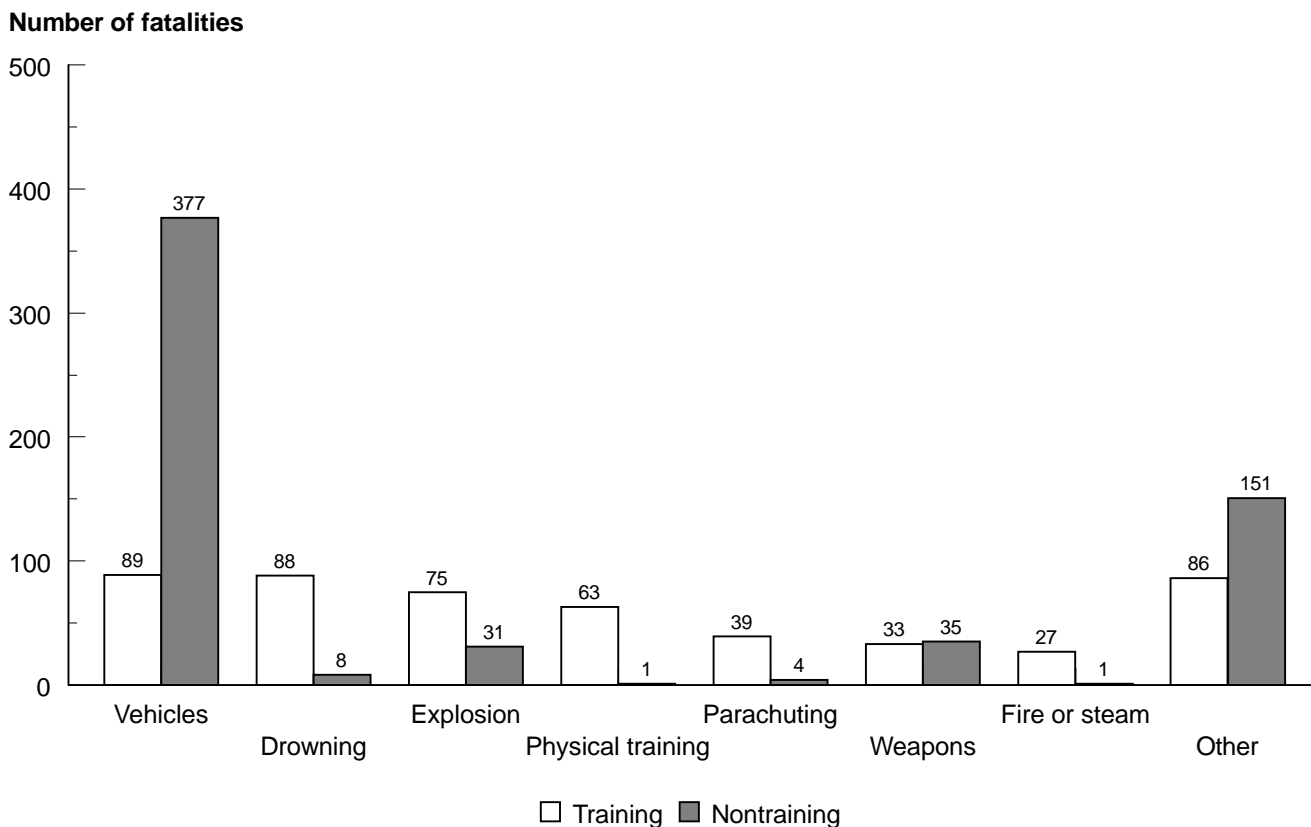
As with overall DOD on-duty accidents, military vehicles were the leading cause of training-related fatalities. Vehicle accidents caused 89, or about 18 percent, of the 500 training fatalities.<sup>1</sup> Drowning was the second leading cause, resulting in 88, or over 17 percent, of the total training fatalities. Explosions accounted for 75 training fatalities, and physical training accounted for 63 fatalities. The remaining training fatalities were due to various other causes, including parachuting, weapons, and fire or steam. Figure II.1 compares the number of DOD on-duty fatalities that occurred during training from 1988 through 1996 with the number that occurred in all other activities. Table II.1 shows fatalities in training-related accidents by service.

---

<sup>1</sup>Vehicle accidents accounted for 377 of the 608 nontraining-related fatalities.

**Appendix II  
Non-aviation Fatalities in Training-related  
Accidents**

**Figure II.1: DOD Non-aviation Fatalities Related to Training and Nontraining Activities, 1988-96**



Note: Other includes equipment- and aircraft-related accidents, falls, electrocutions, hypothermia, lightning, accidents involving maintenance and repair activities, swim training, snow skiing, sporting events, water vehicles, and scuba diving.

**Appendix II  
Non-aviation Fatalities in Training-related  
Accidents**

**Table II.1: Service Fatalities in  
Non-aviation Training-related  
Accidents, 1988-96**

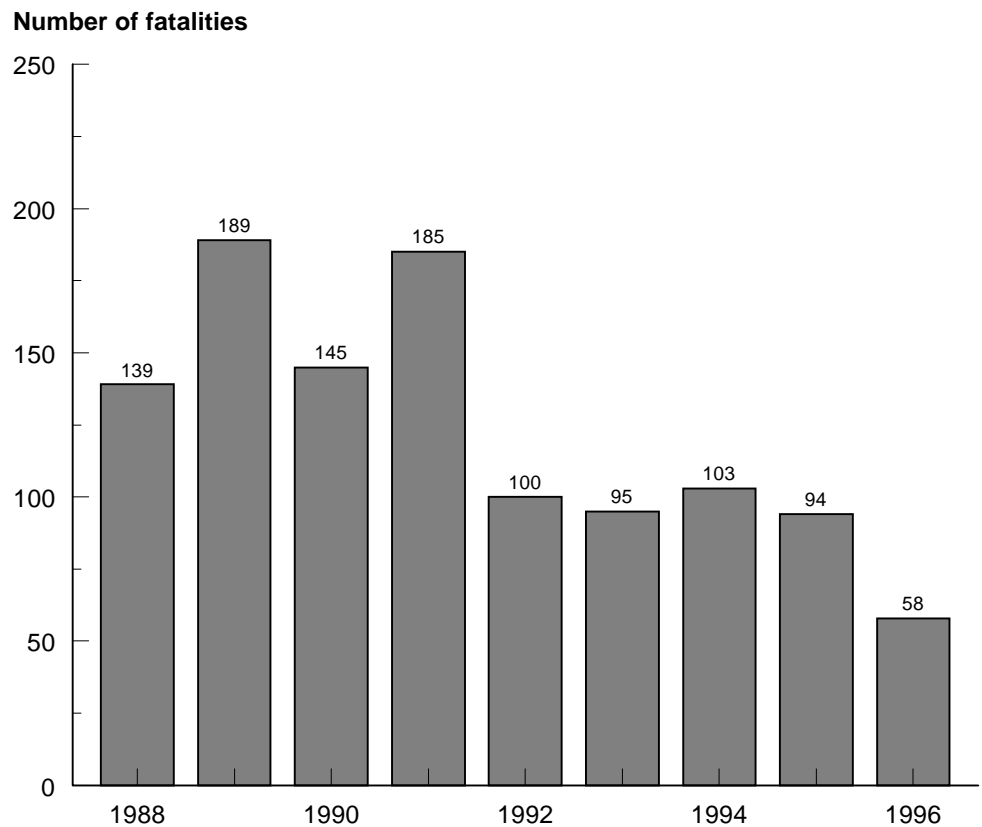
<b>Cause</b>	<b>Army</b>	<b>Navy</b>	<b>Marine Corps</b>	<b>Air Force</b>	<b>Total</b>	<b>Percent</b>
Military vehicle	72	0	15	2	<b>89</b>	17.8
Drowning	15	64	9	0	<b>88</b>	17.6
Explosion	15	53	6	1	<b>75</b>	15.0
Physical training	4	27	32	0	<b>63</b>	12.6
Parachuting	33	2	3	1	<b>39</b>	7.8
Weapon	20	2	10	1	<b>33</b>	6.6
Fire or steam	0	26	0	1	<b>27</b>	5.4
Equipment	5	8	2	0	<b>15</b>	3.0
Fall	1	10	2	0	<b>13</b>	2.6
Aircraft related	10	0	0	1	<b>11</b>	2.2
Electrocution	0	4	3	0	<b>7</b>	1.4
Hypothermia	4	0	0	0	<b>4</b>	0.8
Swim training	0	4	0	0	<b>4</b>	0.8
Maintenance/repair	1	2	0	0	<b>3</b>	0.6
Snow skiing	3	0	0	0	<b>3</b>	0.6
Sporting event	0	3	0	0	<b>3</b>	0.6
Water vehicle	0	3	0	0	<b>3</b>	0.6
Scuba diving	0	2	0	0	<b>2</b>	0.4
Lightning	0	0	1	0	<b>1</b>	0.2
Other	7	7	3	0	<b>17</b>	3.4
<b>Total</b>	<b>190</b>	<b>217</b>	<b>86</b>	<b>7</b>	<b>500</b>	<b>100.0</b>

Of the 89 fatalities in training-related vehicle accidents, 72 were in the Army, 15 in the Marine Corps, and 2 in the Air Force. The fatalities occurred during combat maneuvers and unit training exercises in established training areas and roadways on and outside DOD installations. Of the 88 training-related drowning fatalities, 64 were in the Navy, including 21 in 1 afloat mishap. Of the 75 training-related fatalities involving explosions or explosives, 47 were Navy personnel killed in the gun turret explosion aboard the Iowa. The other 28 training-related explosion fatalities occurred during service exercises involving demolition activities, mines, hand grenades, and other explosives. Army accidents accounted for 33 of 39 parachute training fatalities. Army and Marine Corps accidents together accounted for 30 of the 33 weapons training fatalities. Of the 63 physical training fatalities, 59 involved Navy and Marine Corps personnel.

# Trends in DOD On-duty Fatalities Due to Non-aviation Accidents

The annual number of DOD fatalities in on-duty, non-aviation accidents decreased from 139 in 1988 to 58 in 1996. From 1989 through 1991, there were 519 DOD on-duty accident fatalities—about 47 percent of the 1,108 fatalities between 1988 and 1996. The 1989 explosion aboard the Navy battleship *Iowa* accounted for 47 of the 189 DOD fatalities that year. The increase in fatalities between 1990 and 1991 was largely the result of increased Army and Marine Corps operating tempo associated with Operations Desert Shield and Desert Storm. Figure III.1 shows the annual number of DOD on-duty accident fatalities for 1988 through 1996.

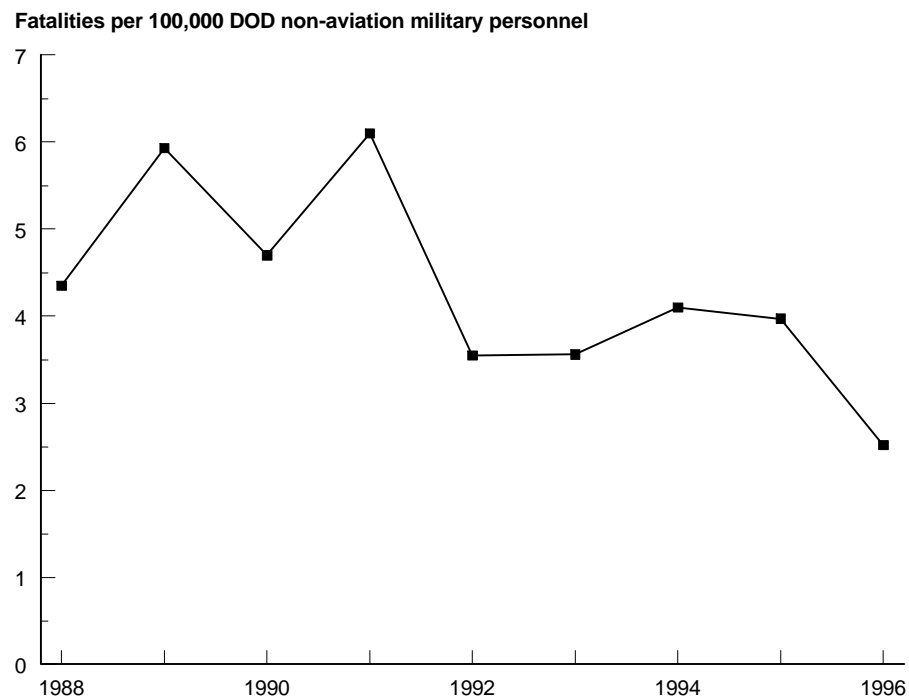
**Figure III.1: Annual Number of DOD On-duty Fatalities From Non-aviation Accidents, 1988-96**



**Appendix III  
Trends in DOD On-duty Fatalities Due to  
Non-aviation Accidents**

DOD's rate for the number of on-duty accident fatalities per 100,000 non-aviation military personnel also declined overall, from about 4.3 in 1988 to 2.5 in 1996. The rate fluctuated during this time, ranging from a high of 6.1 in 1991 to a low of 2.5 in 1996. The rate of on-duty accident fatalities varied in each of the services. The overall rates for the Army, the Navy, and the Marine Corps all declined between 1988 and 1996, but the Air Force's rate—the lowest of all the services—increased during this time. Figure III.2 shows DOD's rate for the number of on-duty accident fatalities per 100,000 non-aviation military personnel. Table III.1 shows this information by service.

**Figure III.2: DOD Rate of On-duty Fatalities From Non-aviation Accidents, 1988-96**



**Appendix III  
Trends in DOD On-duty Fatalities Due to  
Non-aviation Accidents**

**Table III.1: Rates of On-duty Fatalities  
From Non-aviation Accidents by  
Service**

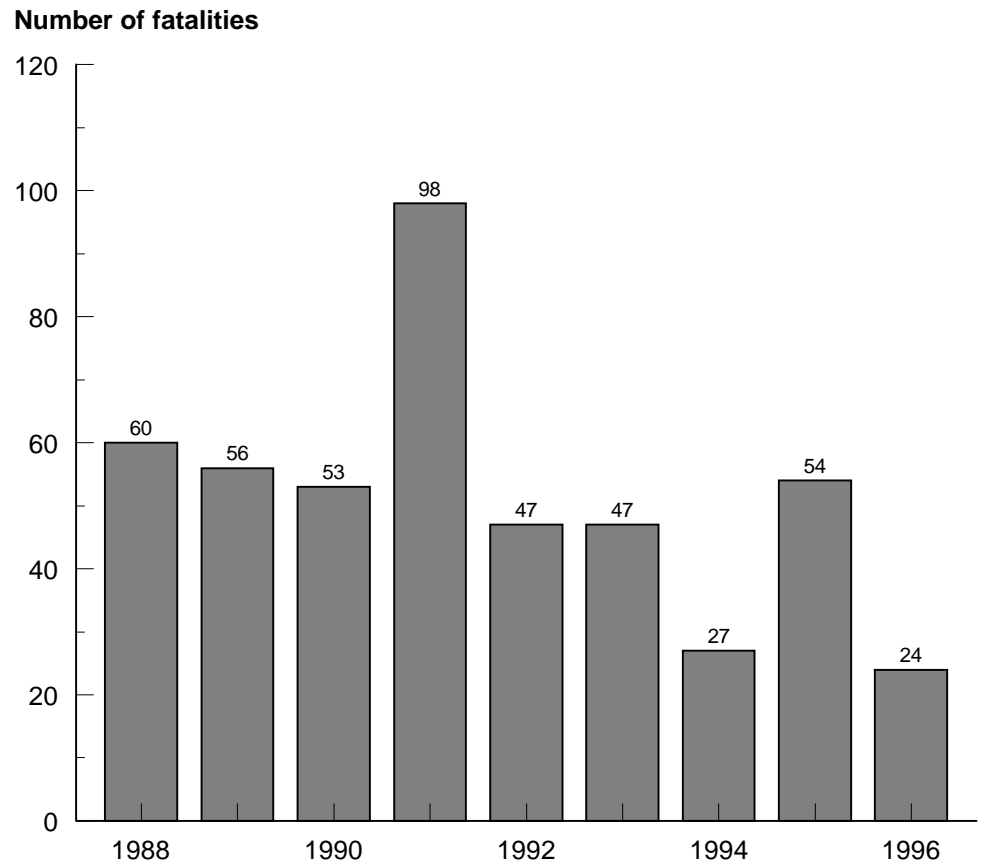
Year	Service			
	Army	Navy	Marine Corps	Air Force
1988	5.0	4.5	11.5	0.6
1989	5.2	11.5	6.4	1.8
1990	5.3	6.9	6.8	0.6
1991	7.6	3.0	18.9	1.5
1992	3.7	4.3	7.7	0.9
1993	4.3	2.1	7.5	2.1
1994	6.1	2.1	5.3	1.4
1995	5.5	2.7	7.6	0.7
1996	2.4	3.3	4.3	1.3

Note: Numbers have been rounded.

The annual number of DOD fatalities in military vehicle accidents decreased from 60 in 1988 to 24 in 1996. From 1989 to 1991, there were 207 vehicle fatalities—over 44 percent of all such fatalities for 1988 through 1996. Similarly, the rate of on-duty fatalities per 100,000 non-aviation personnel in military vehicle accidents declined about 50 percent, from 1.9 in 1988 to 1.0 in 1996. The vehicle fatality rate ranged from a high of 3.2 in 1991 during Operations Desert Shield and Desert Storm to a low of about 1.0 in 1996. Figures III.3 and III.4 show the annual number and rate, respectively, of DOD on-duty fatalities in military vehicle accidents for 1988 through 1996.

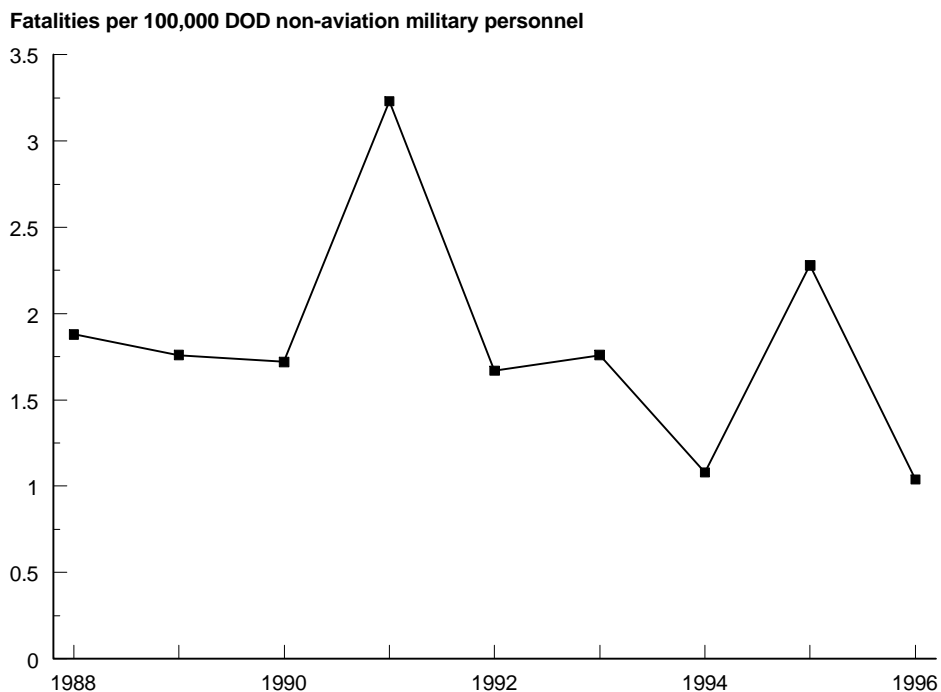
**Appendix III  
Trends in DOD On-duty Fatalities Due to  
Non-aviation Accidents**

**Figure III.3: Annual Number of DOD  
On-duty Fatalities in Military Vehicle  
Accidents**



**Appendix III  
Trends in DOD On-duty Fatalities Due to  
Non-aviation Accidents**

**Figure III.4: DOD Rate of On-duty  
Fatalities in Military Vehicle Accidents**



Between 1988 and 1996, the rate of military vehicle accident fatalities per 100,000 non-aviation personnel varied by service. As with the services' on-duty accidental fatality rates, the military vehicle accident rate decreased for the Army, the Navy, and the Marine Corps but increased slightly for the Air Force. Table III.2 shows the services' rates of on-duty fatalities in military vehicle accidents for 1988 through 1996.



**Appendix III  
Trends in DOD On-duty Fatalities Due to  
Non-aviation Accidents**

**Table III.2: Rates of On-duty Fatalities  
in Military Vehicle Accidents by  
Service**

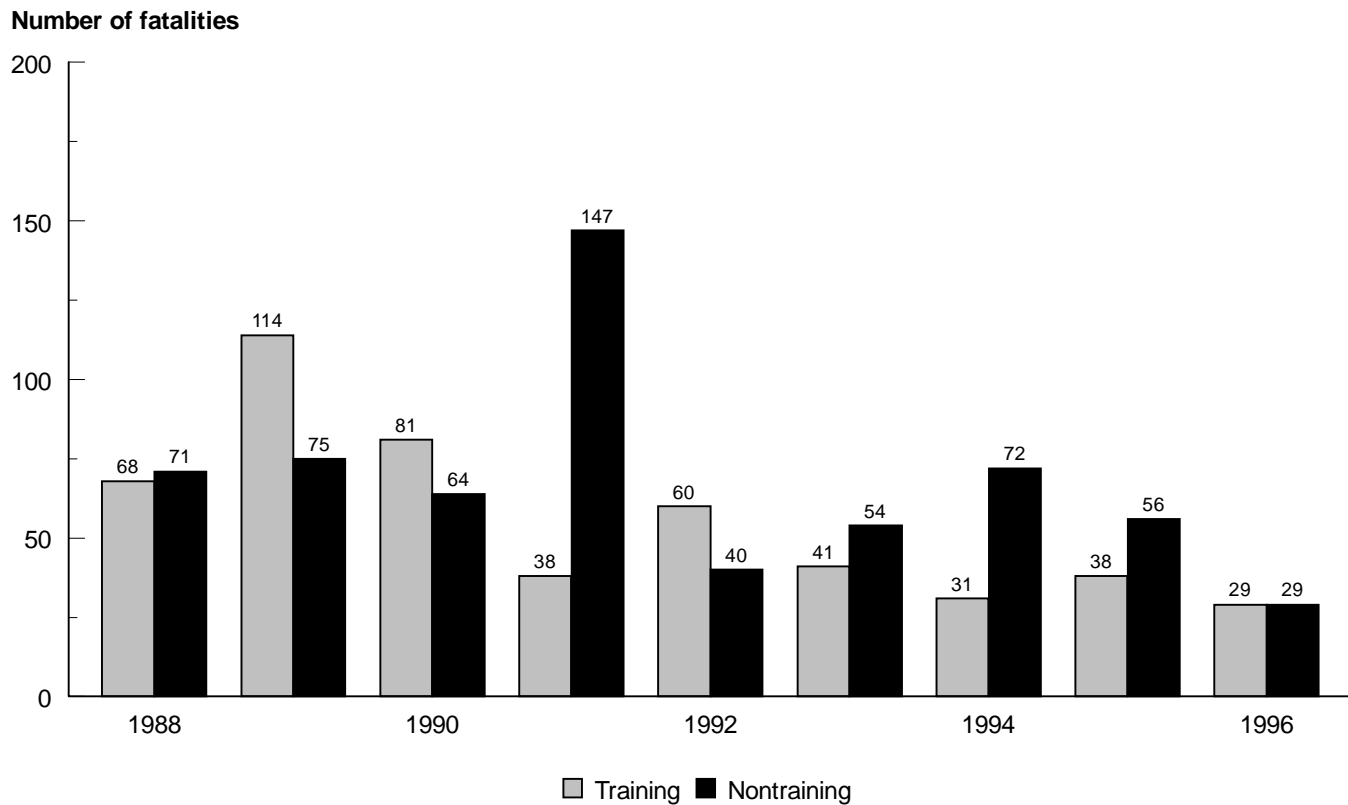
Year	Service			
	Army	Navy	Marine Corps	Air Force
1988	2.6	1.3	3.4	0.4
1989	2.7	0.4	2.1	1.0
1990	3.1	0.3	1.3	0.4
1991	4.9	0.3	9.9	0.4
1992	2.3	0.6	3.6	0.8
1993	2.8	0.7	1.9	0.8
1994	1.4	0.0	1.9	1.0
1995	4.0	0.8	1.4	0.5
1996	1.1	0.4	2.8	0.7

Note: Numbers have been rounded.

The number of DOD fatalities in training-related accidents decreased from 68 in 1988 to 29 in 1996. Likewise, the number of fatalities in other activities, such as peace operations and routine maintenance and repair, decreased from 71 to 29 during the same time. Figure III.5 shows this information.

**Appendix III  
Trends in DOD On-duty Fatalities Due to  
Non-aviation Accidents**

**Figure III.5: Annual Number of DOD Non-aviation Fatalities in Training and Nontraining Accidents**



# Comments From the Department of Defense



## OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3000

SEP. 10 1998

Mr. Mark Gebicke  
Director, Military Operations and  
Capabilities Issues  
National Security and International  
Affairs Division  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Gebicke:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "Military Safety: Analysis of DoD's On-Duty Non-Aviation Accident Fatalities," dated August 18, 1998 (GAO Case 703180/OSD Case 1679).

Overall, we were pleased with the in-depth, professional, and impartial review of the Department's safety performance. Your analysis substantiated what our internal oversight has observed over the years. It is reassuring to have an unbiased outside organization validate that the Department's leaders and the programs they implement provide Service Members a lower risk of accidental death than that which threatens similar civilian populations.

The Department is proud of its accomplishments to date. We recognize however, that there is much yet to do. There is no acceptable accidental loss rate. As the Secretary stated in his June 1998, Proclamation on Accident Prevention "...even one accident is too many, and I continue to advocate continuous improvement until we reach a goal of zero accidents, occupational illnesses, and fires. This is an ambitious goal, but to endorse any other goal legitimizes the acceptance of harm."

Very truly yours,

A handwritten signature in black ink, appearing to read "Sherri W. Goodman".

Sherri W. Goodman  
Deputy Under Secretary of Defense  
(Environmental Security)

*Environmental Security*



*Defending Our Future*

---

## Ordering Information

The first copy of each GAO report and testimony is free. Additional copies are \$2 each. Orders should be sent to the following address, accompanied by a check or money order made out to the Superintendent of Documents, when necessary. VISA and MasterCard credit cards are accepted, also. Orders for 100 or more copies to be mailed to a single address are discounted 25 percent.

### Orders by mail:

U.S. General Accounting Office  
P.O. Box 37050  
Washington, DC 20013

### or visit:

Room 1100  
700 4th St. NW (corner of 4th and G Sts. NW)  
U.S. General Accounting Office  
Washington, DC

Orders may also be placed by calling (202) 512-6000 or by using fax number (202) 512-6061, or TDD (202) 512-2537.

Each day, GAO issues a list of newly available reports and testimony. To receive facsimile copies of the daily list or any list from the past 30 days, please call (202) 512-6000 using a touchtone phone. A recorded menu will provide information on how to obtain these lists.

For information on how to access GAO reports on the INTERNET, send an e-mail message with "info" in the body to:

[info@www.gao.gov](mailto:info@www.gao.gov)

or visit GAO's World Wide Web Home Page at:

<http://www.gao.gov>

---

**United States  
General Accounting Office  
Washington, D.C. 20548-0001**

**Bulk Rate  
Postage & Fees Paid  
GAO  
Permit No. G100**

**Official Business  
Penalty for Private Use \$300**

**Address Correction Requested**

---

