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**USAF OCCUPATIONAL ILLNESS ANNUAL SUMMARY  
FY 1990**

J. Kevin Grayson, Captain, USAF, BSC

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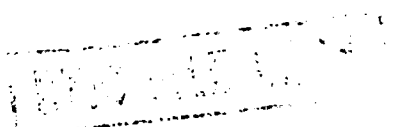
**OCCUPATIONAL AND ENVIRONMENTAL  
HEALTH DIRECTORATE  
Brooks Air Force Base, Texas 78235-5000**

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March 1991

Final Technical Report for Period Fiscal Year 1990

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**AIR FORCE SYSTEMS COMMAND  
BROOKS AIR FORCE BASE, TEXAS 78235-5601**

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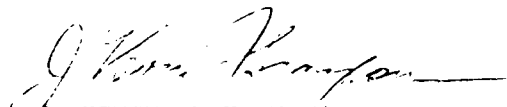
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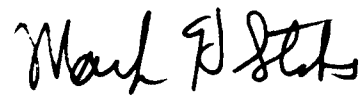
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## I. INTRODUCTION

A. This publication contains summary tables of data taken from the Occupational Illness Data Registry (OIDR) on the occurrence of reported occupational illnesses in the United States Air Force.

B. Part III contains information reported for FY 1990. The tables show the number of cases reported to the OIDR, as well as the distribution of cases by major command, personnel category, occupation code, and OSHA reporting code.

C. Part IV contains tables showing the number of cases reported to the OIDR by fiscal year for the period 1986 - 1990.

D. Part V includes graphs of selected summary data.

E. Part VI summarizes selected epidemiological studies performed with OIDR data during the past year.

F. Part VII presents a discussion of occupational illness reporting and a trend analysis of selected OIDR data.

G. The health surveillance process is a loop that begins in the field, but often doesn't end there. This publication represents the first attempt to close that gap for occupational health. A word of caution is advisable. Over interpretation of the data is possible and not necessarily helpful. Rate comparisons in particular are difficult to interpret, since population at risk figures are hard to obtain. It is possible to find denominator data for some populations, such as a particular base, MAJCOM, or AFSC. The problem with these data is that they don't represent a population at risk based upon exposure to a given agent. Therefore, most of the data seen in this report will consist of proportional comparisons, which match observed totals with those expected, based upon some reference population. Although not as informative as a rate or risk, proportional ratios are useful. They also require no denominator. Finally, recognize that this data only represents cases reported to the OIDR. Several independent estimates of occupational illness underreporting in the Air Force indicate that only ten to fifteen percent of cases are ever recorded.

## II. BACKGROUND INFORMATION

A. Occupational illness reporting in the Air Force serves two purposes. It satisfies federal law, and it is the foundation of a health surveillance system which can guide an informed decision making process.

1. The requirements to report occupational illness can be found in AFR 127-4, Investigating and Reporting USAF Mishaps; AFR 161-33, The Aerospace Medical Program; and, AFR 168-4, Administration of Medical Activities. These

Note: This report was accomplished by the Air Force Occupational and Environmental Health Laboratory (AFOEHL) which is now the Armstrong Laboratory, Occupational and Environmental Health Directorate.

Air Force directives are in turn driven by OSHA standards, as written in the Code of Federal Regulations, volume 29, section 1904.

2. The OADR was established in response to Air Staff directive. This past fiscal year, bases began sending AF Forms 190, Occupational Illness/Injury Report, to the Air Force Occupational and Environmental Health Laboratory (AFOEHL)/EHO, Brooks AFB, as instructed by a HQ USAF/SGP letter, dated 6 Sep 89.

B. Beyond meeting reporting requirements, there are several reasons for collecting occupational health data. One is to locate and follow workers exposed to potentially harmful agents. The second is to discover previously unrecognized associations between workers, their environment, and disease. The vast majority of health surveillance systems depend upon passively acquired information, such as employee compensation records, to perform these functions. The problem with these figures is that they are collected for some other purpose and seldom fulfill expectations. The OADR on the other hand is an active surveillance system. Data is specifically collected to meet its needs. It goes well beyond other systems in that its focus is on the individual. What was their occupation? Their exposure? Their illness? These are questions the OADR can answer. Most base level programs will not record enough cases to accurately forecast trends. By pooling data from every base at the MAJCOM and Air Force level, trends should become visible. The trick is to take this information, couple it with environmental data, and use it to apply interventions, when and where they are needed. We can supply the trends, profiling the ill worker in the classic epidemiologic terms of time, place, and person. You will have to integrate this data with information from the workplace in order to effectively manage your occupational health programs. This information should allow you to prioritize surveillance, intervention, and preventive actions. The outcome should be a more effective, efficient program; a significant accomplishment considering the strain being placed upon our resources.

C. In organizing this data, it became apparent that several cohorts were present. Military and civilian are the most obvious ones. MAJCOMs are another. Throughout this paper cohort analysis will be attempted. However, in many cases the cohorts are too small to make analytic useful.

### III. REPORTED OCCUPATIONAL ILLNESSES, FY 1990

Tables one through six show the number of cases reported to the OADR, as well as the distribution of cases by major command, personnel category, occupational code, and OSHA reporting code.

**Table 1. Reported Occupational Illnesses by Major Command, FY 1990.**

| MAJCOM                             | Civilian   |                |             | Military   |                |             | Total      |                |             |
|------------------------------------|------------|----------------|-------------|------------|----------------|-------------|------------|----------------|-------------|
|                                    | Reported   | Population     | Cases/1000  | Reported   | Population     | Cases/1000  | Reported   | Population     | Cases/1000  |
| Alaskan Air Command (AAC)          | 12         | 1,222          | 9.82        | 1          | 7,468          | 0.13        | 13         | 8,690          | 2.88        |
| Air Force Logistics Command (AFLC) | 318        | 84,449         | 3.77        | 11         | 11,998         | 0.92        | 329        | 96,447         | 3.41        |
| Air Force Reserve (AFRES)          | 8          | 13,200         | 0.46        | 1          | 60,069         | 0.02        | 7          | 73,269         | 0.1         |
| Air Force Systems Command (AFSC)   | 8          | 28,753         | 0.28        | 60         | 23,746         | 2.53        | 68         | 53,499         | 1.29        |
| Air National Guard (ANG)           | 8          | 24,310         | 0.33        | 8          | 116,000        | 0.17        | 16         | 140,310        | 0.11        |
| Air Training Command (ATC)         | 27         | 12,840         | 2.11        | 7          | 59,911         | 0.12        | 34         | 72,751         | 0.47        |
| Air University (AU)                | 0          | 1,562          | 0           | 1          | 5,623          | 0.18        | 1          | 7,184          | 0.14        |
| Military Airlift Command (MAC)     | 13         | 15,022         | 0.87        | 15         | 75,195         | 0.2         | 28         | 90,217         | 0.31        |
| Pacific Air Forces (PACAF)         | 5          | 9,742          | 0.51        | 10         | 28,413         | 0.35        | 15         | 38,155         | 0.39        |
| Strategic Air Command (SAC)        | 21         | 12,284         | 1.71        | 48         | 103,026        | 0.47        | 69         | 115,290        | 0.6         |
| Air Force Space Command (SPACE)    | 4          | 1,794          | 2.23        | 0          | 6,192          | 0           | 4          | 7,986          | 0.5         |
| Tactical Air Command (TAC)         | 16         | 11,562         | 1.3         | 36         | 94,133         | 0.38        | 61         | 105,695        | 0.48        |
| USAF Academy (USAFSA)              | 2          | 1,578          | 1.27        | 0          | 2,704          | 0           | 2          | 4,282          | 0.47        |
| US Air Force in Europe (USAFE)     | 3          | 9,982          | 0.3         | 6          | 60,471         | 0.08        | 8          | 70,453         | 0.11        |
|                                    | <b>442</b> | <b>190,760</b> | <b>2.32</b> | <b>203</b> | <b>594,989</b> | <b>0.35</b> | <b>645</b> | <b>785,649</b> | <b>0.82</b> |

**Table 2. Reported Occupational Illnesses by Civilian Occupation Code, FY 1990.**

| <b>Code</b> | <b>Utilization Field Title</b>          | <b>Total</b> | <b>Percent</b> |
|-------------|---|--------------|----------------|
| 0318 - 2091 | Administrative - Clerical               | 47           | 10.6           |
| 2604        | Electronics Mechanic                    | 3            | 0.7            |
| 2854        | Electronic Equipment Repair             | 5            | 1.1            |
| 2892        | Aircraft Electrical Instrument Repairer | 4            | 0.9            |
| 3414 - 3416 | Machinist - Toolmaker                   | 7            | 1.6            |
| 3806        | Sheetmetal Mechanic                     | 36           | 8.1            |
| 4102        | Painter                                 | 9            | 2              |
| 4201 - 4204 | Pipefitter                              | 3            | 0.7            |
| 4352        | Plastics Fabricator                     | 4            | 0.9            |
| 4848        | Mechanical Parts Repairer               | 5            | 1.1            |
| 5306 - 5414 | Air Conditioning, Boiler Operator       | 6            | 1.4            |
| 6901 - 6910 | Warehouseman                            | 8            | 1.8            |
| 7009        | Equipment Cleaner                       | 4            | 0.9            |
| 8255        | Pneudraulic Mechanic                    | 8            | 1.8            |
| 8602        | Aircraft Engine Mechanic                | 3            | 0.7            |
| 8852        | Aircraft Mechanic                       | 13           | 2.9            |
|             | Unknown or Unspecified                  | 277          | 62.7           |

Table 3. Reported Civilian Occupational Illnesses by Occupation Code and OSHA Code, FY 1990.

| Occupation Code | Utilization Field Title                 | OSHA Code         |                            |                         |                      |                               |                      |                    |     |  |  | Total |
|-----------------|---|-------------------|----------------------------|-------------------------|----------------------|-------------------------------|----------------------|--------------------|-----|--|--|-------|
|                 |   | 21-Skin Disorders | 22-Dr. It Disease of Lungs | 23-Respiratory Toxicity | 24-Systemic Toxicity | 25-Effects of Physical Agents | 26-Repetitive Trauma | 28-Other Disorders |     |  |  |       |
| 0318 - 2091     | Administrative - Clerical               | 4                 | 0                          | 3                       | 3                    | 2                             | 12                   | 23                 | 47  |  |  |       |
| 2604            | Electronics Mechanic                    | 0                 | 0                          | 2                       | 1                    | 0                             | 0                    | 0                  | 3   |  |  |       |
| 2854            | Electronic Equipment Repair             | 0                 | 0                          | 0                       | 0                    | 0                             | 5                    | 0                  | 5   |  |  |       |
| 2892            | Aircraft Electrical Instrument Repairer | 0                 | 0                          | 1                       | 0                    | 0                             | 3                    | 0                  | 4   |  |  |       |
| 3414 - 3416     | Machinist - Toolmaker                   | 3                 | 0                          | 0                       | 0                    | 0                             | 4                    | 0                  | 7   |  |  |       |
| 3806            | Sheetmetal Mechanic                     | 2                 | 0                          | 1                       | 1                    | 1                             | 27                   | 4                  | 36  |  |  |       |
| 4102            | Painter                                 | 4                 | 0                          | 1                       | 1                    | 0                             | 1                    | 2                  | 9   |  |  |       |
| 4201 - 4204     | Pipefitter                              | 1                 | 0                          | 1                       | 1                    | 0                             | 0                    | 0                  | 3   |  |  |       |
| 4352            | Plastics Fabricator                     | 3                 | 0                          | 0                       | 1                    | 0                             | 0                    | 0                  | 4   |  |  |       |
| 4848            | Mechanical Parts Repairer               | 1                 | 0                          | 0                       | 0                    | 0                             | 5                    | 0                  | 6   |  |  |       |
| 5306 - 5414     | Air Conditioning, Boiler Operator       | 1                 | 0                          | 1                       | 0                    | 0                             | 3                    | 1                  | 6   |  |  |       |
| 6901 - 6910     | Warehouseman                            | 1                 | 0                          | 0                       | 1                    | 0                             | 1                    | 5                  | 8   |  |  |       |
| 7009            | Equipment Cleaner                       | 0                 | 0                          | 0                       | 2                    | 0                             | 0                    | 2                  | 4   |  |  |       |
| 8255            | Pneudraulic Mechanic                    | 0                 | 0                          | 1                       | 1                    | 0                             | 6                    | 0                  | 8   |  |  |       |
| 8602            | Aircraft Engine Mechanic                | 2                 | 0                          | 0                       | 0                    | 0                             | 1                    | 0                  | 3   |  |  |       |
| 8852            | Aircraft Mechanic                       | 2                 | 0                          | 2                       | 0                    | 0                             | 8                    | 1                  | 13  |  |  |       |
|                 | Unknown or Unspecified                  | 46                | 4                          | 31                      | 34                   | 12                            | 113                  | 36                 | 276 |  |  |       |
|                 |   | 70                | 4                          | 44                      | 46                   | 15                            | 189                  | 74                 | 442 |  |  |       |

**Table 4. Reported Military Occupational Illnesses  
by Occupation Code, FY 1990.**

| <b>Code</b>     | <b>Utilization Field Title</b> | <b>Total</b> | <b>Assigned</b> | <b>Cases/1000</b> |
|-----------------|--------------------------------|--------------|-----------------|-------------------|
| <b>Officer</b>  |                                |              |                 |                   |
| 05              | Disaster Preparedness          | 1            | 167             | 6.00              |
| 15              | Navigator                      | 1            | 8,375           | 0.10              |
| 97              | Nurse                          | 2            | 5,408           | 0.40              |
| <b>Enlisted</b> |                                |              |                 |                   |
| 11              | Aircrew Operations             | 1            | 8,853           | 0.10              |
| 12              | Aircrew Protection             | 1            | 2,804           | 0.70              |
| 23              | Visual Information             | 1            | 2,722           | 0.40              |
| 27              | Command Control Systems Ops    | 2            | 16,287          | 0.10              |
| 31              | Instrumentation                | 1            | 525             | 1.90              |
| 32              | Precision Maintenance          | 1            | 2,647           | 0.40              |
| 41              | Missile Systems Maintenance    | 1            | 5,038           | 0.20              |
| 45              | Manned Aerospace Maintenance   | 46           | 103,255         | 0.45              |
| 46              | Munitions & Weapons            | 13           | 25,016          | 0.50              |
| 47              | Vehicle Maintenance            | 4            | 5,550           | 0.70              |
| 49              | Communications/Computers       | 1            | 20,386          | 0.05              |
| 54              | Mechanical/Electrical          | 11           | 10,033          | 1.10              |
| 55              | Structures/Pavements           | 13           | 11,819          | 1.10              |
| 56              | Sanitation                     | 7            | 1,624           | 4.30              |
| 57              | Fire Protection                | 30           | 6,112           | 4.90              |
| 60              | Transportation                 | 1            | 13,403          | 0.07              |
| 62              | Services                       | 2            | 6,283           | 0.30              |
| 63              | Fuels                          | 2            | 6,599           | 0.30              |
| 64              | Supply                         | 1            | 23,708          | 0.00              |
| 67              | Financial                      | 1            | 5,583           | 0.20              |
| 70              | Information Management         | 3            | 21,471          | 0.14              |
| 73              | Personnel                      | 3            | 13,849          | 0.22              |
| 74              | Morale, Welfare & Recreation   | 1            | 1,723           | 0.60              |
| 81              | Security Police                | 5            | 37,884          | 0.10              |
| 82              | Special Investigations         | 2            | 933             | 2.10              |
| 87              | Band                           | 1            | 1,129           | 0.90              |
| 90              | Medical                        | 3            | 25,492          | 0.18              |
| 98              | Dental                         | 4            | 3,581           | 1.12              |
|                 | Unknown                        | 38           |                 |                   |

Table 5. Reported Military Occupational Illnesses by Occupation Code and OSHA Code, FY 1990.

| Occupation Code | Utilization Field Title      | 21-Skin Disorders | 22-Dust Disease of Lungs | 23-Respiratory Disorders | 24-Systemic Toxicity | 25-Disorders Due to Physical Agents | 26-Repetitive Trauma | 28-Other Disorders | Total |
|-----------------|------------------------------|-------------------|--------------------------|--------------------------|----------------------|-------------------------------------|----------------------|--------------------|-------|
| <b>OFFICER</b>  |                              |                   |                          |                          |                      |                                     |                      |                    |       |
| 05              | Disaster Preparedness        | 0                 | 0                        | 0                        | 0                    | 1                                   | 0                    | 0                  | 1     |
| <b>ENLISTED</b> |                              |                   |                          |                          |                      |                                     |                      |                    |       |
| 15              | Navigator                    | 0                 | 0                        | 0                        | 0                    | 1                                   | 0                    | 0                  | 1     |
| 97              | Nurse                        | 2                 | 0                        | 0                        | 0                    | 0                                   | 0                    | 0                  | 2     |
| 11              | Aircrew Operations           | 0                 | 0                        | 0                        | 1                    | 0                                   | 0                    | 0                  | 2     |
| 12              | Aircrew Protection           | 0                 | 0                        | 0                        | 0                    | 0                                   | 0                    | 1                  | 1     |
| 23              | Visual Information           | 0                 | 0                        | 0                        | 0                    | 1                                   | 0                    | 0                  | 1     |
| 27              | Command Control Systems Ops  | 1                 | 0                        | 0                        | 0                    | 1                                   | 0                    | 0                  | 2     |
| 31              | Instrumentation              | 1                 | 0                        | 0                        | 0                    | 0                                   | 0                    | 0                  | 1     |
| 32              | Precision Maintenance        | 1                 | 0                        | 0                        | 0                    | 0                                   | 0                    | 0                  | 1     |
| 41              | Missile Systems Maintenance  | 1                 | 0                        | 0                        | 0                    | 0                                   | 0                    | 0                  | 1     |
| 45              | Manned Aerospace Maintenance | 21                | 0                        | 12                       | 6                    | 9                                   | 3                    | 6                  | 46    |
| 46              | Munitions & Weapons          | 3                 | 0                        | 1                        | 4                    | 2                                   | 2                    | 1                  | 13    |
| 47              | Vehicle Maintenance          | 2                 | 0                        | 1                        | 0                    | 0                                   | 0                    | 1                  | 4     |
| 49              | Communications/Computers     | 0                 | 0                        | 0                        | 0                    | 1                                   | 0                    | 0                  | 1     |
| 54              | Mechanical/Electrical        | 0                 | 0                        | 0                        | 0                    | 11                                  | 0                    | 0                  | 11    |
| 55              | Structures/Pavements         | 4                 | 0                        | 1                        | 3                    | 3                                   | 1                    | 0                  | 13    |
| 56              | Sanitation                   | 1                 | 0                        | 1                        | 0                    | 3                                   | 0                    | 0                  | 7     |
| 57              | Fire Protection              | 0                 | 0                        | 0                        | 0                    | 28                                  | 0                    | 0                  | 30    |
| 60              | Transportation               | 0                 | 0                        | 1                        | 0                    | 0                                   | 0                    | 0                  | 1     |
| 62              | Services                     | 0                 | 0                        | 0                        | 0                    | 2                                   | 0                    | 0                  | 2     |
| 63              | Fuels                        | 0                 | 0                        | 1                        | 0                    | 1                                   | 0                    | 0                  | 2     |
| 64              | Supply                       | 0                 | 0                        | 0                        | 0                    | 1                                   | 0                    | 0                  | 1     |
| 67              | Financial                    | 0                 | 0                        | 1                        | 0                    | 0                                   | 0                    | 0                  | 1     |
| 70              | Information Management       | 0                 | 0                        | 0                        | 0                    | 3                                   | 0                    | 0                  | 3     |
| 73              | Personnel                    | 0                 | 0                        | 0                        | 0                    | 2                                   | 0                    | 0                  | 3     |
| 74              | Morale, Welfare & Recreation | 0                 | 0                        | 0                        | 0                    | 1                                   | 0                    | 0                  | 1     |
| 81              | Security Police              | 0                 | 0                        | 2                        | 3                    | 0                                   | 0                    | 0                  | 5     |
| 82              | Special Investigations       | 0                 | 0                        | 0                        | 0                    | 2                                   | 0                    | 0                  | 2     |
| 87              | Band                         | 1                 | 0                        | 0                        | 0                    | 0                                   | 1                    | 0                  | 1     |
| 90              | Medical                      | 1                 | 0                        | 1                        | 0                    | 0                                   | 0                    | 1                  | 3     |
| 98              | Dental                       | 2                 | 0                        | 1                        | 0                    | 1                                   | 0                    | 0                  | 4     |
|                 | Unknown                      | 28                | 0                        | 8                        | 9                    | 1                                   | 3                    | 5                  | 38    |
|                 |                              | 49                | 0                        | 31                       | 27                   | 74                                  | 11                   | 11                 | 203   |

**Table 6. Reported Cases Ranked by ICD-9 Code, FY 1990.**

| <b>ICD-9 Code</b> | <b>ICD-9 Code Description</b>           | <b>Total</b> | <b>Percent</b> |
|-------------------|---|--------------|----------------|
| <b>Civilian</b>   |   |              |                |
| <b>987.</b>       | Toxic effects of other gases ...        | 72           | 16.3           |
| <b>692.</b>       | Contact dermatitis and other eczema     | 64           | 14.5           |
| <b>354.</b>       | Mononeuritis of upper limb              | 58           | 13.1           |
| <b>388.</b>       | Other disorders of ear                  | 57           | 12.9           |
| <b>726.</b>       | Peripheral enthesopathies               | 31           | 7.2            |
| <b>300.</b>       | Neurotic disorders                      | 24           | 5.6            |
| <b>727.</b>       | Other disorders of synovia, tendons ... | 12           | 2.8            |
| <b>729.</b>       | Other disorders of soft tissues         | 10           | 2.3            |
| <b>719.</b>       | Other/unspecified joint disorders       | 8            | 1.9            |
| <b>722.</b>       | Intervertebral disk disorders           | 6            | 1.4            |
| <b>506.</b>       | Respiratory cond. due to chemicals      | 6            | 1.4            |
| <b>Other</b>      |   | 94           | 21.0           |
| <b>Military</b>   |   |              |                |
| <b>992.</b>       | Effects of heat and light               | 67           | 33.0           |
| <b>987.</b>       | Toxic effects of other gases ...        | 52           | 25.6           |
| <b>692.</b>       | Contact dermatitis and other eczema     | 46           | 22.7           |
| <b>354.</b>       | Mononeuritis of upper limb              | 5            | 2.5            |
| <b>388.</b>       | Other disorders of ear                  | 5            | 2.5            |
| <b>991.</b>       | Effects of reduced temperature          | 3            | 1.5            |
| <b>05_.</b>       | Infectious diseases                     | 2            | 1.0            |
| <b>276.</b>       | Volume depletion                        | 2            | 1.0            |
| <b>506.</b>       | Respiratory cond. due to chemicals      | 2            | 1.0            |
| <b>980.</b>       | Toxic effects of alcohols               | 2            | 1.0            |
| <b>Other</b>      |   | 17           | 8.4            |

#### IV. HISTORICAL SUMMARY TABLES COVERING FY 1986 - FY 1990.

Tables seven through 29 show the number of cases reported to the OADR, as well as the distribution of cases by major command, personnel category, occupational code, and OSHA reporting code.

Table 7. Reported Occupational Illnesses by FY and Personnel Component.

| Fiscal Year | Civilian |                | Military |                | All   |                |
|-------------|----------|----------------|----------|----------------|-------|----------------|
|             | Total    | Percent Change | Total    | Percent Change | Total | Percent Change |
| 1986        | 13       |                | 8        |                | 21    |                |
| 1987        | 147      | 1030           | 137      | 1612           | 284   | 1252           |
| 1988        | 237      | 61             | 158      | 15             | 395   | 39             |
| 1989        | 281      | 19             | 117      | -26            | 398   | 1              |
| 1990        | 442      | 57             | 203      | 74             | 645   | 62             |
|             | 1020     |                | 623      |                | 1743  |                |

**Table 8. Reported Occupational Illness by FY, MAJCOM, and Personnel Component.**

| MAJCOM | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|--------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|        | Civ     | Mil | Civ     | Mil | Civ     | Mil | Civ     | Mil | Civ     | Mil | Civ   | Mil |
| AAC    | 12      | 1   | 0       | 4   | 3       | 0   | 7       | 0   | 0       | 0   | 22    | 5   |
| AFLC   | 318     | 11  | 171     | 5   | 123     | 1   | 53      | 3   | 6       | 0   | 671   | 20  |
| AFRES  | 6       | 1   | 0       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 7     | 1   |
| AFSC   | 8       | 60  | 6       | 10  | 4       | 11  | 1       | 3   | 0       | 0   | 19    | 84  |
| ANG    | 8       | 8   | 9       | 2   | 10      | 1   | 2       | 2   | 0       | 0   | 29    | 13  |
| ATC    | 27      | 7   | 11      | 4   | 16      | 6   | 16      | 6   | 0       | 0   | 70    | 23  |
| AU     | 0       | 1   | 0       | 0   | 1       | 1   | 2       | 0   | 0       | 0   | 3     | 2   |
| MAC    | 13      | 15  | 22      | 16  | 23      | 10  | 16      | 19  | 1       | 0   | 75    | 60  |
| PACAF  | 5       | 10  | 15      | 32  | 4       | 68  | 5       | 9   | 1       | 0   | 30    | 119 |
| SAC    | 21      | 48  | 22      | 6   | 30      | 17  | 23      | 61  | 3       | 8   | 99    | 140 |
| SPACE  | 4       | 0   | 0       | 1   | 2       | 0   | 2       | 0   | 0       | 0   | 8     | 1   |
| TAC    | 15      | 36  | 23      | 34  | 19      | 40  | 15      | 26  | 2       | 0   | 74    | 136 |
| USAFA  | 2       | 0   | 1       | 1   | 1       | 1   | 4       | 0   | 0       | 0   | 8     | 2   |
| USAFE  | 3       | 5   | 1       | 2   | 1       | 2   | 0       | 8   | 0       | 0   | 5     | 17  |
|        | 442     | 203 | 281     | 117 | 237     | 158 | 147     | 137 | 13      | 8   | 1,120 | 623 |

**Table 9. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component.**

| OSHA Code                            | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|--------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                      | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21--Skin Disorders                   | 70      | 49  | 58      | 21  | 36      | 25  | 35      | 39  | 3       | 2   | 202   | 136 |
| 22--Dust Disease of the Lungs        | 4       | 0   | 4       | 0   | 6       | 0   | 3       | 0   | 2       | 0   | 19    | 0   |
| 23--Respiratory Disorders            | 44      | 31  | 31      | 16  | 33      | 18  | 15      | 28  | 0       | 1   | 123   | 94  |
| 24--Systemic Toxicity                | 46      | 27  | 37      | 24  | 11      | 26  | 28      | 34  | 3       | 1   | 125   | 112 |
| 25--Disorders due to Physical Agents | 15      | 74  | 5       | 47  | 7       | 80  | 5       | 21  | 0       | 0   | 32    | 222 |
| 26--Repetitive Trauma                | 189     | 11  | 123     | 2   | 117     | 2   | 48      | 10  | 4       | 4   | 481   | 29  |
| 29--Other Disorders                  | 74      | 11  | 23      | 7   | 27      | 7   | 13      | 5   | 1       | 0   | 138   | 30  |
|                                      | 442     | 203 | 281     | 117 | 237     | 158 | 147     | 137 | 13      | 8   | 1,120 | 623 |

**Table 10. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for AAC.**

| OSHA Code                           | FY 1990           |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|-------------------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | CIV               | MII | CIV     | MII | CIV     | MII | CIV     | MII | CIV     | MII | CIV   | MII |
|                                     | 21-Skin Disorders | 1   | 1       | 0   | 0       | 1   | 0       | 0   | 0       | 0   | 0     | 2   |
| 22-Dust Disease of the Lungs        | 0                 | 0   | 0       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 1     | 0   |
| 23-Respiratory Disorders            | 0                 | 0   | 0       | 0   | 2       | 0   | 1       | 0   | 0       | 0   | 3     | 0   |
| 24-Systemic Toxicity                | 6                 | 0   | 0       | 2   | 0       | 0   | 4       | 0   | 0       | 0   | 10    | 2   |
| 25-Disorders due to Physical Agents | 0                 | 0   | 0       | 2   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 2   |
| 26-Repetitive Trauma                | 6                 | 0   | 0       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 6     | 0   |
| 29-Other Disorders                  | 0                 | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
|                                     | 12                | 1   | 0       | 4   | 3       | 0   | 7       | 0   | 0       | 0   | 22    | 5   |

**Table 11. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for AFLC.**

| OSHA Code                           | FY 1990           |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|-------------------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | CIV               | MII | CIV     | MII | CIV     | MII | CIV     | MII | CIV     | MII | CIV   | MII |
|                                     | 21-Skin Disorders | 53  | 4       | 39  | 5       | 19  | 1       | 23  | 1       | 2   | 0     | 136 |
| 22-Dust Disease of the Lungs        | 0                 | 0   | 2       | 0   | 2       | 0   | 0       | 0   | 0       | 0   | 4     | 0   |
| 23-Respiratory Disorders            | 29                | 0   | 15      | 0   | 11      | 0   | 11      | 0   | 0       | 0   | 66    | 0   |
| 24-Systemic Toxicity                | 31                | 4   | 17      | 0   | 7       | 0   | 6       | 1   | 1       | 0   | 62    | 5   |
| 25-Disorders due to Physical Agents | 7                 | 0   | 1       | 0   | 4       | 0   | 0       | 0   | 0       | 0   | 12    | 0   |
| 26-Repetitive Trauma                | 141               | 2   | 89      | 0   | 71      | 0   | 12      | 1   | 3       | 0   | 316   | 3   |
| 29-Other Disorders                  | 57                | 1   | 8       | 0   | 9       | 0   | 1       | 0   | 0       | 0   | 75    | 1   |
|                                     | 318               | 11  | 171     | 5   | 123     | 1   | 53      | 3   | 6       | 0   | 671   | 20  |

**Table 12. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for AFRES.**

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 2       | 0   | 0       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 3     | 0   |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 23-Respiratory Disorders            | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 24-Systemic Toxicity                | 0       | 1   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 1   |
| 25-Disorders due to Physical Agents | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 26-Repetitive Trauma                | 3       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 3     | 0   |
| 29-Other Disorders                  | 1       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 1     | 0   |
|                                     | 6       | 1   | 0       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 7     | 1   |

**Table 13. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for AFSC.**

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 1       | 7   | 2       | 5   | 1       | 5   | 0       | 2   | 0       | 0   | 4     | 19  |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 23-Respiratory Disorders            | 0       | 6   | 1       | 0   | 1       | 0   | 0       | 0   | 0       | 0   | 2     | 6   |
| 24-Systemic Toxicity                | 4       | 5   | 0       | 1   | 0       | 2   | 0       | 0   | 0       | 0   | 4     | 8   |
| 25-Disorders due to Physical Agents | 3       | 40  | 1       | 3   | 1       | 1   | 0       | 1   | 0       | 0   | 5     | 45  |
| 26-Repetitive Trauma                | 0       | 1   | 2       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 3     | 1   |
| 29-Other Disorders                  | 0       | 1   | 0       | 1   | 1       | 3   | 0       | 0   | 0       | 0   | 1     | 5   |
|                                     | 8       | 60  | 6       | 10  | 4       | 11  | 1       | 3   | 0       | 0   | 19    | 84  |

**Table 14. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for ANG.**

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 3       | 0   | 1       | 0   | 0       | 1   | 1       | 0   | 0       | 0   | 5     | 1   |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 23-Respiratory Disorders            | 1       | 4   | 2       | 1   | 6       | 0   | 0       | 0   | 0       | 0   | 9     | 5   |
| 24-Systemic Toxicity                | 0       | 0   | 4       | 1   | 1       | 0   | 1       | 1   | 0       | 0   | 6     | 2   |
| 25-Disorders due to Physical Agents | 0       | 3   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 3   |
| 26-Repetitive Trauma                | 4       | 1   | 1       | 0   | 3       | 0   | 0       | 0   | 0       | 0   | 8     | 1   |
| 29-Other Disorders                  | 0       | 0   | 1       | 0   | 0       | 0   | 0       | 1   | 0       | 0   | 1     | 1   |
|                                     | 8       | 8   | 9       | 2   | 10      | 1   | 2       | 2   | 0       | 0   | 29    | 13  |

**Table 15. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for ATC.**

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 1       | 0   | 2       | 0   | 1       | 1   | 4       | 1   | 0       | 0   | 8     | 2   |
| 22-Dust Disease of the Lungs        | 4       | 0   | 2       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 6     | 0   |
| 23-Respiratory Disorders            | 5       | 0   | 0       | 1   | 1       | 1   | 0       | 3   | 0       | 0   | 6     | 5   |
| 24-Systemic Toxicity                | 2       | 0   | 1       | 1   | 0       | 2   | 2       | 0   | 0       | 0   | 5     | 3   |
| 25-Disorders due to Physical Agents | 1       | 7   | 0       | 2   | 0       | 2   | 0       | 2   | 0       | 0   | 1     | 13  |
| 26-Repetitive Trauma                | 9       | 0   | 4       | 0   | 7       | 0   | 6       | 0   | 0       | 0   | 26    | 0   |
| 29-Other Disorders                  | 5       | 0   | 2       | 0   | 7       | 0   | 5       | 0   | 0       | 0   | 19    | 0   |
|                                     | 27      | 7   | 11      | 4   | 16      | 6   | 16      | 6   | 0       | 0   | 70    | 23  |

**Table 16. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for AU.**

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 0       | 0   | 0       | 0   | 0       | 1   | 0       | 0   | 0       | 0   | 0     | 1   |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 23-Respiratory Disorders            | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 24-Systemic Toxicity                | 0       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 0       | 0   | 1     | 0   |
| 25-Disorders due to Physical Agents | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 26-Repetitive Trauma                | 0       | 1   | 0       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 1     | 1   |
| 29-Other Disorders                  | 0       | 0   | 0       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 1     | 0   |
|                                     | 0       | 1   | 0       | 0   | 1       | 1   | 2       | 0   | 0       | 0   | 3     | 2   |

**Table 17. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for MAC.**

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 2       | 1   | 4       | 3   | 4       | 2   | 3       | 5   | 0       | 0   | 13    | 11  |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 1       | 0   | 2       | 0   | 1       | 0   | 4     | 0   |
| 23-Respiratory Disorders            | 1       | 4   | 2       | 1   | 1       | 5   | 1       | 3   | 0       | 0   | 5     | 13  |
| 24-Systemic Toxicity                | 0       | 2   | 1       | 4   | 1       | 1   | 5       | 9   | 0       | 0   | 7     | 16  |
| 25-Disorders due to Physical Agents | 1       | 7   | 0       | 6   | 1       | 2   | 1       | 0   | 0       | 0   | 3     | 15  |
| 26-Repetitive Trauma                | 6       | 1   | 10      | 0   | 12      | 0   | 4       | 1   | 0       | 0   | 32    | 2   |
| 29-Other Disorders                  | 3       | 0   | 5       | 2   | 3       | 0   | 0       | 1   | 0       | 0   | 11    | 3   |
|                                     | 13      | 15  | 22      | 16  | 23      | 10  | 16      | 19  | 1       | 0   | 75    | 60  |

Table 18. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for PACAF.

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 0       | 5   | 7       | 3   | 0       | 2   | 0       | 4   | 0       | 0   | 7     | 14  |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 23-Respiratory Disorders            | 1       | 2   | 4       | 1   | 3       | 6   | 0       | 2   | 0       | 0   | 8     | 11  |
| 24-Systemic Toxicity                | 0       | 2   | 0       | 4   | 0       | 8   | 0       | 2   | 1       | 0   | 1     | 16  |
| 25-Disorders due to Physical Agents | 0       | 0   | 1       | 24  | 0       | 50  | 0       | 0   | 0       | 0   | 1     | 74  |
| 26-Repetitive Trauma                | 3       | 1   | 2       | 0   | 1       | 0   | 3       | 1   | 0       | 0   | 9     | 2   |
| 29-Other Disorders                  | 1       | 0   | 1       | 0   | 0       | 2   | 2       | 0   | 0       | 0   | 4     | 2   |
|                                     | 5       | 10  | 15      | 32  | 4       | 68  | 5       | 9   | 1       | 0   | 30    | 119 |

Table 19. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for SAC.

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 3       | 17  | 1       | 1   | 4       | 5   | 0       | 17  | 0       | 2   | 8     | 42  |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 2       | 0   | 0       | 0   | 1       | 0   | 3     | 0   |
| 23-Respiratory Disorders            | 3       | 11  | 4       | 0   | 7       | 2   | 1       | 15  | 0       | 1   | 15    | 29  |
| 24-Systemic Toxicity                | 2       | 7   | 3       | 1   | 0       | 6   | 8       | 13  | 1       | 1   | 14    | 28  |
| 25-Disorders due to Physical Agents | 3       | 5   | 1       | 3   | 1       | 2   | 2       | 7   | 0       | 0   | 7     | 17  |
| 26-Repetitive Trauma                | 7       | 3   | 11      | 1   | 12      | 1   | 8       | 6   | 0       | 4   | 38    | 15  |
| 29-Other Disorders                  | 3       | 5   | 2       | 0   | 4       | 1   | 4       | 3   | 1       | 0   | 14    | 9   |
|                                     | 21      | 48  | 22      | 6   | 30      | 17  | 23      | 61  | 3       | 8   | 99    | 140 |

Table 20. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for SPACE.

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 23-Respiratory Disorders            | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 24-Systemic Toxicity                | 0       | 0   | 0       | 1   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 1   |
| 25-Disorders due to Physical Agents | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 26-Repetitive Trauma                | 2       | 0   | 0       | 0   | 2       | 0   | 2       | 0   | 0       | 0   | 6     | 0   |
| 29-Other Disorders                  | 2       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 2     | 0   |
|                                     | 4       | 0   | 0       | 1   | 2       | 0   | 2       | 0   | 0       | 0   | 8     | 1   |

Table 21. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for TAC.

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ     | MII | Civ   | MII |
| 21-Skin Disorders                   | 2       | 11  | 1       | 4   | 5       | 6   | 3       | 4   | 1       | 0   | 12    | 25  |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 0       | 0   | 1     | 0   |
| 23-Respiratory Disorders            | 1       | 3   | 2       | 11  | 1       | 4   | 1       | 4   | 0       | 0   | 5     | 22  |
| 24-Systemic Toxicity                | 1       | 6   | 11      | 7   | 1       | 7   | 1       | 7   | 0       | 0   | 14    | 27  |
| 25-Disorders due to Physical Agents | 0       | 11  | 1       | 7   | 0       | 21  | 2       | 11  | 0       | 0   | 3     | 50  |
| 26-Repetitive Trauma                | 9       | 1   | 4       | 1   | 8       | 1   | 8       | 0   | 1       | 0   | 30    | 3   |
| 29-Other Disorders                  | 2       | 4   | 4       | 4   | 3       | 1   | 0       | 0   | 0       | 0   | 9     | 9   |
|                                     | 15      | 36  | 23      | 34  | 19      | 40  | 15      | 26  | 2       | 0   | 74    | 136 |

**Table 22. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for USAFA.**

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | CIV     | MII | CIV     | MII | CIV     | MII | CIV     | MII | CIV     | MII | CIV   | MII |
| 21-Skin Disorders                   | 2       | 0   | 0       | 0   | 1       | 0   | 0       | 0   | 0       | 0   | 3     | 0   |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 23-Respiratory Disorders            | 0       | 0   | 1       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 1     | 0   |
| 24-Systemic Toxicity                | 0       | 0   | 0       | 1   | 0       | 0   | 1       | 0   | 0       | 0   | 1     | 1   |
| 25-Disorders due to Physical Agents | 0       | 0   | 0       | 0   | 0       | 1   | 0       | 0   | 0       | 0   | 0     | 1   |
| 26-Repetitive Trauma                | 0       | 0   | 0       | 0   | 0       | 0   | 3       | 0   | 0       | 0   | 3     | 0   |
| 29-Other Disorders                  | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
|                                     | 2       | 0   | 1       | 1   | 1       | 1   | 4       | 0   | 0       | 0   | 8     | 2   |

**Table 23. Reported Occupational Illnesses by OSHA Code, FY, and Personnel Component for USAFA.**

| OSHA Code                           | FY 1990 |     | FY 1989 |     | FY 1988 |     | FY 1987 |     | FY 1986 |     | Total |     |
|-------------------------------------|---------|-----|---------|-----|---------|-----|---------|-----|---------|-----|-------|-----|
|                                     | CIV     | MII | CIV     | MII | CIV     | MII | CIV     | MII | CIV     | MII | CIV   | MII |
| 21-Skin Disorders                   | 0       | 3   | 1       | 0   | 0       | 1   | 0       | 5   | 0       | 0   | 1     | 9   |
| 22-Dust Disease of the Lungs        | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
| 23-Respiratory Disorders            | 3       | 1   | 0       | 1   | 0       | 0   | 0       | 1   | 0       | 0   | 3     | 3   |
| 24-Systemic Toxicity                | 0       | 0   | 0       | 1   | 0       | 0   | 0       | 1   | 0       | 0   | 0     | 2   |
| 25-Disorders due to Physical Agents | 0       | 0   | 0       | 0   | 0       | 1   | 0       | 0   | 0       | 0   | 0     | 1   |
| 26-Repetitive Trauma                | 0       | 1   | 0       | 0   | 1       | 0   | 0       | 1   | 0       | 0   | 1     | 2   |
| 29-Other Disorders                  | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0       | 0   | 0     | 0   |
|                                     | 3       | 5   | 1       | 2   | 1       | 2   | 0       | 8   | 0       | 0   | 5     | 17  |

**V. GRAPHS OF SELECTED DATA.**

Figures one through 18 include graphs of selected summary data.

Figure 1.

## Reported Occupational Illnesses By MAJCOM, FY 1990

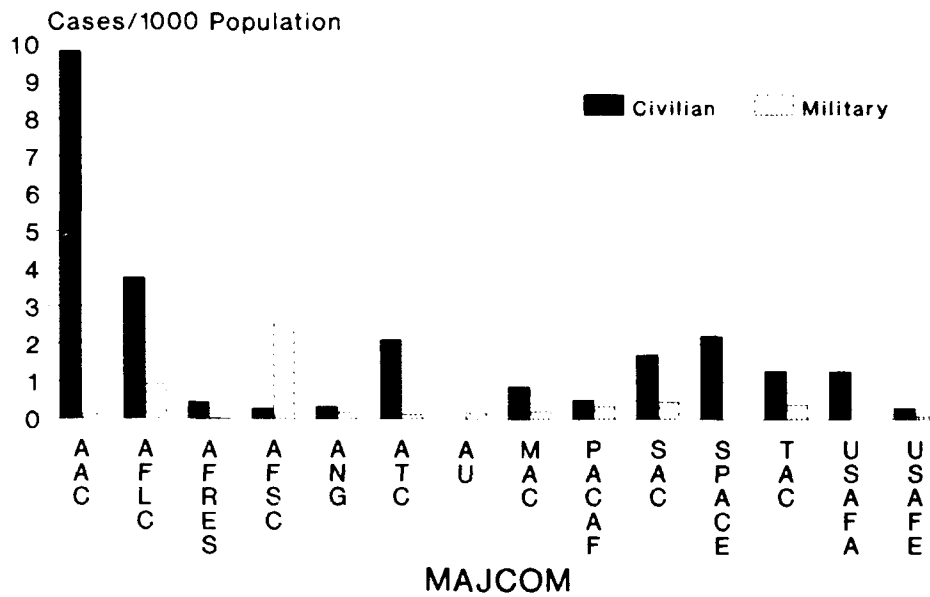


Figure 2.

## Reported Occupational Illnesses FY 1986 - 1990

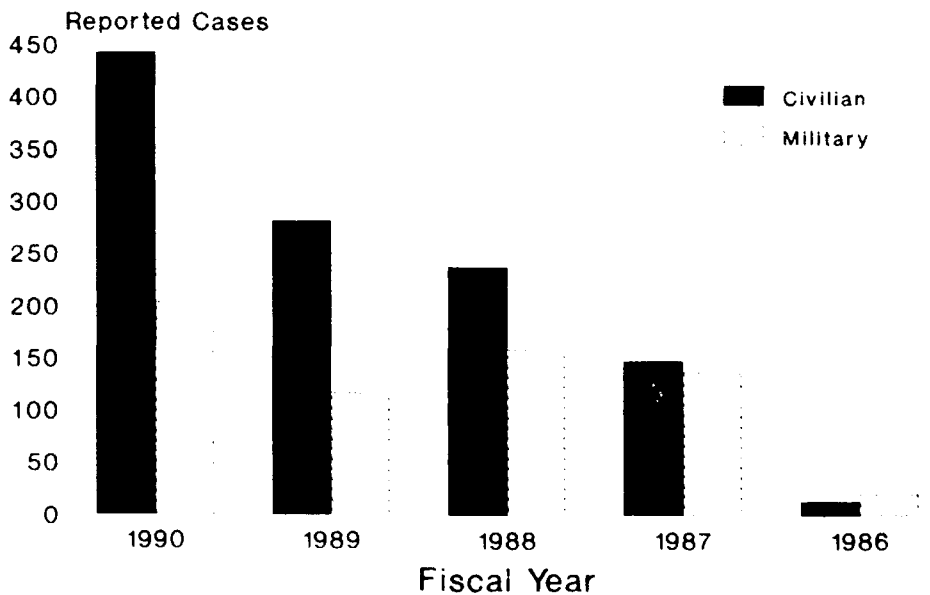


Figure 3.

# Reported Civilian Occupational Illnesses By OSHA Code, FY 1990

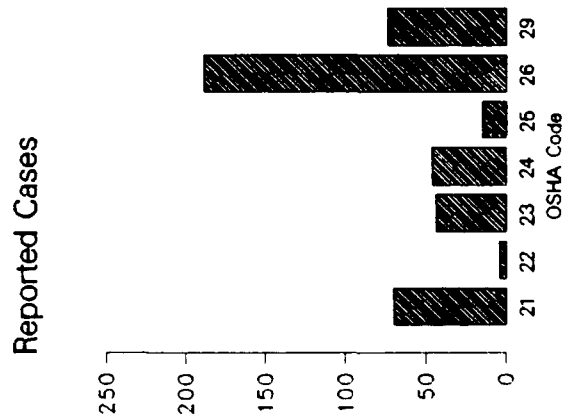
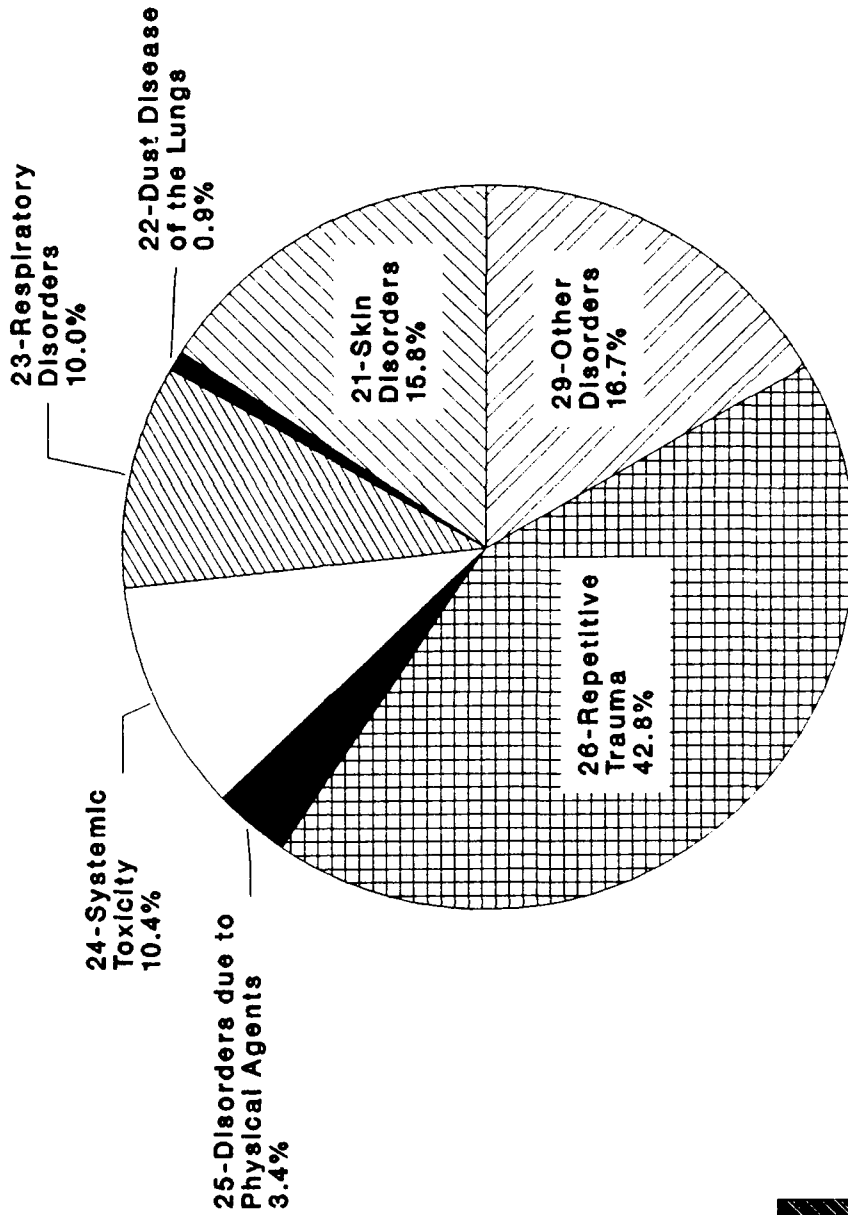


Figure 4.

# Reported USAF Civilian Occupational Illnesses

Comparison of FY 1990 with Average of Previous Three Years

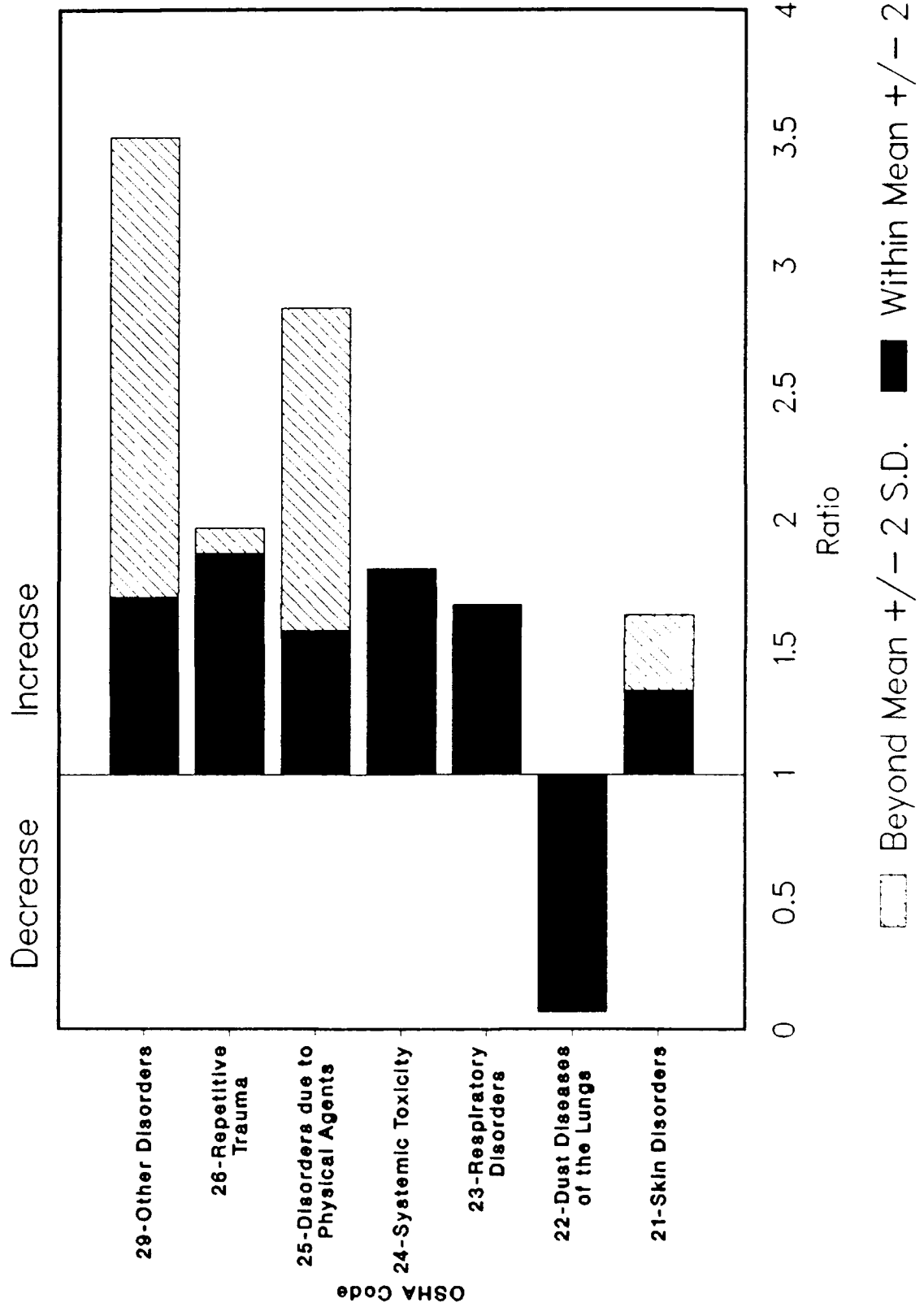


Figure 5.

# Reported Military Occupational Illnesses By OSHA Code, FY 1990

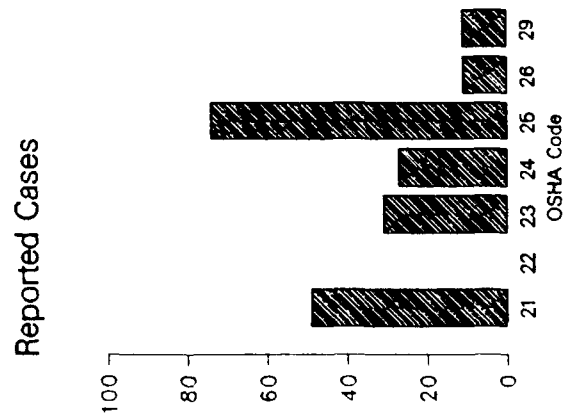
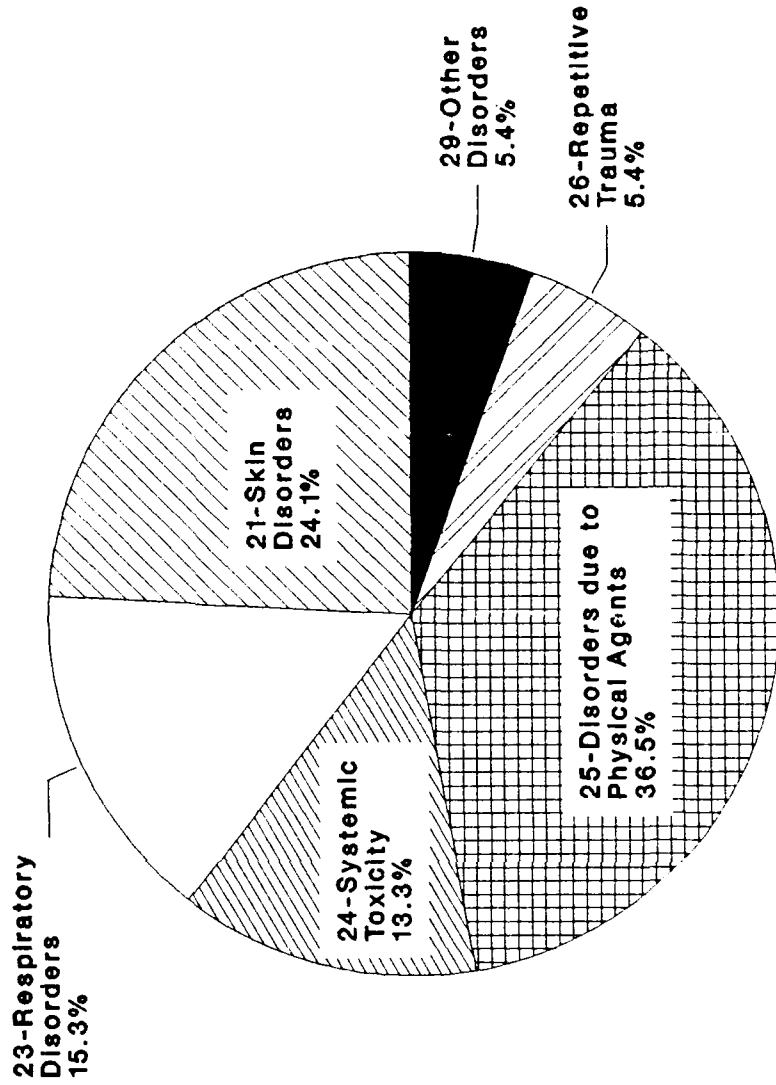


Figure 6.

# Reported USAF Military Occupational Illnesses

Comparison of FY 1990 with Average of Previous Three Years

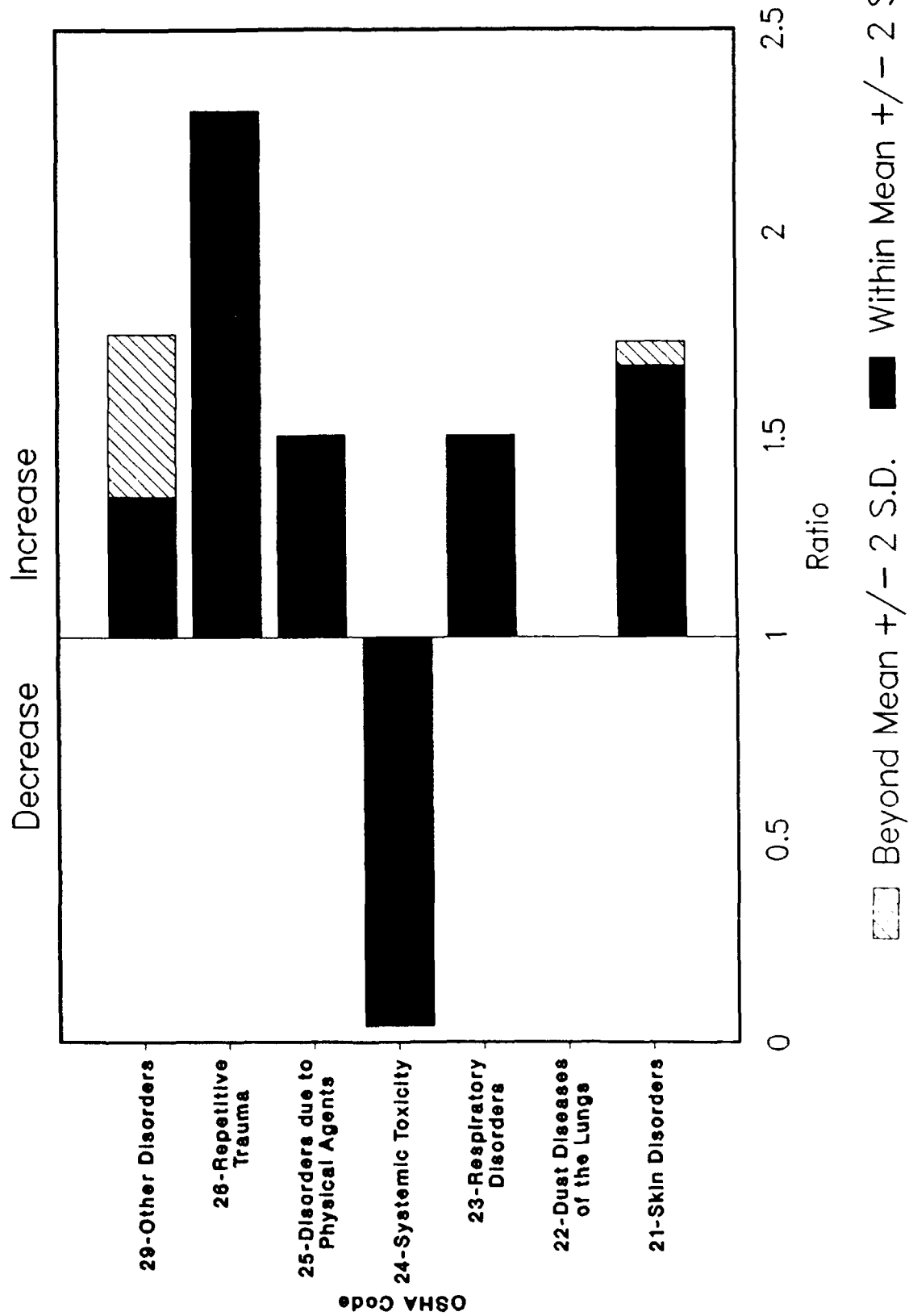


Figure 7.

### Reported Skin Disorders (OSHA Code 21) FY 1986 - 1990

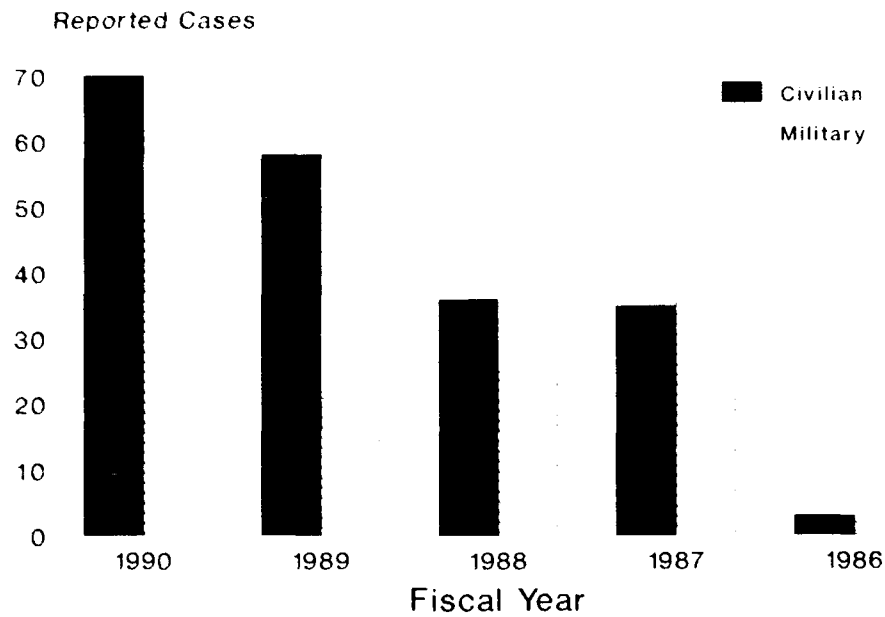


Figure 8.

### Percentage of Reported Illnesses OSHA Code 21, FY 1986 - 1990

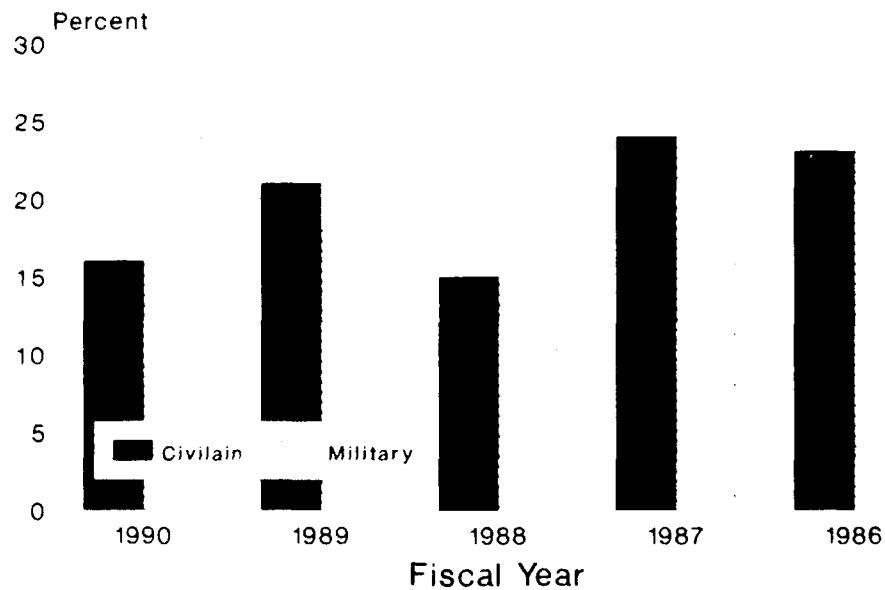


Figure 9.

## Reported Respiratory Conditions (OSHA Codes 22,23) FY 1986 - 1990

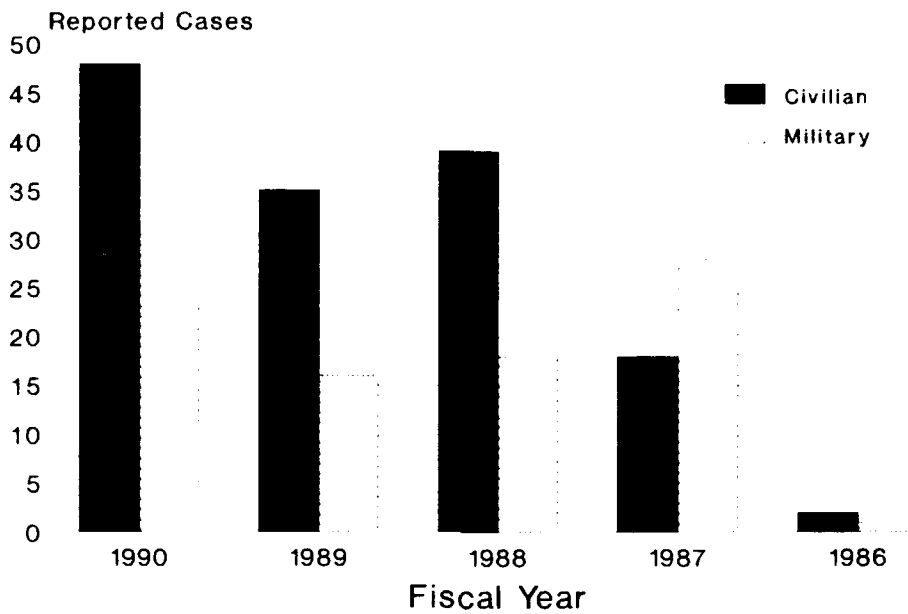


Figure 10.

## Percentage of Reported Illnesses OSHA Codes 22 & 23, FY 1986 - 1990

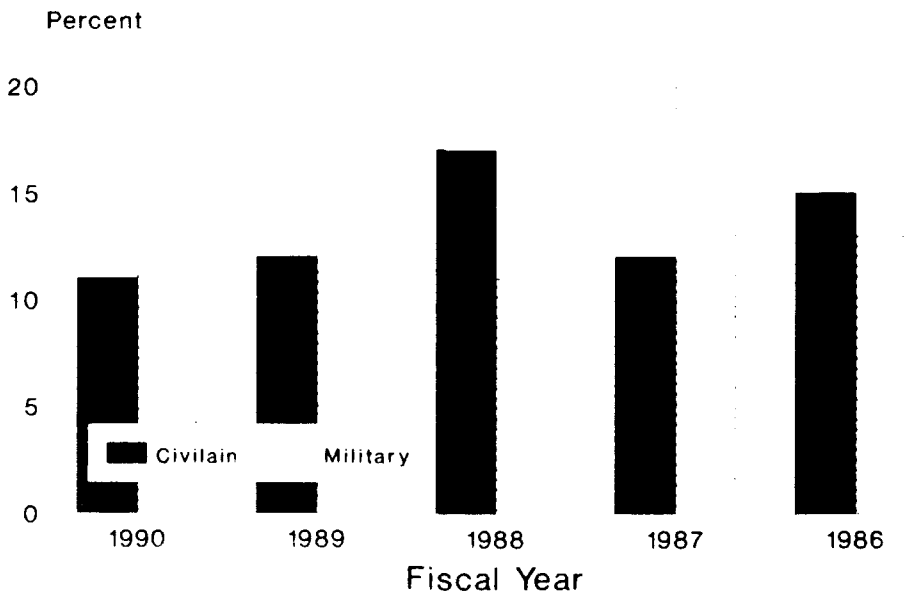


Figure 11.

### Reported Systemic Toxicities (OSHA Code 24) FY 1986 - 1990

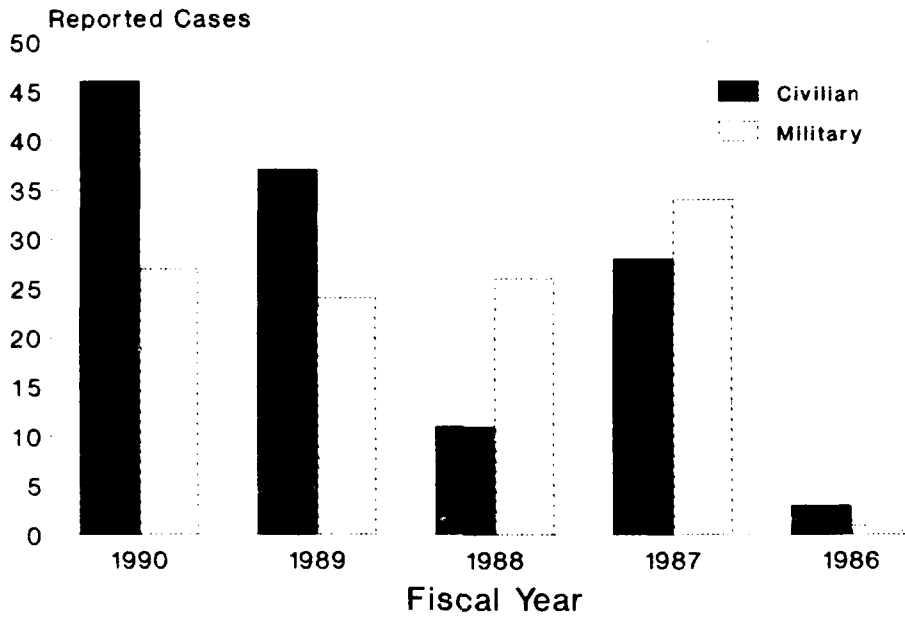


Figure 12.

### Percentage of Reported Illnesses OSHA Code 24, FY 1986 - 1990

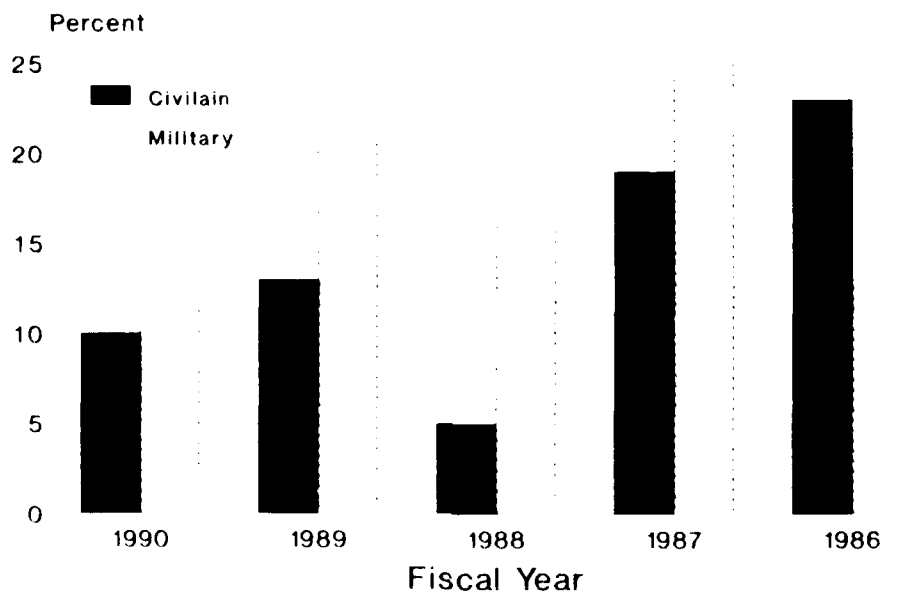


Figure 13.

### Reported Disorders Due to Physical Agent (OSHA Code 25) FY 1986 - 1990

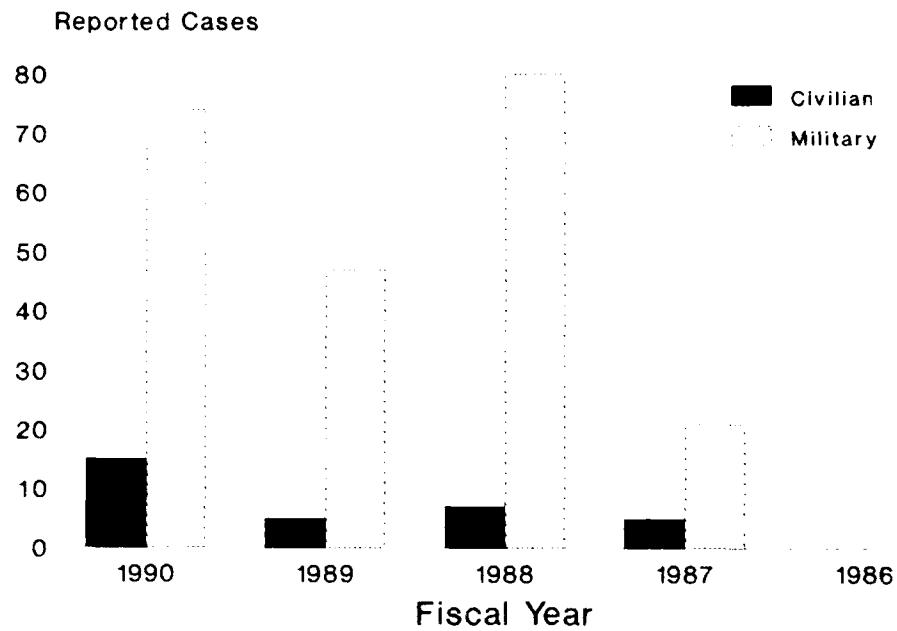


Figure 14.

### Percentage of Reported Illnesses OSHA Code 25, FY 1986 - 1990

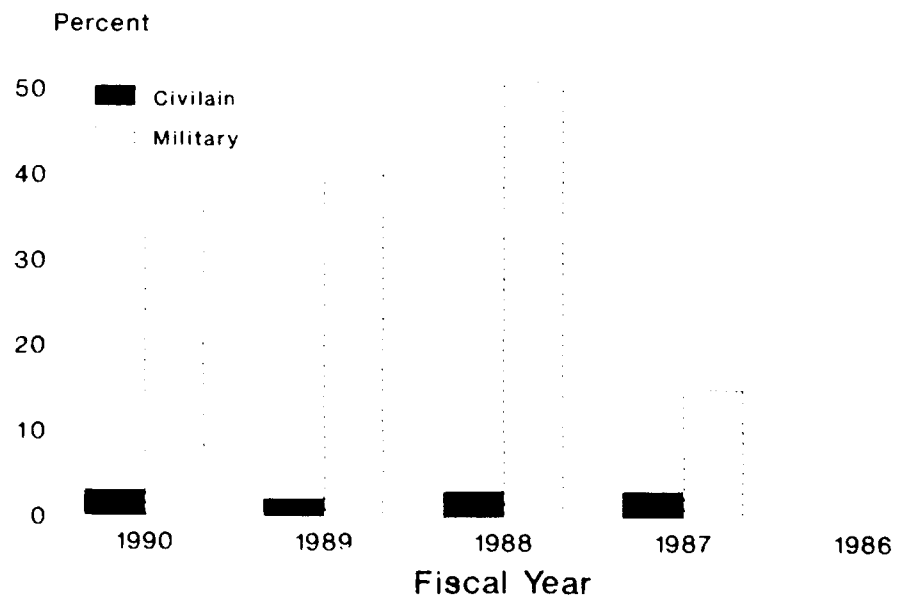


Figure 15.

### Reported Repetitive Trauma Disorders (OSHA Code 26) FY 1986 - 1990

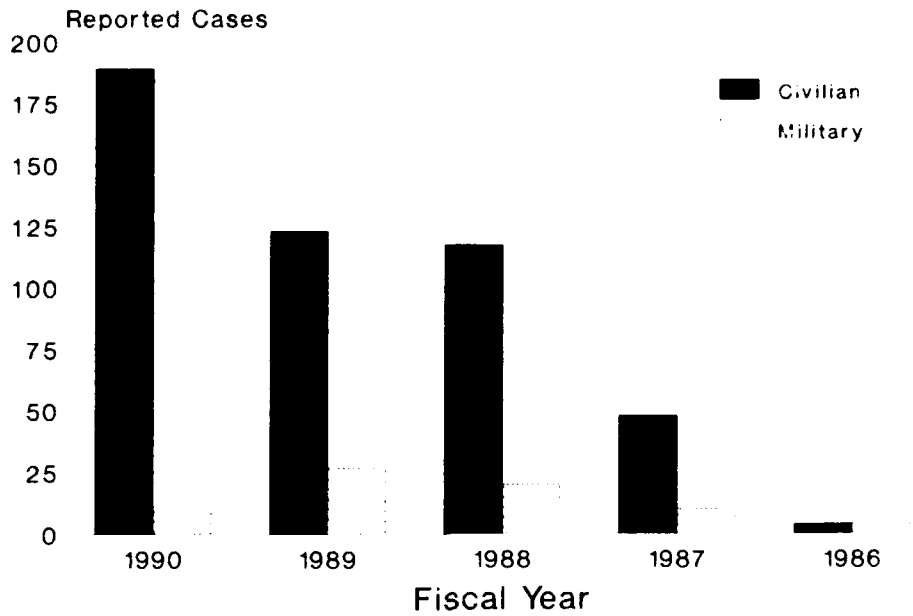


Figure 16.

### Percentage of Reported Illnesses OSHA Code 26, FY 1986 - 1990

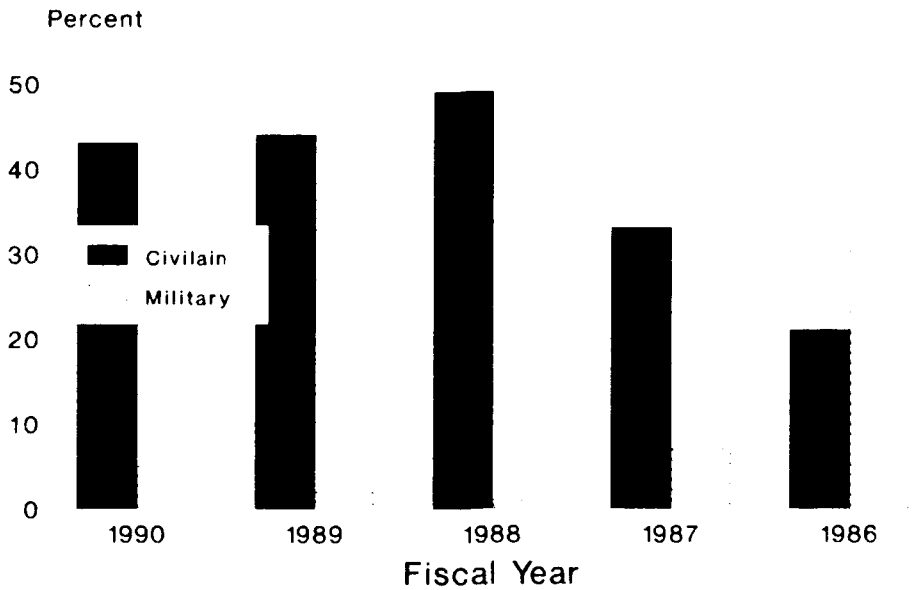


Figure 17.

### Reported Miscellaneous Disorders (OSHA Code 29) FY 1986 - 1990

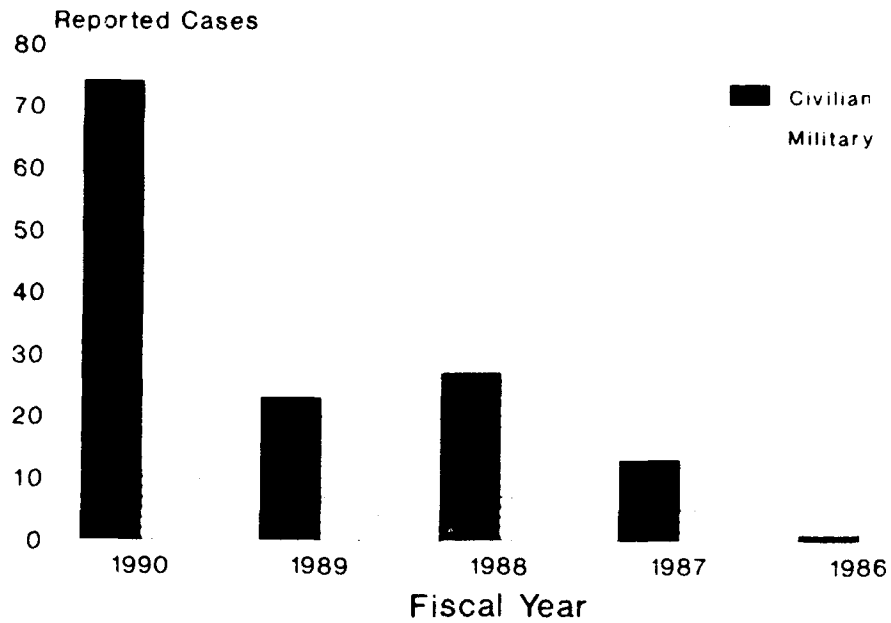
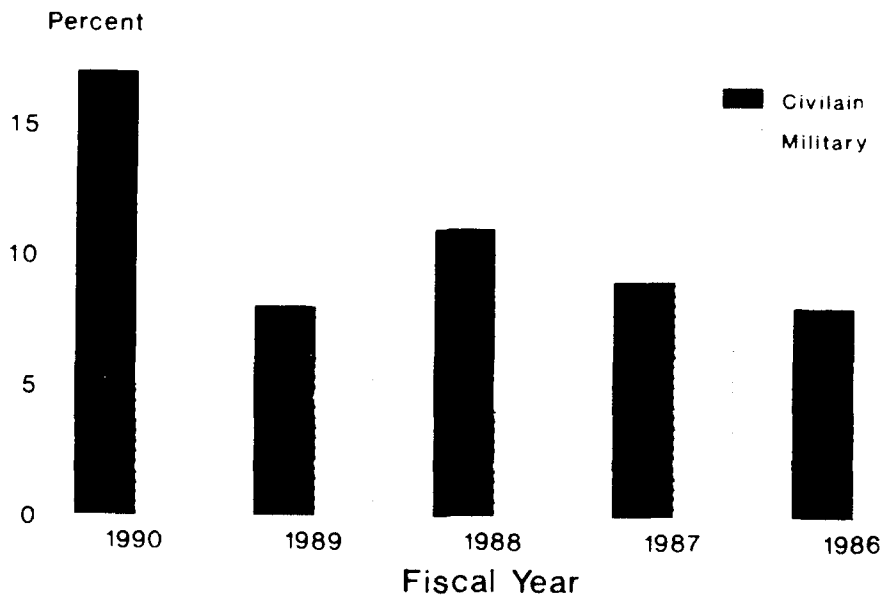


Figure 18.

### Percentage of Reported Illnesses OSHA Code 29. FY 1986 - 1990



## VI. SPECIAL STUDY SUMMARIES.

### A. Proportional morbidity study of USAF Occupational Illnesses, CY 1986 - 1988.

1. All occupational illness reports submitted by the Air Force between 1986 and 1988 were examined (N = 795). Sex, age, personnel category, employment code, OSHA code, exposure or hazard, and task performed were abstracted from each record. A diagnosis was assigned to each case according to the Ninth Revision of the International Classification of Diseases. The total numbers of illnesses were tabulated by OSHA code and personnel status into military and civilian cohorts. Comparisons between the two Air Force cohorts and the U.S. population were made using standardized proportionate morbidity ratios (SPMR). U.S. population figures were provided by the Bureau of Labor Statistics (BLS). The distributions of illnesses among military and Air Force civilian workers by OSHA code are presented in Tables 24 and 25. Since the overall proportions among AF civilians did not significantly differ from the BLS population, age and sex adjusted standardized morbidity ratio calculations between AF civilian and military members were possible. The results are shown in table 26.

Table 24. Observed and Expected Illnesses and SPMRs for Military Members of the United States Air Force, CY 1986 - 1988.

| OSHA Code | Description                      | Obs <sup>a</sup> | Exp <sup>b</sup> | SPMR <sup>c</sup> | 99% CL |       | χ <sup>2</sup>     |
|-----------|----------------------------------|------------------|------------------|-------------------|--------|-------|--------------------|
|           |                                  |                  |                  |                   | LL     | UL    |                    |
| 21        | Skin Disorders                   | 69               | 90               | 0.77              | 0.64   | 0.90  | 0.9                |
| 22        | Dust Diseases of Lungs           | 0                | 5                | 0                 | ---    | ---   | ---                |
| 23        | Respiratory Problems             | 52               | 25               | 2.09              | 1.72   | 2.46  | 1.86               |
| 24        | Systemic Intoxications           | 71               | 8                | 8.45              | 6.02   | 10.88 | 72.1 <sup>§</sup>  |
| 25        | Disorders Due To Physical Agents | 115              | 24               | 4.73              | 3.72   | 5.74  | 21.9 <sup>§</sup>  |
| 26        | Repetitive Trauma Disorders      | 17               | 143              | 0.12              | 0.00   | 0.32  | 1.09               |
| 29        | Other                            | 15               | 42               | 0.36              | 0.04   | 0.68  | 0.49               |
|           |                                  | 339              |                  |                   |        |       | 71.84 <sup>§</sup> |

<sup>a</sup>Obs, observed number of illnesses.

<sup>b</sup>Exp, expected number of illnesses, based upon BLS data.

<sup>c</sup>SPMR, OSHA Code Standardized Proportionate Morbidity Ratio,

$$\text{SPMR} = \frac{\text{Observed Number of Illnesses in OSHA Code Category}}{\text{Expected Number of Illnesses in OSHA Code Category}}$$

<sup>§</sup> p < 0.01

2. The proportions of occupational illnesses among military members of the AF differed significantly from the U. S. population and from AF civilian workers. Systemic intoxications were found to be significantly elevated in both military and AF civilian cohorts when compared to BLS data. Following adjustments for age and sex differences between the military and AF civilian cohorts, the proportional excess of systemic toxicities among military personnel disappeared, as seen in table 26. Disorders due to physical agents (primarily heat stress) were significantly elevated in the military cohort when compared to both the civilian cohort and the U. S. population. This elevation was still present after indirectly standardizing the two cohorts on age and sex. This elevation disappeared when heat stress cases arising during training for chemical warfare defense were discarded from the total. These results are useful for generating hypotheses for future study, however; it is impossible to estimate risk or calculate rates from these data.

Table 25. Observed and Expected Illnesses and SPMRs for Civilian Employees of the United States Air Force, CY 1986 - 1988.

| OSHA Code | Description                      | Obs <sup>a</sup> | Exp <sup>b</sup> | SPMR <sup>c</sup> | 99% CL |      | $\chi^2$           |
|-----------|----------------------------------|------------------|------------------|-------------------|--------|------|--------------------|
|           |                                  |                  |                  |                   | LL     | UL   |                    |
| 21        | Skin Disorders                   | 79               | 119              | 0.66              | 0.52   | 0.80 | 2.05               |
| 22        | Dust Diseases of Lungs           | 11               | 7                | 1.60              | 0.84   | 2.36 | 0.37               |
| 23        | Respiratory Problems             | 59               | 33               | 1.80              | 1.40   | 2.20 | 0.79               |
| 24        | Systemic Intoxications           | 47               | 11               | 4.22              | 2.83   | 5.61 | 11.84 <sup>§</sup> |
| 25        | Disorders Due To Physical Agents | 13               | 33               | 0.40              | 0.00   | 0.75 | 0.40               |
| 26        | Repetitive Trauma Disorders      | 203              | 196              | 1.03              | 1.00   | 1.06 | 0.004              |
| 29        | Other                            | 44               | 55               | 0.79              | 0.63   | 0.95 | 0.06               |
|           |                                  | 456              |                  |                   |        |      | 11.89              |

<sup>a</sup>Obs, observed number of illnesses.

<sup>b</sup>Exp, expected number of illnesses, based upon BLS data.

<sup>c</sup>SPMR, OSHA Code Standardized Proportionate Morbidity Ratio,

$$\text{SPMR} = \frac{\text{Observed Number of Illnesses in OSHA Code Category}}{\text{Expected Number of Illnesses in OSHA Code Category}}$$

<sup>§</sup>  $p < 0.01$

Table 26. Observed and Expected Illnesses and SMRs for Military Members of the United States Air Force, CY 1986 - 1988.

| OSHA Code | Description                      | Obs <sup>a</sup> | Exp <sup>b</sup> | SMR <sup>c</sup> | 99% CL |       | $\chi^2$           |
|-----------|----------------------------------|------------------|------------------|------------------|--------|-------|--------------------|
|           |                                  |                  |                  |                  | LL     | UL    |                    |
| 21        | Skin Disorders                   | 61               | 75.7             | 0.80             | 0.56   | 1.11  | 0.04               |
| 22        | Dust Diseases of Lungs           | 0                | 10.4             | 0.00             | --     | --    | --                 |
| 23        | Respiratory Problems             | 52               | 36.7             | 1.42             | 1.27   | 1.96  | 0.18               |
| 24        | Systemic Intoxications           | 66               | 46.2             | 1.43             | 1.01   | 1.95  | 0.18               |
| 25        | Disorders Due To Physical Agents | 111              | 13.6             | 8.15             | 7.74   | 10.36 | 51.10 <sup>§</sup> |
| 26        | Repetitive Trauma Disorders      | 17               | 96.7             | 0.18             | 0.12   | 0.33  | 0.67               |
| 29        | Other                            | 15               | 30.3             | 0.49             | 0.33   | 0.64  | 0.26               |
|           |                                  | 322              |                  |                  |        |       | 52.45 <sup>§</sup> |

<sup>a</sup>Obs, observed number of illnesses.

<sup>b</sup>Exp, expected number of illnesses, based upon the AF civilian population.

<sup>c</sup>SMR, OSHA Code Standardized Morbidity Ratio,

$$\text{SMR} = \frac{\text{Observed}}{\text{Expected (Adjusted for Age and Sex)}}$$

<sup>§</sup> p < 0.01

B. Reported Cumulative Trauma Disorders Among AFCOMS Employees, CY 1986 - 1990.

1. HQ AFCOMS/SGPM requested information regarding repetitive trauma disorder reports among its employees.

2. A total of 28 occupational illness reports with a workplace function code of "CO", commissary, were found listed in the OADR. Seventy-five percent, or 21, were OSHA Code 26, repetitive trauma disorders. Based upon data from the rest of the Air Force, only eight cases would be expected, a ratio of observed to expected of 2.57. This result was not statistically significant. Examination of work descriptions indicated the following:

- a. Thirty-three percent were cashiers or checkers.
- b. Thirty-three percent were meat cutters.
- c. Thirty-three percent were warehouse workers or stockers.

C. Study of a Selected Population from Tinker AFB CY 1988 - 1990.

1. USAF Hospital Tinker/SGPO wanted information regarding occupational illness reports in a selected group of workers. They were able to provide

population at risk (denominator) data for the study group of 290 people, and the civilian population of Tinker AFB, approximately 17,500 people.

2. Cases entered in the OADR from Tinker AFB with an organization code of "DA", depot aircraft maintenance; and one of the following function codes, "CC", corrosion control; "SR", structural repair; or "WR", washracks; provided the population at risk (PAR). Over the study period, the relative risk of reported occupational illness for Tinker AFB vs. other AFLC bases declined, a fact not indicated in table 27. Within Tinker's civilian population, the relative risk for "depot aircraft" workers remained high. When data were stratified by OSHA code, these workers were at especially increased risk for skin disorders, respiratory disorders, and systemic intoxications.

Table 27. Pooled Data from AFLC, CY 1988 - 1990.

|            | <u>Cases</u> | <u>Non-Cases</u> | <u>Total (Person-Years)</u> | <u>Rate</u> |
|------------|--------------|------------------|-----------------------------|-------------|
| Tinker AFB | 206          | 52,294           | 52,500                      | 0.0039      |
| Other AFLC | 412          | 250,337          | 250,749                     | 0.0016      |
|            | 618          | 302,631          | 303,249 <sup>φ</sup>        |             |

Relative Risk (RR) = 2.44

Table 28. Pooled Data from Tinker AFB, CY 1988 - 1990.

|                  | <u>Cases</u> | <u>Non-Cases</u> | <u>Total (Person-Years)</u> | <u>Rate</u> |
|------------------|--------------|------------------|-----------------------------|-------------|
| Tinker AFB PAR   | 27           | 843              | 870                         | 0.0310      |
| Other Tinker AFB | 179          | 51,451           | 51,630                      | 0.0034      |
|                  | 206          | 52,294           | 52,500                      |             |

RR = 9.12

Table 29. Relative Risks by CY and OSHA Code for PAR vs. Other Tinker AFB Civilians.

| Year   | OSHA Codes |    |      |       |    |      |      |
|--------|------------|----|------|-------|----|------|------|
|        | 21         | 22 | 23   | 24    | 25 | 26   | 29   |
| 1988   | 14.8       | 0  | 73.9 | 58.6  | 0  | 10.4 | 0    |
| 1989   | 8.5        | 0  | 0    | 10.8  | 0  | 4.2  | 0    |
| 1990   | 20.0       | 0  | 58.0 | 119.0 | 0  | 0    | 10.0 |
| Pooled | 11.0       | 0  | 29.6 | 22.8  | 0  | 6.4  | 4.7  |

## VII. DISCUSSION.

### A. FY 1990 Data.

1. This year saw a sharp increase in reported occupational illnesses from the Air Force population over FY 1989, with case reports up 62 percent overall. Reports on military members were up 74 percent, civilians 57 percent. Increased numbers of illnesses may actually be occurring. However, it is more likely that reporting is improving. The advent of the OADR, with changes in the reporting procedure may have been an influence.

a. Among cases reported for civilian personnel, statistically significant increases were apparent for OSHA codes 21, 25, 26, and 29. The increases in OSHA codes 26, repetitive trauma, and 29, other disorders, are not especially surprising, since there has been an increasing trend in these categories for several years. The increase in OSHA Code 25, disorders due to physical agents, is surprising. These cases are evenly distributed between cold stress, heat stress, and a single disorder due to radiofrequency radiation exposure. Although this year saw an increase in OSHA Code 25 reports for civilians, it is important to note that this category comprises only about three percent of all reports. Cases designated as OSHA code 22, dust disease of the lungs, continue to decline. The decrease this year was not statistically significant.

b. Case reports for military personnel revealed statistically significant increases in OSHA codes 21, skin disorders, and 29, other disorders. Cases reported in the code 29 category were truly "miscellaneous," with no apparent trends seen.

2. Reports are itemized by MAJCOM and personnel component in table 1. Since population data were available, the numbers of cases per thousand population were computed. Several commands are notable when examining these figures.

a. The case rate for AAC civilians was much higher than for any other command. The majority of this unexpected increase resulted from five

related cases among preschool teachers exposed to cleaning solvents used to clean carpeting.

b. Logistics command reported the next highest case rate for civilians. The majority of reports came from McClellan AFB, followed by Hill, Tinker, Wright-Patterson, and Robins. Kelly AFB only submitted one report. Among AFLC civilians, 62 percent of case reports were either OSHA Code 26, repetitive trauma disorders, or OSHA Code 29, miscellaneous disorders. The distribution of cases by ICD-9 code was interesting. Twenty cases of code 300, neurotic disorders, were reported. Forty-four cases were code 354.0, carpal tunnel syndrome, and 41 cases sustained code 388.12, noise-induced hearing loss.

c. Reports on Space Command civilians were elevated. Half of the reported cases were carpal tunnel syndrome.

d. ATC had a similarly high number of cases reported per 1000 civilian population. Fifty percent of the reports were filed by Lowry AFB. The distribution of reports by OSHA code from ATC bases was not unusual with the exception that all four cases of OSHA code 22, dust disease of the lungs, were contributed by this command. Two cases involved asbestos exposure, submitted by Chanute AFB, and two came from Lowry, with unknown dust exposures.

e. Reports per 1000 population submitted for military members during FY 1990 were unremarkable with the exception of the unusually high rate, 2.53 per 1000 population, reported by AFSC. Over eighty percent of these reports were submitted by Eglin AFB, 90 percent of which were OSHA code 25, disorders due to physical agents. On the whole, these were cases of heat stress, many among personnel TDY to Eglin from other locations.

3. AF Forms 190 submitted for civilian workers had one thing in common. The majority (62.7 %) contained no recognizable occupation codes. As shown in table 2, occupational illnesses among civilian workers were not confined to individuals from industrial shops. The group containing the most reports was mainly administrative in nature, followed closely by the most distinct occupational group in the table, sheetmetal mechanics. Admittedly, the "administrative" grouping is artificial, but their work and exposures are similar. Reports from the "administrative" group were not limited to white collar illnesses. Thirty-two percent of reports involved toxic effects of gases. Eleven percent of the case reports resulted from tight building investigations. Sheetmetal mechanics were frequently reported with carpal tunnel syndrome and noise-induced hearing loss, 33 percent and 22 percent respectively. This finding isn't too surprising considering the nature of their work. The numbers of cases per unit population were not calculated for civilian workers, as population figures are not readily available for this group. Data for NAF and foreign national personnel are especially difficult to obtain.

4. Occupation code reporting was much more complete for military members (81 %). The numbers of cases per thousand population in each AFSC were computed since denominator data was available. Among Air Force officers, disaster preparedness personnel experienced 6 cases per 1000, but with a population of 167, any single case will have a disproportionate impact. Among enlisted personnel, the highest reporting rates were seen in the fire protection, sanitation, instrumentation, dental, and structures & pavements career fields. These results are notable in that they do not come from

predominantly industrial activities. Among the distinctly industrial population, manned aerospace workers reported the most cases. Forty-one percent and twenty-three percent of these cases resulted from skin disorders, such as eczema, and respiratory disorders, such as difficulty breathing, respectively.

5. Examination of case reports by ICD-9 code was enlightening. Thirty-three percent of civilian reports were classified as repetitive trauma disorders (Codes 354, 388, and 726). Among the military population heat stress was by far the most common disorder reported (33 %). Both civilians and military had high proportions of illness due to ICD-9 codes 987 and 692, toxic effects of gases, fumes, and vapors, and contact dermatitis. These results are similar to OSHA data, suggesting how universal these problems are.

#### B. Historical Review.

1. AFLC has reported over half of the civilian occupational illnesses registered since 1986. Just under half of these reports have been OSHA Code 26, repetitive trauma disorders (RTD). This group of illnesses can be more difficult to document than others, since symptoms are often subtle, and extensive workups may be required to arrive at a diagnosis. The presence of occupational medicine clinics at each AFLC facility may account for the high number of RTDs reported from AFLC bases. Similarly, awareness of occupational illness is probably higher at these facilities due to their extensive surveillance and education programs.

2. Over the period covered by this report, some changes in the proportion of illnesses assigned to each OSHA Code have occurred. The percentage of cases recorded as OSHA Code 21, skin disorders, has remained relatively constant, although civilian reports indicate a gradually increasing trend. On average about 20 percent of reports concern skin disorders each year. The proportion of cases recorded as OSHA Code 22 and 23, dust diseases of the lungs, and respiratory effects of toxic chemicals, has also remained constant at about 13 percent of total case reports. Reports on military personnel reveal a slight decrease historically. Reports of systemic toxicity, OSHA Code 24, have shown no distinct trends. Reported heat stress cases, recorded as OSHA Code 25, disorders due to physical agents, have decreased among the military population, and are currently averaging 30 percent of case reports. Civilian case reports in this category have remained relatively stable. Recorded repetitive trauma disorders, OSHA Code 26, have risen linearly each year for military, and have remained stable over the past two years for civilians. Reports of miscellaneous disorders, OSHA Code 29, have more than doubled over the past five years. Civilian case reports have increased linearly, with the exception of a dip in 1989. Military case reports have varied somewhat, without an apparent trend revealing itself. Mainly, increases in this category have been due to neurotic disorders and stress related problems.

## VIII. SUMMARY

A. Several trends are apparent. Occupational illness reporting has improved significantly over the past five years. This effect is most likely due to efforts on the part of personnel in the field rather than a substantial increase in occupational illnesses. Underreporting is probably still common. Studies to determine the exact level of underreporting are needed.

B. Misreporting is also common. Injuries are often reported as illnesses. Recorded OSHA Codes are at times incorrect. Most forms are incomplete. The majority of reports for civilian workers contain no occupation codes. Few AF Forms 190 contain accurate information on days of work lost or days of restricted duty. A new, improved AF Form 190, incorporating better coding schemes and explicit instructions, is needed.

C. Occupational illnesses are not limited to the industrial sector. Clearly, administrative workers are at risk for occupational illnesses. Their illnesses are also not limited to "white collar" disorders.

D. In previous years, civilian personnel have experienced high amounts of systemic toxicities. The proportions of "poisoning cases" have fallen in recent years, to be replaced by repetitive trauma disorders and miscellaneous disorders. Similar trends are appearing in BLS statistics. We can expect these trends to continue.

E. Systemic toxicities have been a common problem among military personnel in the past, although the proportions have not been significant when compared with Air Force civilian workers. Heat stress has been, and continues to be, the single most important cause of occupational illnesses among military members of the Air Force.

F. The Tinker AFB study illustrates the potential of the OADR when adequate population data are available. Most registries are limited to descriptive studies which suggest further avenues for study. This has been the most common outcome when studies using OADR data are accomplished. However, analytical research is possible when accurate denominator data are made available. Risk estimates then become possible.

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