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# FINAL REPORT

## COLLATERAL DAMAGE

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## SUMMARY

This paper presents the methodology and results of a limited study undertaken to determine collateral population damage from weapons aimed at strategic military bases and to roughly estimate the cost of blast shelters to protect everyone at risk. The study had the following assumptions and criteria:

1. Targets -- 57 operational SAC bases taken from unclassified sources and located on Sectional Aeronautical Charts, Coast and Geodetic Survey.

2. Weapons -- Optimum air burst, 0-CEP, with ground zero occurring at the center of each base. Computations were run for 1, 2, 4, 8, 16 and 64 MT size weapons, one weapon delivered per base (range of from 57 to 3648 total MT's delivered).

3. Damage Model -- A roughly Gaussian relationship between per cent mortalities and peak overpressure in which the 0.5 kill probability ($P_k$) for the unprotected was taken at 10 psi with no survivors at 20 psi. In each city the model assumes that the population at risk is so distributed that the kill probability for the total population is equal to the $P_k$ at the population center.

4. Cost Model -- The cost per blast shelter space is equal to \$50 + \$20 $\sqrt{p}$, where p is the designed overpressure rating in pounds per square inch.

Four sets of calculations are given. The first (Appendix A, labeled "Rough Computations") contains a detailed listing of bases and cities at risk, plus mortalities computed using census data, target to city distances, and the damage model selected. The second (Appendix B, labeled "Detail Calculations for Ten Targets") contains the results of refined calculations for some large cities in which each census tract is treated as a population center. The third (Appendix C, labeled "Adjusted Computations") contains the results of modifying the first set of computations according to the results of the refined computations. The fourth (Appendix D, labeled "Blast Shelter Cost Computations") contains blast shelter cost calculations for protection against 1-MT and 8-MT attacks.

The significant results of the various computations are as follows:

1. Collateral damage for the unprotected population around 57 SAC bases:

| Pop. at Risk (Millions) | Estimated Mortalities (Millions) | | | | | |
|---|---|---|---|---|---|---|
| | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
| 12.0 | 1.2 | 1.7 | 2.4 | 3.5 | 4.8 | 7.6 |

2. Cost to provide a blast shelter space for all at risk to more than 5 psi:

Against a 1-MT attack -- $320,000,000 (approximately 2,700,000 spaces)
Against an 8-MT attack -- $825,000,000 (approximately 6,600,000 spaces)

3. Ten per cent of the targets account for 20% to 40% of the people at risk depending on weapon size and 40% of the mortalities. Twenty per cent of the targets account for 35% to 55% of the people at risk depending on weapon size and 60% of the mortalities.

The paper also concludes that some additional work might be worthwhile to indicate the effects of aiming errors (finite CEP's) on collateral damage.

# COLLATERAL DAMAGE

## Introduction

Among the various possible hardened and/or dispersed shelter programs are those which are designed to limit collateral damage resulting from weapons aimed only at military targets. Preparatory to determining the effectiveness and cost of such programs, it is necessary to undertake some basic map exercises and computations to determine the current vulnerability of the country to a range of counterforce attacks. This paper presents the methodology and results of one set of collateral damage calculations and blast shelter cost calculations.

## Targets

Targets selected for computation of damages consist of 57 air bases located within the continental United States. These are distributed as shown on Figure 1 and are listed in Appendices A and C. This list was compiled from various unclassified sources

The air bases are divided into two groups designated $A_0$ priority and $A_1$ priority.* An $A_0$ priority target is one housing or supporting ICBM facilities. An $A_1$ priority target is a SAC base.

Hypothetical attacks were run on each base assuming 1, 2, 4, 8, 16, and 64 MT air burst weapons delivered on target. Ground zeros were assumed to occur at the midpoint of the longest runway as shown on Sectional Aeronautical Charts compiled by the Coast and Geodetic Survey, U.S. Dept. of Commerce. Where runways were not shown, the GZ was taken at the center of the symbol designating the air base.

## Damage Model

Two basic assumptions were used to determine mortalities from any size weapon. First, the per cent mortalities vs. peak overpressure relationship was assumed to be Gaussian for all prompt weapons effects roughly approximating the Japanese experiences. In this relationship, for an unprotected population 50% mortalities ($P_k = 0.5$) from blast effects occur at a distance from GZ corresponding to 10 psi. Above 20 psi there are no survivors. Second, for small population centers we assume that the population of any urban concentration is so distributed that the probability of kill for the total concentration is equal to the $P_k$ at the population center. Ten large populated areas near the bases are examined in detail

Using current distance-overpressure relationships and scaling laws,** it is now possible to calculate damage from the various weapon sizes (Table 1).

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*"The Probable Fallout Threat Over the Continental United States," E.D. Callahan, et al., Technical Operations Inc., TO-B 60-13, Dec. 1960.

**"Effects of Nuclear Weapons," AEC, 1962

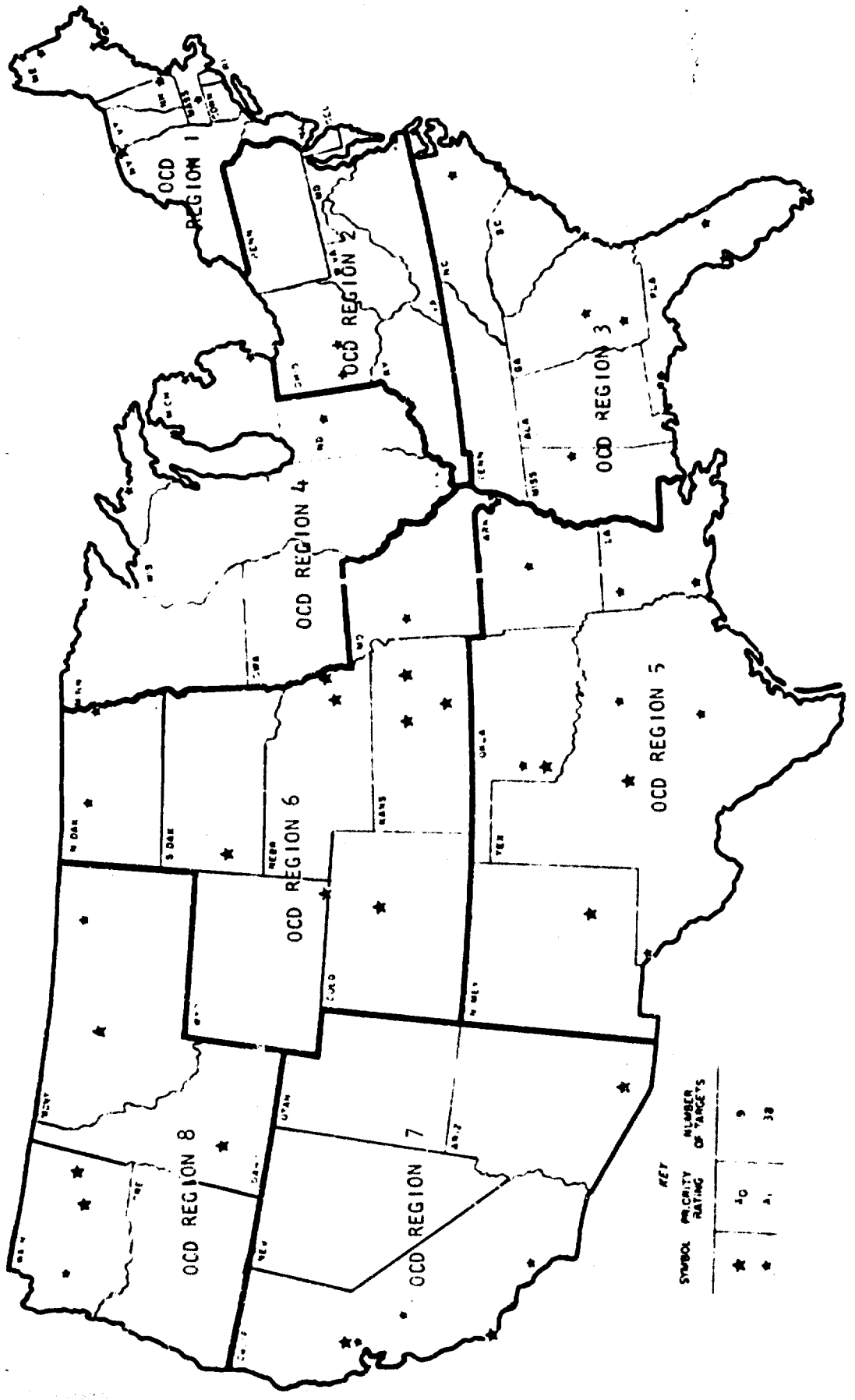


Figure 1. TARGET LOCATIONS

TABLE I

COLLATERAL DAMAGE - % BLAST MORTALITIES

| (psi) | $P_k$ (kill probability) | Distance (Miles) from GZ (airburst) to Population Center 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|
| 20 | 1.00 | 1.75 | 2.2 | 2.8 | 3.5 | 4.5 | 7.0 |
| 19 | .95 | 1.80 | 2.3 | 2.9 | 3.6 | 4.6 | 7.2 |
| 18 | .90 | 1.90 | 2.4 | 3.0 | 3.8 | 4.8 | 7.5 |
| 17 | .85 | 1.95 | 2.5 | 3.1 | 3.9 | 4.9 | 7.7 |
| 16 | .80 | 2.00 | 2.6 | 3.2 | 4.0 | 5.1 | 8.0 |
| 15 | .75 | 2.1 | 2.7 | 3.3 | 4.2 | 5.3 | 8.3 |
| 14 | .70 | 2.2 | 2.8 | 3.5 | 4.4 | 5.6 | 8.7 |
| 13 | .65 | 2.3 | 2.9 | 3.7 | 4.6 | 5.8 | 9.2 |
| 12 | .60 | 2.4 | 3.1 | 3.9 | 4.9 | 6.1 | 9.6 |
| 11 | .55 | 2.6 | 3.3 | 4.1 | 5.2 | 6.5 | 10.2 |
| 10 | .50 | 2.7 | 3.5 | 4.3 | 5.5 | 6.9 | 10.9 |
| 9 | .45 | 2.9 | 3.7 | 4.6 | 5.8 | 7.4 | 11.6 |
| 8 | .40 | 3.2 | 4.0 | 5.0 | 6.3 | 8.0 | 12.7 |
| 7 | .35 | 3.5 | 4.4 | 5.5 | 6.9 | 8.8 | 13.6 |
| 6 | .30 | 3.8 | 4.8 | 6.0 | 7.7 | 9.7 | 15.4 |
| 5 | .20 | 4.3 | 5.5 | 6.9 | 8.7 | 11.0 | 17.4 |
| 4 | .10 | 5.1 | 6.4 | 8.0 | 10.2 | 12.8 | 20.4 |
| 3 | .05 | 6.2 | 7.8 | 9.8 | 12.5 | 15.7 | 25.0 |

## Calculation Procedures

The preliminary or "first cut" computations were done as follows. Using the Aeronautical Charts, all urban and urbanized places at risk were located and listed by name and distance from the GZ. In this first try, the list is limited to places within 15 miles of the target except for large cities within a 25-mile radius. Population figures for each place were obtained from census data.* In order to "pick up" as much of the rural population as possible, towns were also counted and included at 2000 persons per town. These were assumed to be uniformly distributed within a 15-mile radius circle. The $P_k$ assigned to the towns is "weighted" on an area basis. Using the data given in Table I, mortalities for each place were calculated by multiplying the total population by the proper $P_k$.** All of the detail work may be found in Appendix A. The results showing the vulnerability to blast of about 14 million people at risk are summarized in the following table.

*United States Census Population 1960, United States Summary, United States Dept. of Commerce, Bureau of the Census.

**Minimum $P_k$ was chosen at .01.

TABLE 2

COLLATERAL BLAST DAMAGE FOR 57 SAC BASES

| Pop. at risk (millions) | Mortalities (millions) 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|
| 14.00 | 0.83 | 1.41 | 2.23 | 3.32 | 4.73 | 7.94 |
| % 100 | 5.9 | 10.0 | 16.0 | 23.7 | 33.8 | 56.7 |

During these computations it appeared that some serious deviations from the model might have been introduced due to the simple treatment of large urbanized areas especially where: a) an urbanized area was not well defined, or b) the GZ was within or close to the effective radius* of the city, or c) the city was very far (15-plus miles) from GZ. In addition, it was very possible that the distribution assumption for large places was grossly inaccurate.

As a result, it was decided to select a few places (10 in all) and subject them to a more detailed analysis. These were selected primarily according to population; as many in the 250,000 and over category as time would allow. For this analysis each census tract within 20 miles of ground zero was considered as a separate population center. The location and population of the tracts were obtained from the various volumes of the National Location Code prepared by the Bureau of the Census. Measurements were made to the geographical center of each tract and population figures summed for tracts equidistant from GZ. $P_k$'s were then applied to sums according to Table 1. The detailed calculations can be found in Appendix B.

A comparison of the calculation procedures (Table 3) indicates that the rough computation is accurate especially in the medium weapons range (2-8 MT) and for wide variations in population (Detroit), and for distance from GZ (Miami). For highly concentrated places** it is very accurate.

On the basis of the detailed figures it was decided to go back over the first approximation and make more adjustments. These were applied as follows.

1. Across-the-board adjustment of population at risk and mortalities. The population-at-risk comparison for all places except Miami and Detroit indicates that a 10% increase in the rough figures is called for.

*Effective radius (designated $R_o$ in Appendix A) is the radius of a circle whose area is equal to the urban area figures given in the census information.

**Cities like Tacoma where the urban fringe population drops off sharply away from the central city.

TABLE 3

## COMPARISON OF CALCULATION METHODS

### $A_1$ Priority Targets

Lowry AFB, Denver, Colorado — d = 5.2 mi.

| | Pop. at risk (thousands) | Mortalities (thousands) 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|
| Rough Calc | 808 | 72 | 193 | 315 | 451 | 628 | 806 |
| Detail Calc. | 813 | 157 | 225 | 303 | 396 | 498 | 677 |

McConnell AFB, Wichita, Kansas — d = 5.5 mi.

| | Pop. at risk (thousands) | Mortalities (thousands) 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|
| Rough Calc. | 323 | 36 | 59 | 105 | 153 | 222 | 316 |
| Detail Calc. | 362 | 62 | 98 | 138 | 185 | 236 | 312 |

Fairchild AFB, Spokane, Washington — d = 12.5 mi.

| | Pop. at risk (thousands) | Mortalities (thousands) 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|
| Rough Calc. | 257 | 11 | 12 | 15 | 25 | 42 | 116 |
| Detail Calc. | 263 | 7 | 8 | 14 | 29 | 52 | 130 |

### $A_0$ Priority Targets

March AFB, San Bernardino, Riverside, California — d = 8.8 mi.*

| | Pop. at risk (thousands) | Mortalities (thousands) 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|
| Rough Calc. | 398 | 5 | 6 | 37 | 81 | 139 | 274 |
| Detail Calc. | 470 | 10 | 14 | 27 | 47 | 149 | 206 |

Homestead AFB, Homestead (Miami), Florida — d (Miami) = 23.5 mi.

| | Pop. at risk (thousands) | Mortalities (thousands) 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|
| Rough Calc. | 871 | 11 | 13 | 15 | 18 | 22 | 78 |
| Detail Calc. | 253 | 13 | 17 | 24 | 33 | 44 | 97 |

MacDill AFB, Tampa - St. Petersburg, Florida — d = 9.6 mi.*

| | Pop. at risk (thousands) | Mortalities (thousands) 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|
| Rough Calc. | 684 | 7 | 7 | 35 | 105 | 191 | 402 |
| Detail Calc. | 702 | 22 | 36 | 63 | 108 | 178 | 367 |

TABLE 3 (Continued)

Westover AFB, Springfield, Chicopee, Holyoke, Massachusetts d = 5.2 mi.*

| | Pop. at risk (thousands) | Mortalities (thousands) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
| Rough Calc. | 467 | 45 | 108 | 176 | 253 | 348 | 456 |
| Detail Calc. | 530 | 64 | 101 | 150 | 218 | 290 | 423 |

Selfridge AFB, Detroit, Michigan d = 19.0 mi.

| | Pop. at risk (thousands) | Mortalities (thousands) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
| Rough Calc. | 3538 | 35 | 35 | 35 | 35 | 35 | 566 |
| Detail Calc. | 1277 | 25 | 38 | 50 | 94 | 149 | 425 |

Carswell AFB, Fort Worth, Texas d = 6.4 mi.

| | Pop. at risk (thousands) | Mortalities (thousands) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
| Rough Calc. | 513 | 21 | 61 | 132 | 198 | 285 | 509 |
| Detail Calc. | 484 | 43 | 67 | 103 | 153 | 212 | 339 |

McChord AFB, Tacoma, Washington d = 5.1 mi.

| | Pop. at risk (thousands) | Mortalities (thousands) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
| Rough Calc. | 274 | 24 | 60 | 91 | 131 | 190 | 251 |
| Detail Calc. | 408 | 31 | 51 | 87 | 125 | 173 | 274 |

* Weighted distance

2. Adjust the mortality figures for other large places in accordance with the detailed figures (size and distance from GZ). Thus we proportion:

| Base Number | |
|---|---|
| 1 | Tucson like Wichita |
| 7 | Topeka like Fort Worth |
| 10 | Lincoln like Wichita |
| 11 | Omaha like Tampa-St. Petersburg |
| 21 | Little Rock like Spokane |
| 26 | Orlando like Tampa-St. Petersburg |
| 33 | Shreveport like Fort Worth |
| 47 | Utica like Spokane |
| 51 | Columbus like Spokane |
| 52 | Dayton like Tampa-St. Petersburg; Springfield like Miami |

The details of these adjustments as applied to the rough computations are found in Appendix C. The summation of results appears in the following table. Table 2 is reproduced to facilitate comparisons between calculation methods.

TABLE 4

ADJUSTED DETAILED CALCULATIONS

| Pop. at risk (Millions) | Mortalities (Millions) 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|
| 12.04 | 1.15 | 1.69 | 2.43 | 3.47 | 4.77 | 7.58 |
| / 100 | 9.5 | 14.0 | 20.2 | 28.9 | 39.6 | 63.0 |

ROUGH CALCULATIONS

| Pop. at risk (Millions) | Mortalities (Millions) 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|
| 14.00 | 0.83 | 1.41 | 2.23 | 3.32 | 4.73 | 7.94 |
| / 100 | 5.9 | 10.0 | 16.0 | 23.7 | 33.8 | 56.7 |

Discussion

There are many points to be made about these collateral damage computations, their meaning and usefulness. Among these are the following:

1. Concerning the calculation procedures only, it appears that further refinements (i.e., mapping each base in detail) might improve results but probably with diminishing returns, considering the additional effort required and the roughness of the model. However, it may be worthwhile to re-run the calculations to determine the effects of aiming errors (CEP's) on total damage. Even if one credits an enemy with very accurate weapons, there is the outside chance that the ground zero will occur two* or more CEP's away from the target and toward the city. This "worst case" computation might be run, say, using one-half nautical mile CEP weapons in the medium yield range (1-8 MT) and locating the ground zeros one mile nearer the cities.

2. Regardless of computational procedures, one does notice the gross inequalities of targets in terms of collateral damage. One might argue, for example, that an enemy sees all $A_0$ targets as being equal in value. That is, the threat to him from Lowry (Denver, 800,000 at risk) may appear the same as that from Mountain Home (9,000 at risk). One might also argue that the assigned megatonnages are equal. Here, the guess is that even if an enemy wished to assign smaller weapons to Lowry, he could not because he doesn't have them. Of course this does not mean that he must necessarily be malevolent; this has to do with targeting doctrines. However, whether malevolent or benevolent, damage at Mountain Home is small and remains so regardless of doctrine. At Denver, Detroit and other large places, this is not the case. Here, attacks with avoidance or "bonus" are clearly available. As a special feature of target inequalities, consider the elimination of some high risk bases (Figure 2). A 10% reduction in bases reduces the people at risk by 20% to 40% depending on the size of the weapon and reduces mortalities by about 40% for all size weapons. A 20% reduction in bases reduces the people at risk by 35% to 55% and mortalities by about 60%.

3. In the design of blast shelter programs, these inequalities introduce annoying problems. To someone planning a program around Lowry or Westover AFB, Mountain Home or Roswell AFB looks like it already is blast protected. In addition, the population around these remote places have other "built-in" means for protection such as easy dispersal and probably easily available equipment for improvising shelter.

4. In connection with (3) above, it is important that defense planners recognize that the cost of equal protection per capita will vary from place to place. That is, it may not be realistic to estimate the over-all costs of blast shelter programs by assigning costs regardless of locale even for shelters of equal hardness.

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*There is about 95% probability that a weapon lands within a circle of two CEP radius.

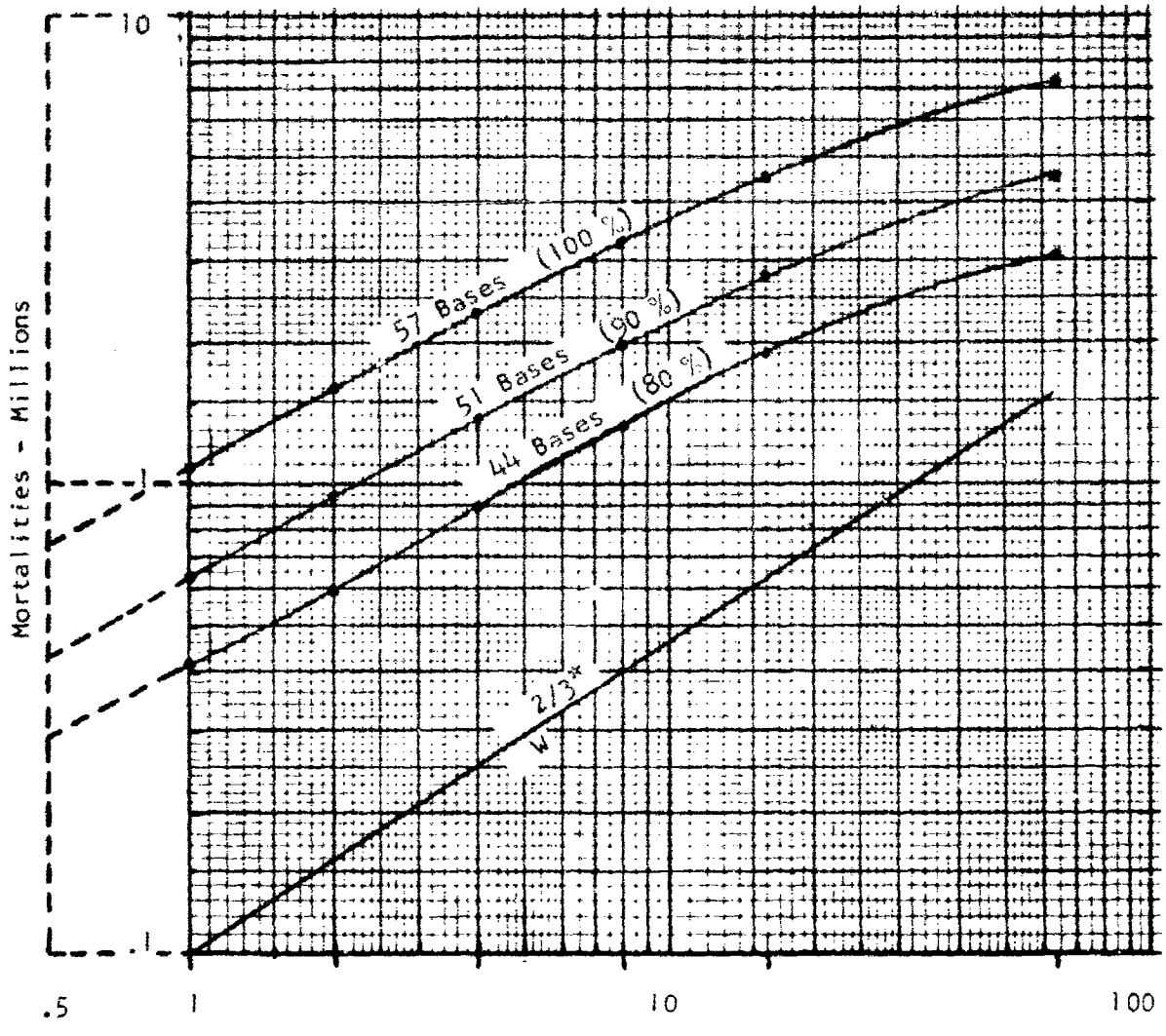


Figure 2

COLLATERAL DAMAGE RESULTS

*Slope commonly used in predicting blast damage.

5. To a first approximation the cost of a program which provides blast shelters which protect against any size weapon (or less) can be obtained by taking the cost of a required shelter space at the center of population, multiplying by the population of the area, and summing over the 57 bases. This was done for 1-MT weapons and 8-MT weapons, except that some detailed calculations were done for 10 large places and adjustments applied to other big cities. These calculations are found in Appendix D. Costs are based on the formula

$$\text{Cost per space} = \$50 + \$20\sqrt{p}$$
where p = shelter psi rating

and 10 levels of shelter hardness (220, 100, 60, 40, 25, 20, 16, 12, 9, and 6 psi). Shelters are provided within 10 miles of GZ for the 8-MT weapon and 5 miles for the 1-MT weapon. Overpressures at greater distances are less than 5 psi and we assume blast shelters are not required. In addition, we assume that people close to GZ ($<$1 mile for 8 MT and $<$0.5 mile for 1 MT) are able to disperse to the shelters provided for them. them. Total program costs are:

| | | |
|---|---|---|
| For 1 MT | $320,000,000 | (approximately 2,700,000 spaces) |
| For 8 MT | $825,000,000 | (approximately 6,600,000 spaces) |

This presumably results in zero mortalities from blast.

# APPENDIX A

## COLLATERAL DAMAGE

Rough Computations

In the following tables, mortalities calculated at a target location are listed under each weapon size and are in thousands of people.

$R_O$, is the radius of an equivalent circular city (miles) whose area is equal to the urban (or urbanized, if available) area of the actual city as given in the 1960 census data. d, is the distance in miles from the apparent center of the equivalent circular city to the target. The quantity $R = d - R_O$, is the distance in miles from the edge of the equivalent circular city to the target. Neither $R_O$ nor R is required in computing damage according to the model selected. These quantities have been found useful in checking the computations for large errors since they provide a yardstick for roughly comparing vulnerability between cities.

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | R=d-$R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ariz. | Davis-MonthanAFB | $A_o$ | | | | | | | | | | |
| | Tucson | | 227 | 5.3 | 5.5 | 0.2 | 16 | 45 | 79 | 114 | 164 | 227 |
| | 2 Towns | | 4 | --- | --- | --- | -- | -- | 1 | 1 | 1 | 2 |
| | Total State | | 231 | --- | --- | --- | 16 | 45 | 80 | 115 | 165 | 229 |
| | | | | | | | | | | | | |
| Cal. | Vandenburg AFB | $A_o$ | | | | | | | | | | |
| | Lompoc | | 14 | 1.1 | 9.2 | 8.1 | -- | -- | 1 | 2 | 5 | 9 |
| | 6 Towns | | 12 | --- | --- | --- | 1 | 1 | 2 | 3 | 4 | 7 |
| | Beale AFB | $A_o$ | | | | | | | | | | |
| | Marysville | | 10 | 1.0 | 7.0 | 6.0 | -- | 1 | 2 | 3 | 5 | 10 |
| | Yuba City | | 12 | 1.0 | 8.8 | 7.8 | -- | -- | 1 | 2 | 4 | 8 |
| | Olivehurst | | 5 | 0.6 | 6.7 | 6.1 | -- | 1 | 1 | 2 | 3 | 5 |
| | | | | | | | | | | | | |

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. $\times 10^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cal. | 10 Towns | | 20 | -- | --- | -- | 1 | 2 | 3 | 4 | 7 | 12 |
| | Total State | | 73 | | | | 2 | 5 | 10 | 16 | 28 | 51 |
| | | | | | | | | | | | | |
| Colo. | Lowry AFB | $A_o$ | | | | | | | | | | |
| | Denver | | 804 | 7.3 | 5.2 | 2.1 | 72 | 193 | 314 | 450 | 627 | 804 |
| | 2 Towns | | 4 | -- | --- | -- | -- | -- | 1 | 1 | 1 | 2 |
| | Total State | | 808 | | | | 72 | 193 | 315 | 451 | 628 | 806 |
| | | | | | | | | | | | | |
| Idaho | Mountain Home AFB | $A_o$ | | | | | | | | | | |
| | Mountain Home | | 6 | 0.6 | 11.2 | 10.6 | -- | -- | -- | -- | 1 | 3 |
| | 2 Towns | | 4 | -- | --- | -- | -- | -- | | 1 | 1 | 2 |
| | Total State | | 10 | | | | 0 | 0 | 1 | 1 | 2 | 5 |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10³ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kan. | Schilling AFB | $A_o$ | | | | | | | | | | |
| | Salina | | 43 | 1.6 | 3.2 | 1.6 | 17 | 25 | 34 | 43 | 43 | 43 |
| | Lindsburg | | 3 | 0.6 | 15.2 | 14.6 | -- | -- | -- | -- | -- | 1 |
| | 13 Towns | | 26 | --- | --- | --- | 1 | 2 | 3 | 5 | 8 | 16 |
| | Forbes AFB | $A_o$ | | | | | | | | | | |
| | Topeka | | 120 | 3.4 | 6.7 | 3.3 | 2 | 12 | 26 | 43 | 64 | 120 |
| | 9 Towns | | 18 | -- | --- | -- | 1 | 2 | 2 | 4 | 6 | 11 |
| | McConnell AFB | $A_o$ | | | | | | | | | | |
| | Wichita | | 292 | 5.1 | 5.6 | 0.5 | 23 | 55 | 99 | 143 | 207 | 292 |
| | Derby | | 6 | 0.6 | 5.0 | 4.4 | 6 | 2 | 2 | 4 | 5 | 6 |
| | Mullvane | | 3 | 0.5 | 10.3 | 9.8 | -- | -- | -- | -- | 1 | 2 |
| | Haysville | | 6 | 0.6 | 5.7 | 5.1 | 6 | 1 | 2 | 3 | 4 | 6 |
| | | | | | | | | | | | | |

| State | Target and City Name | Prior. Desig. | Pop. x10³ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Kan. | 3 Towns | | 16 | -- | --- | --- | 1 | 1 | 2 | 3 | 5 | 10 |
| | Total State | | 533 | | | | 57 | 100 | 170 | 248 | 343 | 507 |
| | | | | | | | | | | | | |
| Mont. | Malmstrom AFB | $A_o$ | | | | | | | | | | |
| | Great Falls | | 58 | 2.0 | 5.2 | 3.2 | 5 | 14 | 23 | 32 | 45 | 58 |
| | 3 Towns | | 6 | -- | --- | -- | -- | 1 | 1 | 1 | 2 | 4 |
| | Total State | | 64 | | | | 5 | 15 | 24 | 33 | 47 | 62 |
| | | | | | | | | | | | | |
| Neb. | Lincoln AFB | $A_o$ | | | | | | | | | | |
| | Lincoln | | 136 | 3.4 | 5.1 | 1.7 | 14 | 34 | 56 | 79 | 109 | 136 |
| | 13 Towns | | 26 | -- | --- | -- | 1 | 2 | 3 | 5 | 8 | 16 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |



COLLATERAL DAMAGE

Megatons-Optimum Air Burst

COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | R=d-$R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Neb. | Offutt AFB | $A_o$ | | | | | | | | | | |
| | Omaha | | 446 | 5.8 | 9.7 | 3.9 | 4 | 4 | 22 | 58 | 134 | 268 |
| | Bellevue | | 9 | 0.7 | i.2 | 0.5 | 9 | 9 | 9 | 9 | 9 | 9 |
| | Plattsmouth | | 6 | 0.9 | 8.2 | 7.3 | -- | -- | 1 | 1 | 2 | 5 |
| | Ralston | | 3 | 0.6 | 5.8 | 4.8 | -- | -- | 1 | 1 | 2 | 3 |
| | 13 Towns | | 26 | -- | --- | -- | 1 | 2 | 3 | 5 | 8 | 16 |
| | Total State | | 652 | | | | 29 | 51 | 95 | 158 | 272 | 453 |
| | | | | | | | | | | | | |
| N.M. | Walker AFB | $A_o$ | | | | | | | | | | |
| | Roswell | | 40 | 1.1 | 6.0 | 4.9 | 2 | 6 | 12 | 17 | 25 | 40 |
| | 3 Towns | | 6 | -- | -- | -- | 1 | 1 | 2 | 3 | 4 | 7 |
| | Total State | | 46 | | | | 3 | 7 | 14 | 20 | 29 | 47 |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10³ | $R_o$ mi. | d mi. | R=d-$R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N.Y. | Plattsburgh AFB | $A_o$ | | | | | | | | | | |
| | Plattsburgh | | 20 | 1.3 | 3.3 | 2.0 | 8 | 11 | 15 | 20 | 20 | 20 |
| | 27 Towns | | 54 | --- | --- | --- | 3 | 5 | 7 | 11 | 18 | 34 |
| | Total State | | 74 | | | | 11 | 16 | 22 | 31 | 38 | 54 |
| Okla. | Altus AFB | $A_o$ | | | | | | | | | | |
| | Altus | | 21 | 1.6 | 3.6 | 2.0 | 7 | 10 | 14 | 20 | 21 | 21 |
| | 10 Towns | | 20 | --- | --- | --- | 1 | 2 | 3 | 4 | 7 | 2 |
| | Total State | | 41 | | | | 8 | 12 | 17 | 24 | 28 | 33 |
| | | | | | | | | | | | | |
| S.D. | Ellsworth AFB | $A_o$ | | | | | | | | | | |
| | Rapid City | | 42 | 2.2 | 5.0 | 5.8 | -- | -- | 4 | 12 | 17 | 34 |
| | 3 Towns | | 6 | --- | --- | --- | -- | 1 | 1 | 1 | 2 | 4 |
| | Total State | | 48 | | | | 0 | 1 | 5 | 13 | 19 | 38 |

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10³ | $R_o$ mi. | d mi. | R=d-$R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Texas | Dyess AFB | $A_o$ | | | | | | | | | | |
| | Abilene | | 92 | 4.5 | 6.5 | 2.0 | 3 | 10 | 22 | 35 | 51 | 92 |
| | 7 Towns | | 14 | --- | --- | --- | 1 | 1 | 2 | 3 | 5 | 9 |
| | Total State | | 106 | | | | 4 | 11 | 24 | 38 | 56 | 101 |
| | | | | | | | | | | | | |
| Wash. | Fairchild AFB | $A_o$ | | | | | | | | | | |
| | Spokane | | 227 | 4.5 | 12.5 | 8.0 | 2 | 2 | 2 | 11 | 25 | 93 |
| | Medical Lake | | 5 | 0.9 | 3.0 | 2.1 | 2 | 3 | 5 | 5 | 5 | 5 |
| | Fairchild AFB | | 6 | 0.9 | 0.0 | --- | 6 | 6 | 6 | 6 | 6 | 6 |
| | Cheney | | 3 | 0.6 | 9.5 | 8.9 | -- | -- | -- | -- | 1 | 2 |
| | 8 Towns | | 16 | --- | --- | --- | 1 | 1 | 2 | 3 | 5 | 10 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | R=d-$R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wash. | Larson AFB | $A_o$ | | | | | | | | | | |
| | Ephrata | | 7 | 1.0 | 13.4 | 12.4 | -- | -- | -- | -- | 1 | 3 |
| | Moses Lake | | 11 | 1.4 | 6.0 | 4.6 | 1 | 2 | 3 | 5 | 7 | 11 |
| | Larson AFB | | 5 | 1.0 | 1.8 | 0.8 | 5 | 5 | 5 | 5 | 5 | 5 |
| | 5 Towns | | 10 | --- | -- | --- | 1 | 1 | 1 | 2 | 3 | 6 |
| | Total State | | 290 | | | | 18 | 20 | 24 | 37 | 58 | 141 |
| | | | | | | | | | | | | |
| Wyo. | Francis E. Warren AFB | $A_o$ | | | | | | | | | | |
| | Cheyenne | | 44 | 1.8 | 1.8 | 0 | 42 | 44 | 44 | 44 | 44 | 44 |
| | 2 Towns | | 4 | --- | -- | -- | -- | -- | 1 | 1 | 1 | 2 |
| | Total State | | 48 | | | | 42 | 44 | 45 | 45 | 45 | 46 |
| | | | | | | | | | | | | |
| | Total | $A_o$ | 3022 | | | | 267 | 520 | 846 | 1229 | 1758 | 2573 |

## COLLATERAL DAMAGE

Megatons - Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10³ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ark. | Blythville AFB | A1 | | | | | | | | | | |
| | Blythville | | 21 | 1.2 | 3.1 | 1.9 | 9 | 13 | 18 | 21 | 21 | 21 |
| | 15 Towns | | 30 | --- | --- | --- | 2 | 3 | 4 | 6 | 10 | 19 |
| | Little Rock AFB | A1 | | | | | | | | | | |
| | Little Rock N.Little Rock | | 185 | 4.5 | 12.3 | 7.8 | 2 | 2 | 2 | 9 | 22 | 78 |
| | Jacksonville | | 14 | 2.0 | 4.4 | 2.4 | 3 | 5 | 7 | 10 | 14 | 14 |
| | 8 Towns | | 16 | --- | --- | --- | 1 | 1 | 2 | 3 | 5 | 10 |
| | Total State | | 266 | | | | 17 | 24 | 33 | 49 | 72 | 142 |
| | | | | | | | | | | | | |
| Cal. | Travis AFB | A1 | | | | | | | | | | |
| | Fairfield | | 15 | 0.9 | 5.6 | 4.7 | 1 | 3 | 5 | 8 | 11 | 15 |
| | Vacaville | | 11 | 0.9 | 7.5 | 6.6 | -- | -- | 2 | 3 | 5 | 10 |
| | | | | | | | | | | | | |

COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | R=d-$R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cal. | Dixon | | 3 | 0.6 | 14.6 | 14.0 | -- | -- | -- | -- | -- | 1 |
| | Pittsburg | | 19 | 1.1 | 15.0 | 13.9 | -- | -- | -- | -- | 1 | 6 |
| | Rio Vista | | 3 | 0.5 | 14.6 | 14.1 | -- | -- | -- | -- | -- | 1 |
| | 7 Towns | | 14 | --- | --- | --- | 1 | 1 | 2 | 3 | 5 | 9 |
| | Castle AFB | A1 | | | | | | | | | | |
| | Merced | | 20 | 1.3 | 7.5 | 6.2 | -- | 1 | 3 | 6 | 9 | 18 |
| | Atwater | | 7 | 0.9 | 2.8 | 1.9 | 3 | 5 | 7 | 7 | 7 | 7 |
| | 11 Towns | | 22 | --- | --- | --- | 1 | 2 | 3 | 5 | 7 | 14 |
| | March AFB | A1 | | | | | | | | | | |
| | San Bernardino Riverside | | 378 | 7.4 | 8.8 | 1.4 | 4 | 4 | 34 | 76 | 132 | 260 |
| | 10 Towns | | 20 | --- | --- | --- | 1 | 2 | 3 | 4 | 7 | 12 |
| | Total State | | 512 | | | | 11 | 18 | 59 | 112 | 184 | 353 |

HI-351-RR/5

COLLATERAL DAMAGE

Megatons- Optimum Air Burst

COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fla. | Homestead AFB | $A_1$ | | | | | | | | | | |
| | Homestead | | 9 | 0.9 | 5.8 | 4.9 | 1 | 2 | 3 | 4 | 6 | 9 |
| | Miami | | 853 | 7.7 | 23.5 | 15.8 | 9 | 9 | 9 | 9 | 9 | 60 |
| | Florida City | | 4 | 0.9 | 5.8 | 4.8 | -- | 1 | 1 | 2 | 3 | 4 |
| | Goulds | | 5 | 0.8 | 4.9 | 4.1 | 1 | 1 | 2 | 3 | 4 | 5 |
| | 0 Towns | | -- | --- | --- | --- | -- | -- | -- | -- | -- | -- |
| | McCoy AFB | $A_1$ | | | | | | | | | | |
| | Orlando | | 201 | 5.0 | 9.4 | 4.4 | 2 | 2 | 12 | 30 | 64 | 127 |
| | St. Cloud | | 4 | 0.9 | 12.8 | 11.9 | -- | -- | -- | -- | -- | 2 |
| | Kissimmee | | 7 | 1.2 | 10.8 | 9.6 | -- | -- | -- | 1 | 1 | 4 |
| | 9 Towns | | 18 | --- | --- | --- | 1 | 2 | 2 | 4 | 6 | 11 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10³ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fla. | MacDill AFB | $A_1$ | | | | | | | | | | |
| | Tampa | | 302 | 5.8 | 8.4 | 2.6 | 3 | 3 | 30 | 69 | 115 | 223 |
| | St. Petersburg | | 325 | 6.1 | 10.8 | 4.7 | 3 | 3 | 3 | 33 | 72 | 166 |
| | Clearwater | | 35 | 1.8 | 18.3 | 16.5 | -- | -- | -- | -- | -- | 6 |
| | 6 Towns | | 12 | --- | --- | --- | 1 | 1 | 2 | 3 | 4 | 7 |
| | Eglin AFB | $A_1$ | | | | | | | | | | |
| | Valpariso | | 6 | 2.1 | 2.0 | -0.1 | 5 | 6 | 6 | 6 | 6 | 6 |
| | Ft. Walton Beach | | 12 | 1.3 | 6.5 | 5.2 | -- | 1 | 3 | 5 | 7 | 12 |
| | Niceville | | 5 | 0.9 | 3.7 | 2.8 | 2 | 2 | 4 | 4 | 5 | 5 |
| | 2 Towns | | 4 | --- | --- | --- | -- | -- | 1 | 1 | 1 | 2 |
| | Total State | | 1802 | | | | 28 | 33 | 78 | 174 | 303 | 649 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |



COLLATERAL DAMAGE

Megatons-Optimum Air Burst

COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop $\times 10^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ga. | Turner AFB | $A_1$ | | | | | | | | | | |
| | Albany | | 58 | 2.8 | 4.0 | 1.2 | 15 | 23 | 33 | 46 | 58 | 58 |
| | 7 Towns | | 14 | --- | --- | --- | 1 | 1 | 2 | 3 | 5 | 9 |
| | Hunter AFB | $A_1$ | | | | | | | | | | |
| | Savannah | | 170 | 4.4 | 4.4 | 0 | 32 | 60 | 82 | 117 | 162 | 170 |
| | 7 Towns | | 14 | --- | --- | --- | 1 | 1 | 2 | 3 | 5 | 9 |
| | Robins AFB | $A_1$ | | | | | | | | | | |
| | Macon | | 114 | 3.3 | 12.8 | 9.5 | 1 | 1 | 1 | 6 | 11 | 46 |
| | Warner-Robins | | 19 | 1.4 | 2.2 | 0.8 | 13 | 17 | 19 | 19 | 19 | 19 |
| | Fort Valley | | 8 | 1.3 | 18.2 | 16.9 | -- | -- | -- | -- | -- | 1 |
| | Perry | | 6 | 1.8 | 15.0 | 13.2 | -- | -- | -- | -- | -- | 2 |
| | 5 Towns | | 10 | --- | --- | --- | 1 | 1 | 1 | 2 | 3 | 6 |
| | Total State | | 413 | | | | 64 | 104 | 140 | 196 | 263 | 320 |

COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop, $\times 10^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ind. | Bunker Hill AFB | A1 | | | | | | | | | | |
| | Kokomo | | 47 | 1.6 | 11.7 | 10.1 | -- | -- | -- | 3 | 8 | 21 |
| | Peru | | 14 | 1.0 | 8.5 | 7.5 | -- | -- | 1 | 3 | 5 | 10 |
| | Logansport | | 21 | 1.2 | 13.7 | 12.5 | -- | -- | -- | -- | 2 | 8 |
| | 21 Towns | | 42 | --- | --- | --- | 2 | 4 | 6 | 9 | 14 | 26 |
| | Total State | | 124 | | | | 2 | 4 | 7 | 15 | 29 | 65 |
| | | | | | | | | | | | | |
| La. | Barksdale AFB | A1 | | | | | | | | | | |
| | Shreveport | | 209 | 4.1 | 6.1 | 2.0 | 13 | 29 | 61 | 88 | 125 | 209 |
| | 11 Towns | | 22 | --- | --- | --- | 1 | 2 | 3 | 5 | 7 | 14 |
| | Chennault AFB | A1 | | | | | | | | | | |
| | Lake Charles | | 89 | 2.8 | 3.8 | 1.0 | 27 | 39 | 56 | 77 | 89 | 89 |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. $x10^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| La. | Sulphur | | 11 | 1.2 | 14.2 | 13.0 | -- | -- | -- | -- | 1 | 4 |
| | West Lake | | 3 | 0.7 | 6.0 | 5.3 | -- | -- | 1 | 1 | 2 | 3 |
| | Goosport | | 17 | 1.2 | 2.7 | 1.5 | 9 | 13 | 16 | 17 | 17 | 17 |
| | 6 Towns | | 12 | --- | --- | --- | 1 | 1 | 2 | 3 | 4 | 7 |
| | Total State | | 363 | | | | 51 | 84 | 139 | 191 | 245 | 343 |
| | | | | | | | | | | | | |
| Me. | Dow AFB | $A_1$ | | | | | | | | | | |
| | Bangor-Brewer | | 48 | 4.1 | 2.0 | -2.1 | 38 | 46 | 48 | 48 | 48 | 48 |
| | Oldtown | | 9 | 3.7 | 12.5 | 8.8 | -- | -- | -- | -- | 1 | 4 |
| | Orono | | 3 | 1.4 | 9.4 | 8.0 | -- | -- | -- | -- | 1 | 2 |
| | 27 Towns | | 54 | --- | --- | --- | 3 | 5 | 7 | 11 | 18 | 34 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | R=d-$R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Me. | Loring AFB | $A_1$ | | | | | | | | | | |
| | Caribou | | 8 | 1.6 | 9.2 | 7.6 | -- | -- | -- | 1 | 3 | 5 |
| | Van Buren | | 4 | 0.7 | 13.8 | 13.1 | -- | -- | -- | -- | -- | 1 |
| | Ft. Fairfield | | 3 | 0.7 | 12.7 | 12.0 | -- | -- | -- | -- | -- | 1 |
| | 14 Towns | | 28 | --- | --- | --- | 1 | 2 | 4 | 6 | 9 | 17 |
| | Presque Isle AFB | $A_1$ | | | | | | | | | | |
| | Presque Isle | | 13 | 4.8 | 1.0 | -3.8 | 13 | 13 | 13 | 13 | 13 | 13 |
| | 10 Towns | | 20 | --- | --- | --- | 1 | 2 | 3 | 4 | 7 | 12 |
| | Total State | | 190 | | | | 56 | 68 | 75 | 83 | 100 | 137 |
| | | | | | | | | | | | | |
| Mass. | Westover AFB | $A_1$ | | | | | | | | | | |
| | Springfield Chicopee Holyoke | | 450 | 8.7 | 5.2 | -3.5 | 45 | 108 | 176 | 252 | 347 | 450 |
| | | | | | | | | | | | | |

COLLATERAL DAMAGE

Megatone-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mass. | Amherst | | 10 | 1.2 | 12.0 | 10.8 | -- | -- | -- | 1 | 1 | 4 |
| | Ware | | 7 | 1.5 | 15.0 | 13.5 | -- | -- | -- | -- | -- | 2 |
| | 0 Towns | | -- | --- | --- | --- | -- | -- | -- | -- | -- | -- |
| | Total State | | 467 | | | | 45 | 108 | 176 | 253 | 348 | 456 |
| | | | | | | | | | | | | |
| Mich. | K. I. Sawyer AFB | $A_1$ | | | | | | | | | | |
| | Marquette | | 20 | 1.8 | 13.5 | 11.7 | -- | -- | -- | -- | 2 | 7 |
| | Negaunee | | 6 | 2.1 | 14.9 | 12.8 | -- | -- | -- | -- | -- | 2 |
| | 9 Towns | | 18 | --- | --- | --- | 1 | 2 | 2 | 4 | 6 | 11 |
| | Selfridge AFB | $A_1$ | | | | | | | | | | |
| | Detroit Pontiac | | 3538 | 15.3 | 19.0 | 3.7 | 35 | 35 | 35 | 35 | 35 | 566 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mich. | Wurtsmith AFB | $A_1$ | | | | | | | | | | |
| | 8 Towns | | 16 | -- | --- | --- | 1 | 1 | 2 | 3 | 5 | 10 |
| | Kincheloe AFB | $A_1$ | | | | | | | | | | |
| | 9 Towns | | 18 | -- | --- | --- | 1 | 2 | 2 | 4 | 6 | 11 |
| | Total State | | 3616 | | | | 38 | 40 | 41 | 46 | 54 | 607 |
| | | | | | | | | | | | | |
| Miss. | Columbus AFB | $A_1$ | | | | | | | | | | |
| | Columbus | | 25 | 1.6 | 10.3 | 8.7 | -- | -- | 1 | 3 | 6 | 14 |
| | Aberdeen | | 7 | 1.3 | 13.8 | 12.5 | -- | -- | -- | -- | 1 | 2 |
| | West Point | | 9 | 1.0 | 11.7 | 10.7 | -- | -- | -- | -- | 1 | 4 |
| | 6 Towns | | 12 | --- | --- | --- | 1 | 1 | 2 | 3 | 4 | 7 |
| | Total State | | 5[illegible] | | | | 1 | 1 | 3 | 6 | 12 | 27 |
| | | | | | | | | | | | | |

COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop, $\times 10^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mo. | Whiteman AFB | $A_1$ | | | | | | | | | | |
| | Warrensburg | | 10 | 1.0 | 10.7 | 9.7 | -- | -- | -- | 1 | 2 | 5 |
| | Windsor | | 3 | 0.7 | 13.6 | 12.9 | -- | -- | -- | -- | -- | 1 |
| | 6 Towns | | 12 | --- | --- | --- | 1 | 1 | 2 | 3 | 4 | 7 |
| | Total State | | 25 | | | | 1 | 1 | 2 | 4 | 6 | 13 |
| | | | | | | | | | | | | |
| Mont. | Glasgow AFB | $A_1$ | | | | | | | | | | |
| | Negl. Pop. | | -- | --- | -- | --- | -- | -- | -- | -- | -- | -- |
| | Total State | | -- | | | | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | | | | | |
| N.H. | Pease AFB | $A_1$ | | | | | | | | | | |
| | Portsmouth | | 26 | 2.2 | 3.2 | 1.0 | 10 | 15 | 21 | 26 | 26 | 26 |
| | | | | | | | | | | | | |

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. $\times 10^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N.H. | Dover | | 19 | 2.9 | 8.8 | 5.9 | -- | -- | 2 | 4 | 7 | 13 |
| | Somersworth | | 9 | 1.8 | 13.2 | 11.4 | -- | -- | -- | -- | 1 | 4 |
| | Newmarket | | 3 | 1.0 | 6.0 | 5.0 | -- | -- | 1 | 1 | 2 | 3 |
| | Exeter | | 6 | 1.0 | 9.3 | 8.3 | -- | -- | -- | 1 | 2 | 4 |
| | Durham | | 5 | 0.9 | 6.8 | 5.9 | -- | -- | 1 | 2 | 3 | 5 |
| | 5 Towns | | 10 | --- | --- | --- | 1 | 1 | 1 | 2 | 3 | 6 |
| | Total State | | 78 | | | | 11 | 16 | 26 | 36 | 44 | 61 |
| | | | | | | | | | | | | |
| N.Y. | Griffiss AFB | $A_1$ | | | | | | | | | | |
| | Rome | | 64 | 5.1 | 2.5 | -2.6 | 37 | 54 | 61 | 64 | 64 | 64 |
| | Utica | | 124 | 3.0 | 12.5 | 9.5 | 1 | 1 | 1 | 6 | 14 | 51 |
| | 45 Towns | | 90 | --- | --- | -- | 5 | 8 | 12 | 19 | 29 | 56 |
| | Total State | | 278 | | | | 43 | 63 | 74 | 89 | 107 | 171 |

COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | R=d-$R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N.C. | Seymour Johnson AFB | A1 | | | | | | | | | | |
| | Goldsboro | | 29 | 1.5 | 3.2 | 1.7 | 29 | 29 | 29 | 29 | 29 | 29 |
| | Mt. Olive | | 5 | 0.7 | 11.5 | 10.8 | -- | -- | -- | -- | 1 | 2 |
| | 8 Towns | | 16 | --- | --- | --- | 1 | 1 | 2 | 3 | 5 | 10 |
| | Total State | | 50 | | | | 30 | 30 | 31 | 32 | 35 | 41 |
| | | | | | | | | | | | | |
| N.D. | Grand Forks AFB | A1 | | | | | | | | | | |
| | Grand Forks | | 35 | 1.3 | 17.3 | 16.0 | -- | -- | -- | -- | 1 | 7 |
| | 9 Towns | | 18 | --- | --- | --- | 1 | 2 | 2 | 4 | 6 | 11 |
| | Minot AFB | A1 | | | | | | | | | | |
| | Minot | | 31 | 1.5 | 14.2 | 12.7 | -- | -- | -- | -- | 2 | 10 |
| | 7 Towns | | 14 | --- | --- | --- | 1 | 1 | 2 | 3 | 5 | 9 |
| | Total State | | 98 | | | | 2 | 3 | 4 | 7 | 14 | 37 |

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10³ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ohio | Lockbourne AFB | A1 | | | | | | | | | | |
| | Columbus | | 617 | 6.8 | 12.0 | 5.8 | 6 | 6 | 6 | 37 | 86 | 265 |
| | Circleville | | 11 | 0.9 | 14.5 | 13.6 | -- | -- | -- | -- | 1 | 4 |
| | Town | | 34 | --- | --- | --- | 2 | 3 | 4 | 7 | 11 | 21 |
| | Wright-Patterson AFB | A1 | | | | | | | | | | |
| | Dayton | | 501 | 6.3 | 9.0 | 2.7 | 5 | 5 | 40 | 85 | 170 | 336 |
| | Springfield | | 90 | 2.6 | 14.2 | 11.6 | 1 | 1 | 1 | 1 | 5 | 29 |
| | Town | | 4 | 0.7 | 12.0 | 11.3 | -- | -- | -- | -- | 1 | 2 |
| | Jamdale | | 6 | 0.8 | 9.0 | 8.2 | -- | -- | -- | 1 | 2 | 4 |
| | Xenia | | 20 | 1.2 | 11.6 | 10.4 | -- | -- | -- | 1 | 3 | 9 |
| | Fairborn | | 19 | 0.8 | 2.0 | 1.2 | 15 | 19 | 19 | 19 | 19 | 19 |
| | New Carlisle | | 4 | 0.7 | 7.8 | 7.1 | -- | -- | -- | -- | 2 | 3 |

COLLATERAL DAMAGE — Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. x10$^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ohio | Yellow Springs | | 4 | 0.7, | 8.2 | 7.5 | -- | -- | -- | -- | 2 | 3 |
| | 13 Towns | | 26 | --- | --- | --- | 1 | 2 | 3 | 5 | 8 | 16 |
| | Total State | | 1336 | | | | 30 | 36 | 73 | 156 | 310 | 711 |
| | | | | | | | | | | | | |
| Okla. | Clinton-Sherman AFB | $A_1$ | | | | | | | | | | |
| | Elk City | | 8 | 0.9 | 12.6 | 11.7 | -- | -- | -- | -- | 1 | 4 |
| | 8 Towns | | 16 | --- | --- | --- | 1 | 1 | 2 | 3 | 5 | 10 |
| | Total State | | 24 | | | | 1 | 1 | 2 | 3 | 6 | 14 |
| | | | | | | | | | | | | |
| Texas | Bergstrom AFB | $A_1$ | | | | | | | | | | |
| | Austin | | 187 | 3.9 | 7.8 | 3.9 | 2 | 7 | 22 | 56 | 77 | 157 |
| | 12 Towns | | 24 | --- | --- | --- | 1 | 2 | 3 | 5 | 8 | 15 |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. $\times 10^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Texas | Biggs AFB | A1 | | | | | | | | | | |
| | El Paso | | 277 | 6.1 | 3.8 | -2.3 | 83 | 122 | 175 | 249 | 277 | 277 |
| | 5 Towns | | 10 | --- | --- | --- | 1 | 1 | 1 | 2 | 3 | 6 |
| | Carswell AFB | A1 | | | | | | | | | | |
| | Fort Worth | | 503 | 9.3 | 6.4 | -2.9 | 20 | 60 | 131 | 196 | 282 | 503 |
| | 5 Towns | | 10 | --- | --- | --- | 1 | 1 | 1 | 2 | 3 | 6 |
| | Total State | | 1011 | | | | 108 | 193 | 333 | 510 | 650 | 964 |
| | | | | | | | | | | | | |
| Wash. | McChord AFB | A1 | | | | | | | | | | |
| | Tacoma | | 215 | 5.1 | 5.1 | 0.0 | 22 | 56 | 84 | 120 | 172 | 215 |
| | Puyallup | | 12 | 1.4 | 9.3 | 7.9 | -- | -- | 1 | 2 | 4 | 8 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| State | Target and City Name | Prior. Desig. | Pop. $\times 10^3$ | $R_o$ mi. | d mi. | $R=d-R_o$ mi. | 1 MT | 2 MT | 4 MT | 8 MT | 16 MT | 64 MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wash. | Sumner | | 3 | 0.6, | 12.4 | 11.8 | -- | -- | -- | -- | -- | 1 |
| | 22 Towns | | 44 | --- | --- | --- | 2 | 4 | 6 | 9 | 14 | 27 |
| | Total State | | 274 | | | | 24 | 60 | 91 | 131 | 190 | 251 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | TOTAL | $A_1$ | 10980 | | | | 563 | 887 | 1387 | 2093 | 2972 | 5362 |
| | TOTAL | $A_o+A_1$ | 14004 | | | | 830 | 1407 | 2233 | 3322 | 4730 | 7935 |
| | % Mortalities | | 100 | | | | 5.9 | 10.0 | 16.0 | 23.7 | 33.8 | 56.7 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

# APPENDIX B

## COLLATERAL DAMAGE

### Detail Calculations for Ten Targets

In the following tables, d, is the distance in miles (rounded to the nearest half-mile) from the target to the geographical centers of surrounding census tracts as shown in the various volumes of National Location Code prepared by the Bureau of the Census for OCD-DOD and the National Resource Evaluation Center-OEP, 1962. Kill probabilities are assigned according to this distance and the data given in Table I located in the main section of this report. This assumes that the damage to the entire census tract is equal to the damage at its center. The computations were simplified by grouping equi-distant tracts.

TABLE I
COLLATERAL DAMAGE COMPUTATIONS
(Lowry Air Force Base, Denver, Colorado)

| | | | 1 MT | | 2 MT | | 3 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Total Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | 1 | 5500 | 1 | 5500 | 1 | 5500 | 1 | 5500 |
| 0.5 | -- | -- | 1 | -- | 1 | -- | 1 | -- |
| 1.0 | 2 | 5800 | 1 | 5800 | 1 | 5800 | 1 | 5800 |
| 1.5 | 7 | 37900 | .95 | 36000 | 1 | 37900 | 1 | 37900 |
| 2.0 | 8 | 35900 | .80 | 28700 | .95 | 34100 | 1 | 35900 |
| 2.5 | 9 | 41600 | .58 | 24100 | .85 | 35400 | .95 | 39500 |
| 3.0 | 9 | 44300 | .43 | 19000 | .63 | 27900 | .90 | 39900 |
| 3.5 | 6 | 26800 | .35 | 9400 | .50 | 13400 | .70 | 18800 |
| 4.0 | 8 | 32100 | .26 | 8300 | .40 | 12800 | .57 | 18300 |
| 4.5 | 10 | 42500 | .18 | 7700 | .34 | 14500 | .46 | 19600 |
| 5.0 | 10 | 61100 | .11 | 6700 | .28 | 17100 | .40 | 24400 |
| 5.5 | 11 | 48700 | .07 | 3400 | .20 | 9700 | .35 | 17000 |
| 6.0 | 7 | 22700 | .06 | 1400 | .15 | 3400 | .30 | 6800 |
| 6.5 | 6 | 28100 | .03 | 800 | .11 | 3100 | .24 | 6700 |
| 7.0 | 8 | 31900 | -- | -- | .08 | 2600 | .20 | 6400 |
| 7.5 | 7 | 37700 | -- | -- | .04 | 1500 | .15 | 5700 |
| 8.0 | 8 | 49200 | -- | -- | -- | -- | .10 | 4900 |
| 8.5 | 4 | 29100 | -- | -- | -- | -- | .09 | 2600 |
| 9.0 | 9 | 47600 | -- | -- | -- | -- | .08 | 3800 |
| 9.5 | 6 | 32900 | -- | -- | -- | -- | .06 | 2000 |
| 10.0 | 6 | 31200 | -- | -- | -- | -- | .04 | 1200 |
| 10.5 | 2 | 13700 | | | | | | |
| 11.0 | 3 | 20300 | | | | | | |
| 11.5 | 2 | 11400 | | | | | | |
| 12.0 | -- | -- | | | | | | |
| 12.5 | 3 | 20200 | | | | | | |
| 13.0 | 3 | 20100 | | | | | | |
| 13.5 | 2 | 17600 | | | | | | |
| 14.0 | 2 | 7200 | | | | | | |
| 14.5 | -- | -- | | | | | | |
| 15.0 | -- | -- | | | | | | |
| 15.5 | -- | -- | | | | | | |
| 16.0 | 1 | 2600 | | | | | | |
| 16.5 | -- | -- | | | | | | |
| 17.0 | -- | -- | | | | | | |
| 17.5 | 1 | 4000 | | | | | | |
| 18.0 | 1 | 3200 | | | | | | |
| 18.5 | -- | -- | | | | | | |
| 19.0 | -- | -- | | | | | | |
| 19.5 | -- | -- | | | | | | |
| 20.0 | -- | -- | | | | | | |
| TOTALS | 162 | 912900 | -- | 156800 | | 224700 | | 302700 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D.)

TABLE I (cont'd.)
COLLATERAL DAMAGE COMPUTATIONS
(Lowry Air Force Base, Denver, Colorado)

| | | | 8 MT | | 16 MT | | 64 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Total Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | 1 | 5500 | 1 | 5500 | 1 | 5500 | 1 | 5500 |
| 0.5 | -- | -- | 1 | -- | 1 | -- | 1 | -- |
| 1.0 | 2 | 5800 | 1 | 5800 | 1 | 5800 | | 5800 |
| 1.5 | 7 | 37900 | 1 | 37900 | 1 | 37900 | | 37900 |
| 2.0 | 8 | 35900 | 1 | 35900 | 1 | 35900 | 1 | 35900 |
| 2.5 | 9 | 41600 | 1 | 41600 | 1 | 41600 | 1 | 41600 |
| 3.0 | 9 | 44300 | 1 | 44300 | 1 | 44300 | 1 | 44300 |
| 3.5 | 6 | 26800 | .95 | 25500 | 1 | 26800 | 1 | 26800 |
| 4.0 | 8 | 32100 | .80 | 25700 | 1 | 32100 | 1 | 32100 |
| 4.5 | 10 | 42500 | .67 | 28500 | .95 | 40400 | 1 | 42500 |
| 5.0 | 10 | 61100 | .58 | 35400 | .83 | 50700 | 1 | 61100 |
| 5.5 | 11 | 48700 | .50 | 24400 | .72 | 35100 | 1 | 48700 |
| 6.0 | 7 | 22700 | .43 | 9800 | .62 | 14100 | 1 | 22700 |
| 6.5 | 6 | 28100 | .38 | 10700 | .55 | 15500 | 1 | 28100 |
| 7.0 | 8 | 31900 | .34 | 10800 | .49 | 15600 | .95 | 30300 |
| 7.5 | 7 | 37700 | .31 | 11700 | .44 | 16600 | .90 | 33900 |
| 8.0 | 8 | 49200 | .28 | 13800 | .40 | 19700 | .80 | 39400 |
| 8.5 | 4 | 29100 | .22 | 6400 | .36 | 10500 | .72 | 21000 |
| 9.0 | 9 | 47600 | .17 | 8100 | .34 | 16200 | .67 | 31900 |
| 9.5 | 6 | 32900 | .14 | 4600 | .31 | 10200 | .61 | 20100 |
| 10.0 | 6 | 31200 | .11 | 3400 | .27 | 8400 | .56 | 17500 |
| 10.5 | 2 | 13700 | .10 | 1400 | .23 | 3200 | .53 | 7300 |
| 11.0 | 3 | 20300 | .09 | 1800 | .20 | 4100 | .49 | 9900 |
| 11.5 | 2 | 11400 | .07 | 800 | .17 | 1900 | .45 | 5100 |
| 12.0 | -- | -- | .06 | -- | .14 | -- | .43 | -- |
| 12.5 | 3 | 20200 | .05 | 1000 | .11 | 2200 | .41 | 8300 |
| 13.0 | 3 | 20100 | .04 | 800 | .09 | 1800 | .39 | 7800 |
| 13.5 | 2 | 17600 | -- | -- | .08 | 1400 | .37 | 6500 |
| 14.0 | 2 | 7200 | | | .07 | 500 | .35 | 2500 |
| 14.5 | -- | -- | | | .06 | -- | .33 | -- |
| 15.0 | -- | -- | | | .05 | -- | .31 | -- |
| 15.5 | -- | -- | | | .05 | -- | .30 | -- |
| 16.0 | 1 | 2600 | | | .04 | 100 | .28 | 700 |
| 16.5 | -- | -- | | | | | .25 | -- |
| 17.0 | -- | -- | | | | | .23 | -- |
| 17.5 | 1 | 4000 | | | | | .20 | 800 |
| 18.0 | 1 | 3200 | | | | | .18 | 600 |
| 18.5 | -- | -- | | | | | .16 | -- |
| 19.0 | -- | -- | | | | | .14 | -- |
| 19.5 | -- | -- | | | | | .12 | -- |
| 20.0 | -- | -- | | | | | .10 | -- |
| TOTALS | 162 | 812900 | -- | 395600 | -- | 498100 | -- | 676600 |

TABLE 2
COLLATERAL DAMAGE COMPUTATIONS
(McConnell Air Force Base,
Wichita, Kansas)

| | | | 1 MT | | 2 MT | | 4 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | 1 | 2000 | 1 | 2000 | 1 | 2000 | 1 | 2000 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | 3 | 12800 | .95 | 12200 | 1 | 12800 | 1 | 12800 |
| 2.0 | 3 | 7300 | .80 | 5800 | .95 | 6900 | 1 | 7300 |
| 2.5 | 3 | 16500 | .58 | 9600 | .85 | 14000 | .95 | 15700 |
| 3.0 | 4 | 12900 | .43 | 5500 | .63 | 8100 | .90 | 11600 |
| 3.5 | 4 | 19200 | .35 | 6700 | .50 | 9600 | .70 | 13400 |
| 4.0 | 9 | 32800 | .26 | 8500 | .40 | 13100 | .57 | 18700 |
| 4.5 | 8 | 24500 | .18 | 4400 | .34 | 8300 | .46 | 11300 |
| 5.0 | 8 | 38100 | .11 | 4200 | .28 | 10700 | .40 | 15200 |
| 5.5 | 7 | 19300 | .07 | 1400 | .20 | 3900 | .35 | 6800 |
| 6.0 | 6 | 22600 | .06 | 1400 | .15 | 3400 | .30 | 6800 |
| 6.5 | 6 | 22800 | .03 | 700 | .11 | 2500 | .24 | 5500 |
| 7.0 | 6 | 28800 | | | .08 | 2300 | .20 | 5800 |
| 7.5 | 3 | 8700 | | | .04 | 300 | .15 | 1300 |
| 8.0 | 4 | 14500 | | | | | .10 | 1500 |
| 8.5 | 4 | 10500 | | | | | .09 | 900 |
| 9.0 | 3 | 11000 | | | | | .08 | 900 |
| 9.5 | 2 | 5300 | | | | | .06 | 300 |
| 10.0 | 2 | 4000 | | | | | .04 | 200 |
| 10.5 | --- | ---- | | | | | | |
| 11.0 | 1 | 3700 | | | | | | |
| 11.5 | --- | ---- | | | | | | |
| 12.0 | 2 | 1300 | | | | | | |
| 12.5 | 1 | 4100 | | | | | | |
| 13.0 | 1 | 2200 | | | | | | |
| 13.5 | 2 | 5900 | | | | | | |
| 14.0 | 4 | 6500 | | | | | | |
| 14.5 | 2 | 3500 | | | | | | |
| 15.0 | --- | ---- | | | | | | |
| 15.5 | --- | ---- | | | | | | |
| 16.0 | 1 | 100 | | | | | | |
| 16.5 | --- | ---- | | | | | | |
| 17.0 | --- | ---- | | | | | | |
| 17.5 | --- | ---- | | | | | | |
| 18.0 | 4 | 1100 | | | | | | |
| 18.5 | --- | ---- | | | | | | |
| 19.0 | 4 | 17300 | | | | | | |
| 19.5 | --- | ---- | | | | | | |
| 20.0 | 2 | 2600 | | | | | | |
| TOTALS | 110 | 361900 | | 62400 | | 97900 | | 138000 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D.)

TABLE 2 (cont'd.)
COLLATERAL DAMAGE COMPUTATIONS
(McConnell Air Force Base,
Wichita, Kansas)

| Dist. d Mi. | No. Tracts | Tot. Pop. | 8 MT $P_k$ | 8 MT Mort. | 16 MT $P_k$ | 16 MT Mort. | 64 MT $P_k$ | 64 MT Mort. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 2000 | 1 | 2000 | 1 | 2000 | 1 | 2000 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | 3 | 12800 | 1 | 12800 | 1 | 12800 | 1 | 12800 |
| 2.0 | 3 | 7300 | 1 | 7300 | 1 | 7300 | 1 | 7300 |
| 2.5 | 3 | 16500 | 1 | 16500 | 1 | 16500 | 1 | 16500 |
| 3.0 | 4 | 12900 | 1 | 12900 | 1 | 12900 | 1 | 12900 |
| 3.5 | 4 | 19200 | .95 | 18200 | 1 | 19200 | 1 | 19200 |
| 4.0 | 9 | 32800 | .80 | 26200 | 1 | 32800 | 1 | 32800 |
| 4.5 | 8 | 24500 | .67 | 16400 | .95 | 23300 | 1 | 24500 |
| 5.0 | 8 | 38100 | .58 | 22100 | .83 | 31600 | 1 | 38100 |
| 5.5 | 7 | 19300 | .50 | 9700 | .72 | 13900 | 1 | 19300 |
| 6.0 | 6 | 22600 | .43 | 9700 | .62 | 14000 | 1 | 22600 |
| 6.5 | 6 | 22800 | .38 | 8700 | .55 | 12500 | 1 | 22800 |
| 7.0 | 6 | 28800 | .34 | 9800 | .49 | 14100 | .95 | 27400 |
| 7.5 | 3 | 8700 | .31 | 2700 | 44 | 3800 | .90 | 7800 |
| 8.0 | 4 | 14500 | .28 | 4100 | .40 | 5800 | .80 | 11600 |
| 8.5 | 4 | 10500 | .22 | 2300 | .36 | 3800 | .72 | 7600 |
| 9.0 | 3 | 11000 | .17 | 1900 | .34 | 3700 | .67 | 7400 |
| 9.5 | 2 | 5300 | .14 | 700 | .31 | 1600 | .61 | 3200 |
| 10.0 | 2 | 4000 | .11 | 400 | .27 | 1100 | .56 | 2200 |
| 10.5 | --- | ---- | .10 | ---- | .23 | ---- | .53 | ---- |
| 11.0 | 1 | 3700 | .09 | 300 | .20 | 700 | .49 | 1800 |
| 11.5 | --- | ---- | .07 | ---- | .17 | ---- | .45 | ---- |
| 12.0 | 2 | 1300 | .06 | 100 | .14 | 200 | .43 | 600 |
| 12.5 | 1 | 4100 | .05 | 200 | .11 | 500 | .41 | 1700 |
| 13.0 | 1 | 2200 | .04 | 100 | .09 | 200 | .39 | 900 |
| 13.5 | 2 | 5900 | | | .08 | 500 | .37 | 2200 |
| 14.0 | 4 | 6500 | | | .07 | 500 | .35 | 2300 |
| 14.5 | 2 | 3500 | | | .06 | 200 | .33 | 1200 |
| 15.0 | --- | ---- | | | .05 | | .31 | ---- |
| 15.5 | --- | ---- | | | .05 | | .30 | ---- |
| 16.0 | 1 | 100 | | | .04 | | .28 | ---- |
| 16.5 | --- | ---- | | | | | .25 | ---- |
| 17.0 | --- | ---- | | | | | .23 | ---- |
| 17.5 | --- | ---- | | | | | .20 | ---- |
| 18.0 | 4 | 1100 | | | | | .18 | 200 |
| 18.5 | --- | ---- | | | | | .16 | ---- |
| 19.0 | 4 | 17300 | | | | | .14 | 2400 |
| 19.5 | --- | ---- | | | | | .12 | ---- |
| 20.0 | 2 | 2600 | | | | | .10 | 300 |
| TOTALS | 110 | 361900 | | 185100 | | 235500 | | 311600 |

TABLE 3
COLLATERAL DAMAGE COMPUTATIONS
(Fairchild Air Force Base,
Spokane, Washington)

| | | | 1 MT | | 2 MT | | 4 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | 1 | 5700 | 1 | 5700 | 1 | 5700 | 1 | 5700 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | --- | ---- | .95 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | --- | ---- | .80 | ---- | .95 | ---- | 1 | ---- |
| 2.5 | --- | ---- | .58 | ---- | .85 | ---- | .95 | ---- |
| 3.0 | --- | ---- | .43 | ---- | .63 | ---- | .90 | ---- |
| 3.5 | --- | ---- | .35 | ---- | .50 | ---- | .70 | ---- |
| 4.0 | 1 | 4800 | .26 | 1200 | .40 | 1900 | .57 | 2700 |
| 4.5 | --- | ---- | .18 | ---- | .34 | ---- | .46 | ---- |
| 5.0 | 1 | 800 | .11 | 100 | .28 | 200 | .40 | 300 |
| 5.5 | --- | ---- | .07 | | .15 | ---- | .35 | ---- |
| 6.0 | --- | ---- | .06 | | .11 | ---- | .30 | ---- |
| 6.5 | --- | ---- | .03 | | .08 | ---- | .24 | ---- |
| 7.0 | 3 | 6500 | | | .04 | 300 | .20 | 1300 |
| 7.5 | --- | ---- | | | | | .15 | ---- |
| 8.0 | --- | ---- | | | | | .10 | ---- |
| 8.5 | 1 | 2300 | | | | | .09 | 200 |
| 9.0 | 6 | 23700 | | | | | .08 | 1900 |
| 9.5 | 1 | 5400 | | | | | .06 | 300 |
| 10.0 | 7 | 30700 | | | | | .04 | 1200 |
| 10.5 | 5 | 23600 | | | | | | |
| 11.0 | 4 | 18500 | | | | | | |
| 11.5 | 4 | 20300 | | | | | | |
| 12.0 | 3 | 16400 | | | | | | |
| 12.5 | 3 | 10200 | | | | | | |
| 13.0 | 6 | 27500 | | | | | | |
| 13.5 | 3 | 13700 | | | | | | |
| 14.0 | 2 | 5000 | | | | | | |
| 14.5 | 1 | 1000 | | | | | | |
| 15.0 | 2 | 5100 | | | | | | |
| 15.5 | --- | ---- | | | | | | |
| 16.0 | 1 | 3600 | | | | | | |
| 16.5 | 2 | 6100 | | | | | | |
| 17.0 | 2 | 3100 | | | | | | |
| 17.5 | 2 | 5700 | | | | | | |
| 18.0 | --- | ---- | | | | | | |
| 18.5 | 2 | 12500 | | | | | | |
| 19.0 | 2 | 6900 | | | | | | |
| 19.5 | --- | ---- | | | | | | |
| 20.0 | 1 | 3800 | | | | | | |
| TOTALS | 66 | 262900 | | 7000 | | 8100 | | 13600 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D.)

TABLE 3 (cont'd.)
COLLATERAL DAMAGE COMPUTATIONS
(Fairchild Air Force Base,
Spokane, Washington)

| Dist. d Mi. | No. Tracts | Tot. Pop. | 8 MT Pk | 8 MT Mort. | 16 MT Pk | 16 MT Mort. | 64 MT Pk | 64 MT Mort. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 5700 | 1 | 5700 | 1 | 5700 | 1 | 5700 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 2.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 3.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 3.5 | --- | ---- | | ---- | 1 | ---- | 1 | ---- |
| 4.0 | 1 | 4800 | .95 | ---- | 1 | ---- | 1 | ---- |
| 4.5 | --- | ---- | .80 | 3800 | 1 | 4800 | 1 | 4800 |
| 5.0 | 1 | 800 | .67 | ---- | .95 | ---- | 1 | --- |
| 5.5 | --- | ---- | .58 | 500 | .83 | 700 | 1 | 800 |
| 6.0 | --- | ---- | .50 | ---- | .72 | ---- | 1 | ---- |
| 6.5 | --- | ---- | .43 | ---- | .62 | ---- | 1 | ---- |
| 7.0 | 3 | 6500 | .38 | ---- | .55 | ---- | 1 | ---- |
| 7.5 | --- | ---- | .34 | 2200 | .49 | 3200 | .95 | 6200 |
| 8.0 | --- | ---- | .31 | ---- | .44 | ---- | .90 | ---- |
| 8.5 | 1 | 2300 | .28 | ---- | .40 | ---- | .80 | ---- |
| 9.0 | 6 | 23700 | .22 | 500 | .36 | 800 | .72 | 1700 |
| 9.5 | 1 | 5400 | .17 | 4000 | .34 | 8100 | .67 | 15900 |
| 10.0 | 7 | 30700 | .14 | 800 | .31 | 1700 | .61 | 3300 |
| 10.5 | 5 | 23600 | .11 | 3400 | .27 | 8300 | .56 | 17200 |
| 11.0 | 4 | 18500 | .10 | 2400 | .23 | 5400 | .53 | 12500 |
| 11.5 | 4 | 20300 | .09 | 1700 | .20 | 3700 | .49 | 9100 |
| 12.0 | 3 | 16400 | .07 | 1400 | .17 | 3500 | .45 | 9100 |
| 12.5 | 3 | 10200 | .06 | 1000 | .14 | 2300 | .43 | 7100 |
| 13.0 | 6 | 27500 | .05 | 500 | .11 | 1100 | .41 | 4200 |
| 13.5 | 3 | 13700 | .04 | 1100 | .09 | 2500 | .39 | 10700 |
| 14.0 | 2 | 5000 | | | .08 | 2200 | .37 | 10200 |
| 14.5 | 1 | 1000 | | | .07 | 400 | .35 | 1800 |
| 15.0 | 2 | 5100 | | | .06 | 100 | .33 | 300 |
| 15.5 | --- | ---- | | | .05 | 300 | .31 | 1600 |
| 16.0 | 1 | 3600 | | | .05 | ---- | .30 | ---- |
| 16.5 | 2 | 6100 | | | .04 | 100 | .28 | 1000 |
| 17.0 | 2 | 3100 | | | | | .25 | 1500 |
| 17.5 | 2 | 5700 | | | | | .23 | 700 |
| 18.0 | --- | ---- | | | | | .20 | 1100 |
| 18.5 | 2 | 12500 | | | | | .18 | ---- |
| 19.0 | 2 | 6900 | | | | | .16 | 2000 |
| 19.5 | --- | ---- | | | | | .14 | 1100 |
| 20.0 | 1 | 3800 | | | | | .12 | ---- |
| | | | | | | | .10 | 400 |
| TOTALS | 66 | 262900 | | 29000 | | 52400 | | 129900 |

TABLE 4
COLLATERAL DAMAGE COMPUTATIONS
(March Air Force Base,
San Bernardino-Riverside, California)

| Dist. d Mi. | No. Tracts | Tot. Pop. | 1 MT $P_k$ | 1 MT Mort. | 2 MT $P_k$ | 2 MT Mort. | 4 MT $P_k$ | 4 MT Mort. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 5800 | 1 | 5800 | 1 | 5800 | 1 | 5800 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | --- | ---- | .95 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | --- | ---- | .80 | ---- | .95 | ---- | 1 | ---- |
| 2.5 | --- | ---- | .58 | ---- | .85 | ---- | .95 | ---- |
| 3.0 | 1 | 7300 | .43 | 3100 | .63 | 4600 | .90 | 6600 |
| 3.5 | --- | ---- | .35 | ---- | .50 | ---- | .70 | ---- |
| 4.0 | --- | ---- | .26 | ---- | .40 | ---- | .57 | ---- |
| 4.5 | --- | ---- | .18 | ---- | .34 | ---- | .46 | ---- |
| 5.0 | --- | ---- | .11 | ---- | .28 | ---- | .40 | ---- |
| 5.5 | 2 | 7600 | .07 | 500 | .20 | 1500 | .35 | 2700 |
| 6.0 | --- | ---- | .06 | ---- | .15 | ---- | .30 | ---- |
| 6.5 | 1 | 5300 | .03 | 200 | .11 | 600 | .24 | 1300 |
| 7.0 | 3 | 8800 | | | .08 | 700 | .20 | 1800 |
| 7.5 | 4 | 16000 | | | .04 | 600 | .15 | 2400 |
| 8.0 | 5 | 29200 | | | | | .10 | 2900 |
| 8.5 | 3 | 11000 | | | | | .09 | 1000 |
| 9.0 | 4 | 19600 | | | | | .08 | 1600 |
| 9.5 | 1 | 4300 | | | | | .06 | 300 |
| 10.0 | 1 | 2000 | | | | | .04 | 100 |
| 10.5 | 1 | 5300 | | | | | | |
| 11.0 | 6 | 26300 | | | | | | |
| 11.5 | 2 | 7700 | | | | | | |
| 12.0 | 4 | 16000 | | | | | | |
| 12.5 | 4 | 13200 | | | | | | |
| 13.0 | 4 | 11600 | | | | | | |
| 13.5 | 2 | 8100 | | | | | | |
| 14.0 | 6 | 27500 | | | | | | |
| 14.5 | 7 | 20600 | | | | | | |
| 15.0 | 7 | 19700 | | | | | | |
| 15.5 | 9 | 40000 | | | | | | |
| 16.0 | 7 | 27500 | | | | | | |
| 16.5 | 10 | 49000 | | | | | | |
| 17.0 | 4 | 16100 | | | | | | |
| 17.5 | 4 | 20200 | | | | | | |
| 18.0 | 5 | 39200 | | | | | | |
| 18.5 | --- | ---- | | | | | | |
| 19.0 | 1 | 3700 | | | | | | |
| 19.5 | --- | ---- | | | | | | |
| 20.0 | 1 | 1300 | | | | | | |
| TOTALS | 110 | 469900 | | 9600 | | 13800 | | 26500 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D.)

TABLE 4 (cont'd.)
COLLATERAL DAMAGE COMPUTATIONS
(March Air Force Base,
San Bernardino-Riverside, California)

| | | | 8 MT | | 16 MT | | 64 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | 1 | 5800 | 1 | 5800 | 1 | 5800 | 1 | 5800 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 2.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 3.0 | 1 | 7300 | 1 | 7300 | 1 | 7300 | 1 | 7300 |
| 3.5 | --- | ---- | .95 | ---- | 1 | ---- | 1 | ---- |
| 4.0 | --- | ---- | .80 | ---- | 1 | ---- | 1 | ---- |
| 4.5 | --- | ---- | .67 | ---- | .95 | ---- | 1 | ---- |
| 5.0 | --- | ---- | .58 | ---- | .83 | ---- | 1 | ---- |
| 5.5 | 2 | 7600 | .50 | 3800 | .72 | 5500 | 1 | 7600 |
| 6.0 | --- | ---- | .43 | ---- | .62 | ---- | 1 | ---- |
| 6.5 | 1 | 5300 | .38 | 2000 | .55 | 2900 | 1 | 5300 |
| 7.0 | 3 | 8800 | .34 | 3000 | .49 | 4300 | .95 | 8400 |
| 7.5 | 4 | 16000 | .31 | 5000 | .44 | 7000 | .90 | 14400 |
| 8.0 | 5 | 29200 | .28 | 8200 | .40 | 11700 | .80 | 23400 |
| 8.5 | 3 | 11000 | .22 | 2400 | .36 | 4000 | .72 | 7900 |
| 9.0 | 4 | 19600 | .17 | 3300 | .34 | 6700 | .67 | 13100 |
| 9.5 | 1 | 4300 | .14 | 600 | .31 | 1300 | .61 | 2600 |
| 10.0 | 1 | 2000 | .11 | 200 | .27 | 500 | .56 | 1100 |
| 10.5 | 1 | 5300 | .10 | 500 | .23 | 1200 | .53 | 2800 |
| 11.0 | 6 | 26300 | .09 | 2400 | .20 | 5300 | .49 | 12900 |
| 11.5 | 2 | 7700 | .07 | 500 | .17 | 1300 | .45 | 3500 |
| 12.0 | 4 | 16000 | .06 | 1000 | .14 | 2200 | .43 | 6900 |
| 12.5 | 4 | 13200 | .05 | 700 | .11 | 1500 | .41 | 5400 |
| 13.0 | 4 | 11600 | .04 | 500 | .09 | 1000 | .39 | 4500 |
| 13.5 | 2 | 8100 | | | .08 | 600 | .37 | 3000 |
| 14.0 | 6 | 27500 | | | .07 | 1900 | .35 | 9700 |
| 14.5 | 7 | 20600 | | | .06 | 1200 | .33 | 7000 |
| 15.0 | 7 | 19700 | | | .05 | 1000 | .31 | 6100 |
| 15.5 | 9 | 40000 | | | .05 | 2000 | .30 | 12000 |
| 16.0 | 7 | 27500 | | | .04 | 1100 | .28 | 7700 |
| 16.5 | 10 | 49000 | | | | | .25 | 12300 |
| 17.0 | 4 | 16100 | | | | | .23 | 3700 |
| 17.5 | 4 | 20200 | | | | | .20 | 4000 |
| 18.0 | 5 | 39200 | | | | | .18 | 7100 |
| 18.5 | --- | ---- | | | | | .16 | --- |
| 19.0 | 1 | 3700 | | | | | .14 | 500 |
| 19.5 | --- | ---- | | | | | .12 | --- |
| 20.0 | 1 | 1300 | | | | | .10 | 100 |
| TOTALS | 110 | 469900 | | 47200 | | 149300 | | 206100 |

TABLE 5
COLLATERAL DAMAGE COMPUTATIONS
(Homestead Air Force Base,
Homestead, Florida)

| | | | 1 MT | | 2 MT | | 4 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | 1 | 8300 | 1 | 8300 | 1 | 8300 | 1 | 8300 |
| 1.5 | --- | ---- | .95 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | --- | ---- | .80 | ---- | .95 | ---- | 1 | ---- |
| 2.5 | --- | ---- | .58 | ---- | .85 | ---- | .95 | ---- |
| 3.0 | 1 | 2900 | .43 | 1200 | .63 | 1800 | .90 | 2600 |
| 3.5 | 2 | 4600 | .35 | 1600 | .50 | 2300 | .70 | 3200 |
| 4.0 | --- | ---- | .26 | ---- | .40 | ---- | .57 | ---- |
| 4.5 | 1 | 3100 | .18 | 600 | .34 | 1100 | .46 | 1400 |
| 5.0 | 1 | 2600 | .11 | 300 | .28 | 700 | .40 | 1000 |
| 5.5 | 1 | 3800 | .07 | 300 | .20 | 800 | .35 | 1300 |
| 6.0 | --- | ---- | .06 | ---- | .15 | ---- | .30 | ---- |
| 6.5 | 2 | 16200 | .03 | 500 | .11 | 1800 | .24 | 3900 |
| 7.0 | 1 | 4200 | | | .08 | 300 | .20 | 800 |
| 7.5 | 2 | 7600 | | | .04 | 300 | .15 | 1100 |
| 8.0 | --- | ---- | | | | | .10 | ---- |
| 8.5 | --- | ---- | | | | | .09 | ---- |
| 9.0 | --- | ---- | | | | | .08 | ---- |
| 9.5 | --- | ---- | | | | | .06 | ---- |
| 10.0 | 1 | 10600 | | | | | .04 | 400 |
| 10.5 | 1 | 4200 | | | | | | |
| 11.0 | --- | ---- | | | | | | |
| 11.5 | --- | ---- | | | | | | |
| 12.0 | --- | ---- | | | | | | |
| 12.5 | --- | ---- | | | | | | |
| 13.0 | 2 | 10900 | | | | | | |
| 13.5 | --- | ---- | | | | | | |
| 14.0 | 1 | 1800 | | | | | | |
| 14.5 | 2 | 6100 | | | | | | |
| 15.0 | 1 | 2100 | | | | | | |
| 15.5 | 1 | 1500 | | | | | | |
| 16.0 | 3 | 12700 | | | | | | |
| 16.5 | 2 | 17200 | | | | | | |
| 17.0 | 4 | 17300 | | | | | | |
| 17.5 | --- | ---- | | | | | | |
| 18.0 | 7 | 36000 | | | | | | |
| 18.5 | 3 | 16000 | | | | | | |
| 19.0 | 2 | 8700 | | | | | | |
| 19.5 | 4 | 20700 | | | | | | |
| 20.0 | 8 | 34100 | | | | | | |
| TOTALS | 52 | 253200 | | 12800 | | 17400 | | 24000 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D.)

TABLE 5 (cont'd.)
COLLATERAL DAMAGE COMPUTATIONS
(Homestead Air Force Base,
Homestead, Florida)

| | | | 8 MT | | 16 MT | | 64 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | 1 | 8300 | 1 | 8300 | 1 | 8300 | 1 | 8300 |
| 1.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 2.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 3.0 | 1 | 2900 | 1 | 2900 | 1 | 2900 | 1 | 2900 |
| 3.5 | 2 | 4600 | .95 | 4400 | 1 | 4600 | 1 | 4600 |
| 4.0 | --- | ---- | .80 | ---- | 1 | ---- | 1 | ---- |
| 4.5 | 1 | 3100 | .67 | 2100 | .95 | 2900 | 1 | 3100 |
| 5.0 | 1 | 2600 | .58 | 1500 | .83 | 2200 | 1 | 2600 |
| 5.5 | 1 | 3800 | .50 | 1900 | .72 | 2700 | 1 | 3800 |
| 6.0 | --- | ---- | .43 | ---- | .62 | ---- | 1 | ---- |
| 6.5 | 2 | 16200 | .38 | 6200 | .55 | 8900 | 1 | 16200 |
| 7.0 | 1 | 4200 | .34 | 1400 | .49 | 2100 | .95 | 4000 |
| 7.5 | 2 | 7600 | .31 | 2400 | .44 | 3300 | .90 | 6800 |
| 8.0 | --- | ---- | .28 | ---- | .40 | ---- | .80 | ---- |
| 8.5 | --- | ---- | .22 | ---- | .36 | ---- | .72 | ---- |
| 9.0 | --- | ---- | .17 | ---- | .34 | ---- | .67 | ---- |
| 9.5 | --- | ---- | .14 | ---- | .31 | ---- | .61 | ---- |
| 10.0 | 1 | 10600 | .11 | 1200 | .27 | 2900 | .56 | 5900 |
| 10.5 | 1 | 4200 | .10 | 400 | .23 | 1000 | .53 | 2200 |
| 11.0 | --- | ---- | .09 | ---- | .20 | ---- | .49 | ---- |
| 11.5 | --- | ---- | .07 | ---- | .17 | ---- | .45 | ---- |
| 12.0 | --- | ---- | .06 | ---- | .14 | ---- | .43 | ---- |
| 12.5 | --- | ---- | .04 | ---- | .11 | ---- | .41 | ---- |
| 13.0 | 2 | 10900 | | | .09 | 1000 | .39 | 4300 |
| 13.5 | --- | ---- | | | .08 | ---- | .37 | ---- |
| 14.0 | 1 | 1800 | | | .07 | 100 | .35 | 600 |
| 14.5 | 2 | 6100 | | | .06 | 400 | .33 | 2000 |
| 15.0 | 1 | 2100 | | | .05 | 100 | .31 | 700 |
| 15.5 | 1 | 1500 | | | .05 | ---- | .30 | 500 |
| 16.0 | 3 | 12700 | | | .04 | 500 | .28 | 3600 |
| 16.5 | 2 | 17200 | | | | | .25 | 4300 |
| 17.0 | 4 | 17300 | | | | | .23 | 4000 |
| 17.5 | --- | ---- | | | | | .20 | ---- |
| 18.0 | 7 | 36000 | | | | | .18 | 6500 |
| 18.5 | 3 | 16000 | | | | | .16 | 2600 |
| 19.0 | 2 | 8700 | | | | | .14 | 1200 |
| 19.5 | 4 | 20700 | | | | | .12 | 2500 |
| 20.0 | 8 | 34100 | | | | | .10 | 3400 |
| TOTALS | 52 | 253200 | | 32700 | | 43900 | | 96600 |

TABLE 6
COLLATERAL DAMAGE COMPUTATIONS
(MacDill Air Force Base,
Tampa, Florida)

| Dist. d Mi. | No. Tracts | Tot. Pop. | 1 MT $P_k$ | 1 MT Mort. | 2 MT $P_k$ | 2 MT Mort. | 4 MT $P_k$ | 4 MT Mort. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 4100 | 1 | 4100 | 1 | 4100 | 1 | 4100 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | --- | ---- | .95 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | 2 | 4700 | .80 | 3800 | .95 | 4500 | 1 | 4700 |
| 2.5 | 1 | 8900 | .58 | 5200 | .85 | 7600 | .95 | 8500 |
| 3.0 | 1 | 4500 | .43 | 1900 | .63 | 2800 | .90 | 4100 |
| 3.5 | --- | ---- | .35 | ---- | .50 | ---- | .70 | ---- |
| 4.0 | 2 | 12700 | .26 | 3300 | .40 | 5100 | .57 | 7200 |
| 4.5 | --- | ---- | .18 | ---- | .34 | ---- | .46 | ---- |
| 5.0 | 4 | 18300 | .11 | 2000 | .28 | 5100 | .40 | 7300 |
| 5.5 | 3 | 13300 | .07 | 900 | .20 | 2700 | .35 | 4700 |
| 6.0 | 1 | 3700 | .06 | 200 | .15 | 600 | .30 | 1100 |
| 6.5 | 2 | 9200 | .03 | 300 | .11 | 1000 | .24 | 2200 |
| 7.0 | 4 | 14100 | | | .08 | 1100 | .20 | 2800 |
| 7.5 | 5 | 22200 | | | .04 | 900 | .15 | 3300 |
| 8.0 | 4 | 19100 | | | | | .10 | 1900 |
| 8.5 | 7 | 31200 | | | | | .09 | 2800 |
| 9.0 | 12 | 51600 | | | | | .08 | 4100 |
| 9.5 | 8 | 33800 | | | | | .06 | 2000 |
| 10.0 | 13 | 44200 | | | | | .04 | 1800 |
| 10.5 | 7 | 27400 | | | | | | |
| 11.0 | 4 | 18900 | | | | | | |
| 11.5 | 10 | 44600 | | | | | | |
| 12.0 | 8 | 43000 | | | | | | |
| 12.5 | 4 | 23200 | | | | | | |
| 13.0 | 7 | 36700 | | | | | | |
| 13.5 | 3 | 13500 | | | | | | |
| 14.0 | 3 | 16000 | | | | | | |
| 14.5 | 2 | 4000 | | | | | | |
| 15.0 | 6 | 43800 | | | | | | |
| 15.5 | --- | ---- | | | | | | |
| 16.0 | 3 | 19100 | | | | | | |
| 16.5 | --- | ---- | | | | | | |
| 17.0 | 3 | 13500 | | | | | | |
| 17.5 | --- | ---- | | | | | | |
| 18.0 | 9 | 58600 | | | | | | |
| 18.5 | 2 | 8000 | | | | | | |
| 19.0 | 2 | 6800 | | | | | | |
| 19.5 | 1 | 3300 | | | | | | |
| 20.0 | 6 | 25500 | | | | | | |
| TOTALS | 150 | 701500 | | 21700 | | 35500 | | 62600 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D.)

TABLE 6 (cont'd.)
COLLATERAL DAMAGE COMPUTATIONS
(MacDill Air Force Base,
Tampa, Florida)

| | | | 8 MT | | 16 MT | | 64 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort |
| 0.0 | 1 | 4100 | 1 | 4100 | 1 | 4100 | 1 | 4100 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | 2 | 4700 | 1 | 4700 | 1 | 4700 | 1 | 4700 |
| 2.5 | 1 | 8900 | 1 | 8900 | 1 | 8900 | 1 | 8900 |
| 3.0 | 1 | 4500 | 1 | 4500 | 1 | 4500 | 1 | 4500 |
| 3.5 | --- | ---- | .95 | ---- | 1 | ---- | 1 | ---- |
| 4.0 | 2 | 12700 | .80 | 10200 | 1 | 12700 | 1 | 12700 |
| 4.5 | --- | ---- | .67 | ---- | .95 | ---- | 1 | ---- |
| 5.0 | 4 | 18300 | .58 | 10600 | .83 | 15200 | 1 | 18300 |
| 5.5 | 3 | 13300 | .50 | 6700 | .72 | 9600 | 1 | 13300 |
| 6.0 | 1 | 3700 | .43 | 1600 | .62 | 2300 | 1 | 3700 |
| 6.5 | 2 | 9200 | .38 | 3500 | .55 | 5100 | 1 | 9200 |
| 7.0 | 4 | 14100 | .34 | 4800 | .49 | 6900 | .95 | 13400 |
| 7.5 | 5 | 22200 | .31 | 6900 | .44 | 9800 | .90 | 20000 |
| 8.0 | 4 | 19100 | .28 | 5300 | .40 | 7600 | .80 | 15300 |
| 8.5 | 7 | 31200 | .22 | 6900 | .36 | 11200 | .72 | 22500 |
| 9.0 | 12 | 51600 | .17 | 8800 | .34 | 17500 | .67 | 34600 |
| 9.5 | 8 | 33800 | .14 | 4700 | .31 | 10500 | .61 | 20600 |
| 10.0 | 13 | 44200 | .11 | 4900 | .27 | 11900 | .56 | 24800 |
| 10.5 | 7 | 27400 | .10 | 2700 | .23 | 6300 | .53 | 14500 |
| 11.0 | 4 | 18900 | .09 | 1700 | .20 | 3800 | .49 | 9300 |
| 11.5 | 10 | 44600 | .07 | 3100 | .17 | 7600 | .45 | 20100 |
| 12.0 | 8 | 43000 | .06 | 2600 | .14 | 6000 | .43 | 18500 |
| 12.5 | 4 | 23200 | .04 | 900 | .11 | 2600 | .41 | 9500 |
| 13.0 | 7 | 36700 | | | .09 | 3300 | .39 | 14300 |
| 13.5 | 3 | 13500 | | | .08 | 1100 | .37 | 5000 |
| 14.0 | 3 | 16000 | | | .07 | 1100 | .35 | 5600 |
| 14.5 | 2 | 4000 | | | .06 | 200 | .33 | 1300 |
| 15.0 | 6 | 43800 | | | .05 | 2200 | .31 | 13600 |
| 15.5 | --- | ---- | | | .05 | ---- | .30 | ---- |
| 16.0 | 3 | 19100 | | | .04 | 800 | .28 | 5300 |
| 16.5 | --- | ---- | | | | | .25 | ---- |
| 17.0 | 3 | 13500 | | | | | .23 | 3100 |
| 17.5 | --- | ---- | | | | | .20 | ---- |
| 18.0 | 9 | 58600 | | | | | .18 | 10500 |
| 18.5 | 2 | 8000 | | | | | .16 | 1300 |
| 19.0 | 2 | 6800 | | | | | .14 | 1000 |
| 19.5 | 1 | 3300 | | | | | .12 | 400 |
| 20.0 | 6 | 25500 | | | | | .10 | 2600 |
| TOTALS | 150 | 701500 | | 108100 | | 177500 | | 366500 |

TABLE 7
COLLATERAL DAMAGE COMPUTATIONS
(Westover Air Force Base,
Springfield, Chicopee,
Holyoke, Mass.)

| | | | 1 MT | | 2 MT | | 4 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | 1 | 8100 | 1 | 8100 | 1 | 8100 | 1 | 8100 |
| 0.5 | --- | ---- | - | ---- | - | ---- | - | ---- |
| 1.0 | --- | ---- | - | ---- | - | ---- | - | ---- |
| 1.5 | 1 | 7400 | .95 | 7000 | 1 | 7400 | 1 | 7400 |
| 2.0 | 2 | 9700 | .80 | 7800 | .95 | 9200 | 1 | 9700 |
| 2.5 | 1 | 5800 | .58 | 3400 | .85 | 4900 | .95 | 5500 |
| 3.0 | 2 | 10600 | .43 | 4600 | .63 | 6700 | .90 | 9500 |
| 3.5 | 5 | 34100 | .35 | 11900 | .50 | 17100 | .70 | 23900 |
| 4.0 | 2 | 14200 | .26 | 3700 | .40 | 5700 | .57 | 8100 |
| 4.5 | 7 | 58700 | .18 | 0600 | .34 | 20000 | .46 | 27000 |
| 5.0 | 3 | 20800 | .11 | 2300 | .28 | 5800 | .40 | 8300 |
| 5.5 | 3 | 22000 | .07 | 1500 | .20 | 4400 | .35 | 7700 |
| 6.0 | 7 | 32300 | .06 | 1900 | .15 | 4800 | .30 | 9700 |
| 6.5 | 6 | 32600 | .03 | 1000 | .11 | 3600 | .24 | 7800 |
| 7.0 | 4 | 21800 | | | .08 | 1700 | .20 | 4400 |
| 7.5 | 9 | 44000 | | | .04 | 1800 | .15 | 6600 |
| 8.0 | 4 | 30500 | | | | | .10 | 3100 |
| 8.5 | 2 | 16800 | | | | | .09 | 1500 |
| 9.0 | --- | ---- | | | | | .08 | ---- |
| 9.5 | 2 | 11400 | | | | | .06 | 700 |
| 10.0 | 4 | 25900 | | | | | .04 | 1000 |
| 10.5 | 2 | 26300 | | | | | | |
| 11.0 | 4 | 16000 | | | | | | |
| 11.5 | 3 | 10400 | | | | | | |
| 12.0 | 1 | 6500 | | | | | | |
| 12.5 | --- | ---- | | | | | | |
| 13.0 | 3 | 20400 | | | | | | |
| 13.5 | 1 | 4300 | | | | | | |
| 14.0 | 3 | 13500 | | | | | | |
| 14.5 | --- | ---- | | | | | | |
| 15.0 | 1 | 900 | | | | | | |
| 15.5 | --- | ---- | | | | | | |
| 16.0 | 1 | 800 | | | | | | |
| 16.5 | --- | ---- | | | | | | |
| 17.0 | 2 | 10000 | | | | | | |
| 17.5 | 1 | 2200 | | | | | | |
| 18.0 | --- | ---- | | | | | | |
| 18.5 | 1 | 6100 | | | | | | |
| 19.0 | 1 | 2600 | | | | | | |
| 19.5 | --- | ---- | | | | | | |
| 20.0 | 1 | 3500 | | | | | | |
| TOTALS | 90 | 530200 | | 63800 | | 101200 | | 140000 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D)

TABLE 7 (Cont'd.)
COLLATERAL DAMAGE COMPUTATIONS
(Westover Air Force Base,
Springfield, Chicopee,
Holyoke, Mass.)

| | | | 8 MT | | 16 MT | | 64 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | 1 | 8100 | 1 | 8100 | 1 | 8100 | 1 | 8100 |
| 0.5 | --- | ---- | - | ---- | - | ---- | - | ---- |
| 1.0 | --- | ---- | - | ---- | - | ---- | - | ---- |
| 1.5 | 1 | 7400 | 1 | 7400 | 1 | 7400 | 1 | 7400 |
| 2.0 | 2 | 9700 | 1 | 9700 | 1 | 9700 | 1 | 9700 |
| 2.5 | 1 | 5800 | 1 | 5800 | 1 | 5800 | 1 | 5800 |
| 3.0 | 2 | 10600 | 1 | 10600 | 1 | 10600 | 1 | 10600 |
| 3.5 | 5 | 34100 | .95 | 32400 | 1 | 34100 | 1 | 34100 |
| 4.0 | 2 | 14200 | .80 | 11400 | 1 | 14200 | 1 | 14200 |
| 4.5 | 7 | 58700 | .67 | 39300 | .95 | 55800 | 1 | 58700 |
| 5.0 | 3 | 20800 | .58 | 12100 | .83 | 17300 | 1 | 20800 |
| 5.5 | 3 | 22000 | .50 | 11000 | .72 | 15800 | 1 | 22000 |
| 6.0 | 7 | 32300 | .43 | 13900 | .62 | 20000 | 1 | 32300 |
| 6.5 | 6 | 32600 | .38 | 12400 | .55 | 17900 | 1 | 32600 |
| 7.0 | 4 | 21800 | .34 | 7400 | .49 | 10700 | .95 | 20700 |
| 7.5 | 9 | 44000 | .31 | 13600 | .44 | 19400 | .90 | 39600 |
| 8.0 | 4 | 30500 | .28 | 8500 | .40 | 12200 | .80 | 24400 |
| 8.5 | 2 | 16800 | .22 | 3700 | .36 | 6000 | .72 | 12100 |
| 9.0 | --- | ---- | .17 | ---- | .34 | ---- | .67 | ---- |
| 9.5 | 2 | 11400 | .14 | 1600 | .31 | 3500 | .61 | 7000 |
| 10.0 | 4 | 25900 | .11 | 2800 | .27 | 7000 | .56 | 14500 |
| 10.5 | 2 | 26300 | .10 | 2600 | .23 | 6000 | .53 | 13900 |
| 11.0 | 4 | 16000 | .09 | 1400 | .20 | 3200 | .49 | 7800 |
| 11.5 | 3 | 10400 | .07 | 700 | .17 | 1800 | .45 | 4700 |
| 12.0 | 1 | 6500 | .06 | 400 | .14 | 900 | .43 | 2800 |
| 12.5 | --- | ---- | .05 | ---- | .11 | ---- | .41 | ---- |
| 13.0 | 3 | 20400 | .04 | 800 | .09 | 1800 | .39 | 8000 |
| 13.5 | 1 | 4300 | | | .07 | 300 | .37 | 1600 |
| 14.0 | 3 | 13500 | | | .06 | 800 | .35 | 4700 |
| 14.5 | --- | ---- | | | .05 | ---- | .33 | ---- |
| 15.0 | 1 | 900 | | | .05 | ---- | .31 | 300 |
| 15.5 | --- | ---- | | | .04 | ---- | .30 | ---- |
| 16.0 | 1 | 800 | | | | | .28 | 200 |
| 16.5 | --- | ---- | | | | | .25 | ---- |
| 17.0 | 2 | 10000 | | | | | .23 | 2300 |
| 17.5 | 1 | 2200 | | | | | .20 | 400 |
| 18.0 | --- | ---- | | | | | .18 | ---- |
| 18.5 | 1 | 6100 | | | | | .16 | 1000 |
| 19.0 | 1 | 2600 | | | | | .14 | 400 |
| 19.5 | --- | ---- | | | | | .12 | ---- |
| 20.0 | 1 | 3500 | | | | | .10 | 400 |
| TOTALS | 90 | 530300 | | 217600 | | 290300 | | 431[illegible] |

TABLE 5
COLLATERAL DAMAGE COMPUTATION
(Selfridge Air Force Base,
Detroit, Michigan)

| Dist. d Mi. | No. Tracts | Tot. Pop. | 1 MT Pk | 1 MT Mort. | 2 MT Pk | 2 MT Mort. | 4 MT Pk | 4 MT Mort. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 3900 | 1 | 3900 | 1 | 3900 | 1 | 3900 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | --- | ---- | .95 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | 2 | 9300 | .80 | 7400 | .95 | 8800 | 1 | ---- |
| 2.5 | --- | ---- | .58 | ---- | .85 | ---- | .95 | ---- |
| 3.0 | 3 | 13900 | .43 | 6000 | .63 | 8800 | .90 | 12500 |
| 3.5 | 2 | 11500 | .35 | 4000 | .50 | 5800 | .70 | 8100 |
| 4.0 | 1 | 5400 | .26 | 1400 | .40 | 2200 | .57 | 3100 |
| 4.5 | 1 | 8900 | .18 | 1600 | .34 | 3000 | .46 | 4100 |
| 5.0 | 1 | 3300 | .11 | 400 | .28 | 900 | .40 | 1300 |
| 5.5 | 1 | 3400 | .07 | 200 | .20 | 200 | .35 | 1200 |
| 6.0 | 3 | 19400 | .06 | 100 | .15 | 2900 | .30 | 5800 |
| 6.5 | 1 | 1300 | .03 | | .11 | 100 | .24 | 300 |
| 7.0 | 2 | 10000 | | | .08 | 800 | .20 | 2000 |
| 7.5 | 3 | 7300 | | | .04 | 300 | .15 | 1100 |
| 8.0 | 2 | 10700 | | | | | .10 | 1100 |
| 8.5 | 3 | 17900 | | | | | .09 | 1600 |
| 9.0 | 4 | 26400 | | | | | .08 | 2100 |
| 9.5 | 1 | 14600 | | | | | .06 | 900 |
| 10.0 | 3 | 17800 | | | | | .04 | 700 |
| 10.5 | 4 | 18900 | | | | | | |
| 11.0 | 5 | 40600 | | | | | | |
| 11.5 | 4 | 25600 | | | | | | |
| 12.0 | 5 | 34200 | | | | | | |
| 12.5 | 7 | 52800 | | | | | | |
| 13.0 | --- | ---- | | | | | | |
| 13.5 | 4 | 29800 | | | | | | |
| 14.0 | 3 | 15100 | | | | | | |
| 14.5 | 4 | 25800 | | | | | | |
| 15.0 | 16 | 77400 | | | | | | |
| 15.5 | 5 | 31900 | | | | | | |
| 16.0 | 17 | 93800 | | | | | | |
| 16.5 | 10 | 51200 | | | | | | |
| 17.0 | 13 | 69100 | | | | | | |
| 17.5 | 17 | 83300 | | | | | | |
| 18.0 | 19 | 86800 | | | | | | |
| 18.5 | 17 | 80200 | | | | | | |
| 19.0 | 26 | 128100 | | | | | | |
| 19.5 | 13 | 57800 | | | | | | |
| 20.0 | 19 | 89900 | | | | | | |
| TOTALS | 242 | 1277300 | | 25000 | | 37700 | | 49800 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D.)

TABLE 8 (cont'd.)
COLLATERAL DAMAGE COMPUTATIONS
(Selfridge Air Force Base,
Detroit, Michigan)

| | | | 8 MT | | 16 MT | | 64 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | 1 | 3900 | 1 | 3900 | 1 | 3900 | 1 | 3900 |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | 2 | 9300 | 1 | 9300 | 1 | 9300 | 1 | 9300 |
| 2.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 3.0 | 3 | 13900 | 1 | 13900 | 1 | 13900 | 1 | 13900 |
| 3.5 | 2 | 11500 | .95 | 10900 | 1 | 11500 | 1 | 11500 |
| 4.0 | 1 | 5400 | .80 | 4300 | 1 | 5400 | 1 | 5400 |
| 4.5 | 1 | 8900 | .67 | 6000 | .95 | 8500 | 1 | 8900 |
| 5.0 | 1 | 3300 | .58 | 1900 | .83 | 2700 | 1 | 3300 |
| 5.5 | 1 | 3400 | .50 | 1700 | .72 | 2400 | 1 | 3400 |
| 6.0 | 3 | 19400 | .43 | 8300 | .62 | 12000 | 1 | 19400 |
| 6.5 | 1 | 1300 | .38 | 500 | .55 | 700 | 1 | 1300 |
| 7.0 | 2 | 10000 | .34 | 3400 | .49 | 4900 | .95 | 9500 |
| 7.5 | 3 | 7300 | .31 | 2300 | .44 | 3200 | .90 | 6600 |
| 8.0 | 2 | 10700 | .28 | 3000 | .40 | 4300 | .80 | 8600 |
| 8.5 | 3 | 17900 | .22 | 3900 | .36 | 6400 | .72 | 12900 |
| 9.0 | 4 | 26400 | .17 | 4500 | .34 | 9000 | .67 | 17700 |
| 9.5 | 1 | 14600 | .14 | 2000 | .31 | 4500 | .61 | 8900 |
| 10.0 | 3 | 17800 | .11 | 2000 | .27 | 4800 | .56 | 10000 |
| 10.5 | 4 | 18900 | .10 | 1900 | .23 | 4300 | .53 | 10000 |
| 11.0 | 5 | 40600 | .09 | 3700 | .20 | 8100 | .49 | 20000 |
| 11.5 | 4 | 25600 | .07 | 1800 | .17 | 4400 | .45 | 11500 |
| 12.0 | 5 | 34200 | .06 | 2100 | .14 | 4800 | .43 | 14700 |
| 12.5 | 7 | 52800 | .05 | 2600 | .11 | 5800 | .41 | 21600 |
| 13.0 | --- | ---- | .04 | | .09 | ---- | .39 | ---- |
| 13.5 | 4 | 29800 | | | .08 | 2400 | .37 | 11000 |
| 14.0 | 3 | 15100 | | | .07 | 1100 | .35 | 5300 |
| 14.5 | 4 | 25800 | | | .06 | 1500 | .33 | 8500 |
| 15.0 | 16 | 77400 | | | .05 | 3900 | .31 | 24000 |
| 15.5 | 5 | 31900 | | | .05 | 1600 | .30 | 9600 |
| 16.0 | 17 | 93800 | | | .04 | 3800 | .28 | 26300 |
| 16.5 | 10 | 51200 | | | | | .25 | 12800 |
| 17.0 | 13 | 69100 | | | | | .23 | 15900 |
| 17.5 | 17 | 83300 | | | | | .20 | 16700 |
| 18.0 | 19 | 86800 | | | | | .18 | 15600 |
| 18.5 | 17 | 80200 | | | | | .16 | 12800 |
| 19.0 | 26 | 128100 | | | | | .14 | 17900 |
| 19.5 | 13 | 57800 | | | | | .12 | 6900 |
| 20.0 | 19 | 89900 | | | | | .10 | 9000 |
| TOTALS | 242 | 1277300 | | 93900 | | 149100 | | 424600 |

| Dist. d Mi. | No. Tracts | Total Pop. | MT $P_k$ | MT Mort. | MT $P_k$ | MT Mort. | MT $P_k$ | MT Mort. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 6200 | | 6200 | | 6200 | | 6200 |
| 0.5 | --- | ---- | --- | ---- | --- | ---- | --- | ---- |
| 1.0 | --- | ---- | --- | ---- | --- | ---- | --- | ---- |
| 1.5 | 1 | 3600 | .95 | 3400 | | 3600 | | 3600 |
| 2.0 | 1 | 8400 | .80 | 6700 | .95 | 8000 | | 8400 |
| 2.5 | 1 | 4800 | .58 | 2800 | .85 | 4100 | .95 | 4600 |
| 3.0 | 3 | 17800 | .43 | 7700 | .63 | 11200 | .90 | 16000 |
| 3.5 | 2 | 10400 | .35 | 3600 | .50 | 5200 | .70 | 7300 |
| 4.0 | 3 | 11300 | .26 | 2900 | .40 | 4500 | .57 | 6400 |
| 4.5 | 6 | 33800 | .18 | 6100 | .34 | 11500 | .46 | 15500 |
| 5.0 | 3 | 13400 | .11 | 1500 | .28 | 3800 | .40 | 5400 |
| 5.5 | 4 | 14000 | .07 | 1000 | .20 | 2800 | .35 | 4900 |
| 6.0 | 3 | 12700 | .06 | 800 | .15 | 1900 | .30 | 3800 |
| 6.5 | 4 | 14000 | .03 | 400 | .11 | 1500 | .24 | 3400 |
| 7.0 | 5 | 18200 | | | .08 | 1500 | .20 | 3600 |
| 7.5 | 6 | 24000 | | | .04 | 1000 | .15 | 3600 |
| 8.0 | 6 | 25800 | | | | | .10 | 2600 |
| 8.5 | 8 | 40000 | | | | | .09 | 3600 |
| 9.0 | 5 | 20500 | | | | | .08 | 1600 |
| 9.5 | 4 | 16200 | | | | | .06 | 1000 |
| 10.0 | 6 | 23800 | | | | | .04 | 1000 |
| 10.5 | 3 | 17900 | | | | | | |
| 11.0 | 6 | 28300 | | | | | | |
| 11.5 | 1 | 5900 | | | | | | |
| 12.0 | 4 | 19600 | | | | | | |
| 12.5 | 3 | 9900 | | | | | | |
| 13.0 | 2 | 16200 | | | | | | |
| 13.5 | 2 | 4800 | | | | | | |
| 14.0 | 2 | 2700 | | | | | | |
| 14.5 | 2 | 14400 | | | | | | |
| 15.0 | 2 | 4600 | | | | | | |
| 15.5 | 1 | 3700 | | | | | | |
| 16.0 | 3 | 15300 | | | | | | |
| 16.5 | --- | ----- | | | | | | |
| 17.0 | --- | ----- | | | | | | |
| 17.5 | 1 | 10200 | | | | | | |
| 18.0 | 1 | 4300 | | | | | | |
| 18.5 | --- | ---- | | | | | | |
| 19.0 | 1 | 3200 | | | | | | |
| 19.5 | 1 | 2100 | | | | | | |
| 20.0 | 1 | 1200 | | | | | | |
| TOTALS | 108 | 483700 | | 43100 | | 66800 | | 102500 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D.)

TABLE [illegible]
COLLATERAL DAMAGE COMPUTATIONS
(Carswell AFB, Fort Worth, Texas)

| Dist. d Mi. | No. Tracts | Tot. Pop. | 8 MT Pk | 8 MT Mort. | 16 MT Pk | 16 MT Mort. | 64 MT Pk | 64 MT Mort. |
|---|---|---|---|---|---|---|---|---|
| 0.0 | 1 | 6200 | 1 | 6200 | 1 | 6200 | 1 | 6200 |
| 0.5 | --- | ---- | --- | ---- | --- | ---- | --- | ---- |
| 1.0 | --- | ---- | --- | ---- | --- | ---- | --- | ---- |
| 1.5 | 1 | 3600 | 1 | 3600 | 1 | 3600 | 1 | 3600 |
| 2.0 | 1 | 8400 | 1 | 8400 | 1 | 8400 | 1 | 8400 |
| 2.5 | 1 | 4800 | 1 | 4800 | 1 | 4800 | 1 | 4800 |
| 3.0 | 3 | 17800 | 1 | 17800 | 1 | 17800 | 1 | 17800 |
| 3.5 | 2 | 10400 | .95 | 9900 | 1 | 10400 | 1 | 10400 |
| 4.0 | 3 | 11300 | .80 | 9000 | 1 | 11300 | 1 | 11300 |
| 4.5 | 6 | 33800 | .67 | 22600 | .95 | 32100 | 1 | 33800 |
| 5.0 | 3 | 13400 | .58 | 7800 | .83 | 11100 | 1 | 13400 |
| 5.5 | 4 | 14000 | .50 | 7000 | .72 | 10100 | 1 | 14000 |
| 6.0 | 3 | 12700 | .43 | 5500 | .62 | 7900 | 1 | 12700 |
| 6.5 | 4 | 14000 | .38 | 5300 | .55 | 7700 | 1 | 14000 |
| 7.0 | 5 | 18200 | .34 | 6200 | .49 | 8900 | .95 | 17300 |
| 7.5 | 6 | 24000 | .31 | 7400 | .44 | 10600 | .90 | 21600 |
| 8.0 | 6 | 25800 | .28 | 7200 | .40 | 10300 | .80 | 20600 |
| 8.5 | 8 | 40000 | .22 | 8800 | .36 | 14400 | .72 | 28800 |
| 9.0 | 5 | 20500 | .17 | 3500 | .34 | 7000 | .67 | 13700 |
| 9.5 | 4 | 16200 | .14 | 2300 | .31 | 5000 | .61 | 9900 |
| 10.0 | 6 | 23800 | .11 | 2600 | .27 | 6400 | .56 | 13300 |
| 10.5 | 3 | 17900 | .10 | 1800 | .23 | 4100 | .53 | 9500 |
| 11.0 | 6 | 28300 | .09 | 2500 | .20 | 5700 | .49 | 13900 |
| 11.5 | 1 | 5900 | .07 | 400 | .17 | 1000 | .45 | 2700 |
| 12.0 | 4 | 19600 | .06 | 1200 | .14 | 2700 | .43 | 8400 |
| 12.5 | 3 | 9900 | .05 | 500 | .11 | 1100 | .41 | 4100 |
| 13.0 | 2 | 16200 | .04 | 600 | .09 | 1500 | .39 | 6300 |
| 13.5 | 2 | 4800 | | | .07 | 300 | .37 | 1800 |
| 14.0 | 2 | 2700 | | | .06 | 200 | .35 | 900 |
| 14.5 | 2 | 14400 | | | .05 | 700 | .33 | 4800 |
| 15.0 | 2 | 4600 | | | .05 | 200 | .31 | 1400 |
| 15.5 | 1 | 3700 | | | .04 | 100 | .30 | 1100 |
| 16.0 | 3 | 15800 | | | | | .28 | 4400 |
| 16.5 | --- | ----- | | | | | .25 | ---- |
| 17.0 | --- | ----- | | | | | .23 | ---- |
| 17.5 | 1 | 10200 | | | | | .20 | 2000 |
| 18.0 | 1 | 4300 | | | | | .18 | 800 |
| 18.5 | --- | ---- | | | | | .16 | ---- |
| 19.0 | 1 | 3200 | | | | | .14 | 400 |
| 19.5 | 1 | 2100 | | | | | .12 | 300 |
| 20.0 | 1 | 1200 | | | | | .10 | 100 |
| TOTALS | 108 | 483700 | | 152900 | | 211600 | | 338500 |

TABLE 10
COLLATERAL DAMAGE COMPUTATIONS
(McChord Air Force Base,
Tacoma, Washington)

| | | | 1 MT | | 2 MT | | 4 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | $P_k$ | Mort. | $P_k$ | Mort. | $P_k$ | Mort. |
| 0.0 | --- | ---- | | ---- | | ---- | | ---- |
| 0.5 | --- | ---- | | ---- | | ---- | | ---- |
| 1.0 | --- | ---- | | ---- | | ---- | | ---- |
| 1.5 | --- | ---- | .95 | ---- | | ---- | | ---- |
| 2.0 | 1 | 8100 | .80 | 6500 | .95 | 7700 | | 8100 |
| 2.5 | 1 | 6100 | .58 | 3500 | .85 | 5200 | .95 | 5800 |
| 3.0 | 2 | 17000 | .43 | 7300 | .63 | 10700 | .90 | 15300 |
| 3.5 | 1 | 9200 | .35 | 3200 | .50 | 4600 | .70 | 6400 |
| 4.0 | 1 | 2800 | .26 | 700 | .40 | 1100 | .57 | 1600 |
| 4.5 | 3 | 14500 | .18 | 2600 | .34 | 4900 | .46 | 6700 |
| 5.0 | 6 | 26800 | .11 | 2900 | .28 | 7500 | .40 | 10700 |
| 5.5 | 3 | 35700 | .07 | 2500 | .15 | 5400 | .35 | 12500 |
| 6.0 | 5 | 17400 | .06 | 1000 | .11 | 1900 | .30 | 5200 |
| 6.5 | 2 | 9800 | .03 | 300 | .08 | 800 | .24 | 2400 |
| 7.0 | 4 | 18800 | | | .04 | 800 | .20 | 3800 |
| 7.5 | 4 | 16400 | | | | | .15 | 2500 |
| 8.0 | 2 | 8600 | | | | | .10 | 900 |
| 8.5 | 5 | 21800 | | | | | .09 | 2000 |
| 9.0 | 3 | 15500 | | | | | .08 | 1200 |
| 9.5 | 4 | 26700 | | | | | .06 | 1600 |
| 10.0 | 4 | 14900 | | | | | .04 | 600 |
| 10.5 | 2 | 7400 | | | | | | |
| 11.0 | --- | ---- | | | | | | |
| 11.5 | 1 | 700 | | | | | | |
| 12.0 | 4 | 13600 | | | | | | |
| 12.5 | 4 | 10000 | | | | | | |
| 13.0 | 1 | 8500 | | | | | | |
| 13.5 | 1 | 900 | | | | | | |
| 14.0 | 2 | 9900 | | | | | | |
| 14.5 | 1 | 2100 | | | | | | |
| 15.0 | 3 | 7400 | | | | | | |
| 15.5 | --- | ---- | | | | | | |
| 16.0 | 1 | 5700 | | | | | | |
| 16.5 | 1 | 3000 | | | | | | |
| 17.0 | 1 | 2900 | | | | | | |
| 17.5 | --- | ---- | | | | | | |
| 18.0 | 1 | 5700 | | | | | | |
| 18.5 | --- | ---- | | | | | | |
| 19.0 | 6 | 36200 | | | | | | |
| 19.5 | --- | ---- | | | | | | |
| 20.0 | 5 | 24000 | | | | | | |
| TOTALS | 85 | 408100 | | 30500 | | 50600 | | 87300 |

Notes:

1. Population and Mortalities in thousands
2. Kill Probability ($P_k$) for optimum air burst

(CONT'D.)

TABLE 10 (cont'd.)
COLLATERAL DAMAGE COMPUTATIONS
(McChord Air Force Base,
Tacoma, Washington)

| | | | 8 MT | | 16 MT | | 64 MT | |
|---|---|---|---|---|---|---|---|---|
| Dist. d Mi. | No. Tracts | Tot. Pop. | Pk | Mort. | Pk | Mort. | Pk | Mort. |
| 0.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 0.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.0 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 1.5 | --- | ---- | 1 | ---- | 1 | ---- | 1 | ---- |
| 2.0 | 1 | 8100 | 1 | 8100 | 1 | 8100 | 1 | 8100 |
| 2.5 | 1 | 6100 | 1 | 6100 | 1 | 6100 | 1 | 6100 |
| 3.0 | 2 | 17000 | 1 | 17000 | 1 | 17000 | 1 | 17000 |
| 3.5 | 1 | 9200 | .95 | 8700 | 1 | 9200 | 1 | 9200 |
| 4.0 | 1 | 2800 | .80 | 2200 | 1 | 2800 | 1 | 2800 |
| 4.5 | 3 | 14500 | .67 | 9700 | .95 | 13800 | 1 | 14500 |
| 5.0 | 6 | 26800 | .58 | 15500 | .83 | 22200 | 1 | 26800 |
| 5.5 | 3 | 35700 | .50 | 17900 | .72 | 25700 | 1 | 35700 |
| 6.0 | 5 | 17400 | .43 | 7500 | .62 | 10800 | 1 | 17400 |
| 6.5 | 2 | 9800 | .38 | 3700 | .55 | 5400 | 1 | 9800 |
| 7.0 | 4 | 18800 | .34 | 6400 | .49 | 9200 | .95 | 17900 |
| 7.5 | 4 | 16400 | .31 | 5100 | .44 | 7200 | .90 | 14800 |
| 8.0 | 2 | 8600 | .28 | 2400 | .40 | 3400 | .80 | 6900 |
| 8.5 | 5 | 21800 | .22 | 4800 | .36 | 7800 | .72 | 15700 |
| 9.0 | 3 | 15500 | .17 | 2600 | .34 | 5300 | .67 | 10400 |
| 9.5 | 4 | 26700 | .14 | 3700 | .31 | 8300 | .61 | 16300 |
| 10.0 | 4 | 14900 | .11 | 1600 | .27 | 4000 | .56 | 8300 |
| 10.5 | 2 | 7400 | .10 | 700 | .23 | 1700 | .53 | 3900 |
| 11.0 | --- | ---- | .09 | ---- | .20 | ---- | .49 | ---- |
| 11.5 | 1 | 700 | .07 | ---- | .17 | 100 | .45 | 300 |
| 12.0 | 4 | 13600 | .06 | 800 | .14 | 1900 | .43 | 5800 |
| 12.5 | 4 | 10000 | .05 | 500 | .11 | 1100 | .41 | 4100 |
| 13.0 | 1 | 8500 | .04 | 300 | .09 | 800 | .39 | 3300 |
| 13.5 | 1 | 900 | | | .08 | 100 | .37 | 300 |
| 14.0 | 2 | 9900 | | | .07 | 700 | .35 | 3500 |
| 14.5 | 1 | 2100 | | | .06 | 100 | .33 | 700 |
| 15.0 | 3 | 7400 | | | .05 | 400 | .31 | 2300 |
| 15.5 | --- | ---- | | | .05 | ---- | .30 | ---- |
| 16.0 | 1 | 5700 | | | .04 | 200 | .28 | 1600 |
| 16.5 | 1 | 3000 | | | | | .25 | 800 |
| 17.0 | 1 | 2900 | | | | | .23 | 700 |
| 17.5 | --- | ---- | | | | | .20 | ---- |
| 18.0 | 1 | 5700 | | | | | .18 | 1000 |
| 18.5 | --- | ---- | | | | | .16 | ---- |
| 19.0 | 6 | 36200 | | | | | .14 | 5100 |
| 19.5 | --- | ---- | | | | | .12 | ---- |
| 20.0 | 5 | 24000 | | | | | .10 | 2400 |
| TOTALS | 85 | 408100 | | 125300 | | 173400 | | 273500 |

# APPENDIX C

## COLLATERAL DAMAGE

### Adjusted Computations

The following tables are the results of adjusting the rough damage computations (Appendix A) according to the information derived from the detailed computations (Appendix B).[1] Mortalities are listed under each weapon size and are in thousands of people.

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[1] Targets calculated in detail are designated by an asterisk.

Megatons - Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Desig. | Pop. x10$^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Davis-Monthan | Ariz. | $A_O$ | | | | | | | | | |
| | Tucson | | | 254 | 5.5 | 43 | 69 | 97 | 130 | 166 | 219 | |
| 2 | Vandenburg | Cal. | $A_O$ | | | | | | | | | |
| | Lompoc | | | 29 | 9.2 | 1 | 1 | 3 | 6 | 10 | 18 | |
| 3 | Beale | Cal. | $A_O$ | | | | | | | | | |
| | Marysville | | | 52 | 7.0 | 1 | 4 | 9 | 12 | 21 | 39 | |
| 4 | Lowry | Colo. | $A_O$ | | | | | | | | | |
| | Denver | | | 813 | 5.2 | 157 | 225 | 303 | 396 | 498 | 677 | |
| 5 | Mountain Home | Idaho | $A_O$ | | | | | | | | | |
| | Mountain Home | | | 11 | 11.2 | -- | -- | 1 | 1 | 2 | 6 | |
| 6 | Schilling | Kan. | $A_O$ | | | | | | | | | |
| | Salina | | | 79 | 3.2 | 20 | 30 | 41 | 53 | 56 | 66 | |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons - Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Desig. | Pop. x10$^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | Forbes | Kan. | $A_o$ | | | | | | | | | |
| | Topeka | | | 152 | 6.7 | 14 | 21 | 32 | 48 | 67 | 106 | |
| 8 | McConnell | Kan. | $A_o$ | | | | | | | | | * |
| | Wichita | | | 362 | 5.5 | 62 | 98 | 138 | 185 | 236 | 312 | |
| 9 | Malmstrom | Mont. | $A_o$ | | | | | | | | | |
| | Great Falls | | | 70 | 5.2 | 6 | 17 | 26 | 36 | 52 | 68 | |
| 10 | Lincoln | Neb. | $A_o$ | | | | | | | | | |
| | Lincoln | | | 178 | 5.1 | 31 | 43 | 68 | 91 | 116 | 153 | |
| 11 | Offutt | Neb. | $A_o$ | | | | | | | | | |
| | Omaha | | | 539 | 9.7 | 17 | 28 | 48 | 83 | 137 | 282 | |
| 12 | Walker | N.M. | $A_o$ | | | | | | | | | |
| | Roswell | | | 51 | 6.0 | 3 | 8 | 15 | 22 | 32 | 52 | |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons - Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Desig. | Pop. $\times 10^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | Plattsburgh | N.Y. | $A_O$ | | | | | | | | | |
| | Plattsburgh | | | 81 | 3.3 | 12 | 18 | 24 | 34 | 42 | 59 | |
| 14 | Altus | Okla. | $A_O$ | | | | | | | | | |
| | Altus | | | 45 | 3.6 | 9 | 13 | 19 | 26 | 31 | 36 | |
| 15 | Ellsworth | S.D. | $A_O$ | | | | | | | | | |
| | Rapid City | | | 53 | 8.0 | -- | 1 | 6 | 14 | 21 | 42 | |
| 16 | Dyess | Texas | $A_O$ | | | | | | | | | |
| | Abilene | | | 117 | 6.5 | 4 | 12 | 28 | 42 | 62 | 111 | |
| 17 | Fairchild | Wash. | $A_O$ | | | | | | | | | |
| | Spokane | | | 263 | 12.5 | 7 | 8 | 14 | 29 | 52 | 130 | |
| 18 | Larson | Wash. | $A_O$ | | | | | | | | | |
| | Moses Lake | | | 36 | 6.0 | 8 | 9 | 10 | 13 | 18 | 28 | |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons - Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Desig. | $Pop_3$ $x10^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | Francis E. Warren | Wyo. | $A_o$ | | | | | | | | | |
| | Cheyenne | | | 53 | 1.8 | 46 | 48 | 50 | 50 | 50 | 51 | |
| | TOTAL $A_o$ | | | 3238 | | 441 | 658 | 932 | 1271 | 1669 | 2455 | |
| | | | | | | | | | | | | |
| 20 | Blythville | Ark. | $A_1$ | | | | | | | | | |
| | Blythville | | | 56 | 3.1 | 12 | 18 | 24 | 30 | 34 | 44 | |
| 21 | L ttle Rock | Ark. | $A_1$ | | | | | | | | | |
| | Little Rock | | | 237 | 12.3 | 6 | 7 | 13 | 26 | 47 | 117 | |
| 22 | Travis | Cal. | $A_1$ | | | | | | | | | |
| | Fairfield | | | 72 | 5.6 | 2 | 4 | 10 | 15 | 24 | 46 | |
| 23 | Castle | Cal. | $A_1$ | | | | | | | | | |
| | Merced | | | 54 | 7.5 | 4 | 9 | 14 | 20 | 25 | 43 | |
| | | | | | | | | | | | | |

COLLATERAL DAMAGE

Megatons - Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Dsig. | Pop, $x10^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | March | Cal. | $A_1$ | | | | | | | | | * |
| | San Bernardino Riverside | | | 470 | 8.8 | 10 | 14 | 27 | 47 | 149 | 206 | |
| 25 | Homestead | Fla. | $A_1$ | | | | | | | | | * |
| | Miami-Homestead | | | 253 | 23.5 | 13 | 17 | 24 | 33 | 44 | 92 | |
| 26 | McCoy | Fla. | A | | | | | | | | | |
| | Orlando | | | 253 | 9.4 | 8 | 13 | 23 | 39 | 64 | 132 | |
| 27 | MacDill | Fla. | A | | | | | | | | | * |
| | Tampa-St. Petersburg | | | 702 | 9.6 | 22 | 36 | 63 | 108 | 178 | 367 | |
| 28 | Eglin | Fla. | $A_1$ | | | | | | | | | |
| | Valpariso | | | 30 | 2.0 | 8 | 10 | 15 | 18 | 21 | 28 | |
| 29 | Turner | Ga. | $A_1$ | | | | | | | | | |
| | Albany | | | 79 | 4.0 | 18 | 26 | 39 | 54 | 69 | 74 | |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons - Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Desig. | Pop. x10$^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | Hunter | Ga. | $A_1$ | | | | | | | | | |
| | Savannah | | | 202 | 4.4 | 36 | 67 | 92 | 132 | 184 | 197 | |
| 31 | Robins | Ga. | $A_1$ | | | | | | | | | |
| | Macon | | | 173 | 12.8 | 17 | 21 | 23 | 30 | 36 | 81 | |
| 32 | Bunker Hill | Ind. | $A_1$ | | | | | | | | | |
| | Kokomo | | | 136 | 11.7 | 2 | 4 | 8 | 17 | 32 | 72 | |
| 33 | Barksdale | La. | $A_1$ | | | | | | | | | |
| | Shreveport | | | 254 | 6.1 | 23 | 35 | 54 | 80 | 111 | 178 | |
| 34 | Chennault | La. | $A_1$ | | | | | | | | | |
| | Lake Charles | | | 145 | 3.8 | 41 | 58 | 83 | 108 | 124 | 132 | |
| 35 | Dow | Me. | $A_1$ | | | | | | | | | |
| | Bangor | | | 125 | 2.0 | 45 | 56 | 61 | 65 | 75 | 97 | |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons - Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Desig. | Pop, x10$^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | Loring | Me. | $A_1$ | | | | | | | | | |
| | Caribou | | | 47 | 9.2 | 1 | 2 | 4 | 8 | 13 | 26 | |
| 37 | Presque Isle | Me. | $A_1$ | | | | | | | | | |
| | Presque Isle | | | 36 | 1.0 | 15 | 17 | 18 | 19 | 22 | 28 | |
| 38 | Westover | Mass. | $A_1$ | | | | | | | | | |
| | Springfield | | | 530 | 5.2 | 64 | 101 | 150 | 218 | 290 | 423 | |
| 39 | K. I. Sawyer | Mich. | $A_1$ | | | | | | | | | |
| | Marquette | | | 48 | 11.7 | 1 | 2 | 2 | 4 | 9 | 22 | |
| 40 | Selfridge | Mich. | $A_1$ | | | | | | | | | |
| | Detroit | | | 1277 | 19.0 | 25 | 38 | 50 | 94 | 149 | 425 | |
| 41 | Wurtsmith | Mich. | $A_1$ | | | | | | | | | |
| | Small Towns | | | 18 | -- | 1 | 1 | 2 | 3 | 6 | 11 | |
| | | | | | | | | | | | | |

## COLLATERAL DAMAGE

Megatons - Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Desig. | Pop. x10$^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | Kincheloe | Mich. | $A_1$ | | | | | | | | | |
| | Small Towns | | | 20 | -- | 1 | 2 | 2 | 4 | 7 | 12 | |
| 43 | Columbus | Miss. | $A_1$ | | | | | | | | | |
| | Columbus | | | 58 | 10.3 | 1 | 1 | 3 | 7 | 13 | 30 | |
| 44 | Whiteman | Mo. | $A_1$ | | | | | | | | | |
| | Warrensburg | | | 28 | 9.7 | 1 | 1 | 2 | 4 | 7 | 14 | |
| 45 | Glasgow | Mont. | $A_1$ | | | | | | | | | |
| | Small Towns | | | -- | -- | -- | -- | -- | -- | -- | -- | |
| 46 | Pease | N.H. | $A_1$ | | | | | | | | | |
| | Portsmouth | | | 86 | 3.2 | 12 | 18 | 29 | 40 | 48 | 67 | |
| 47 | Griffiss | N.Y. | $A_1$ | | | | | | | | | |
| | Rome | | | 103 | 2.5 | 43 | 63 | 72 | 77 | 81 | 91 | |
| | Utica | | | 202 | 12.5 | 5 | 6 | 11 | 22 | 40 | 100 | |

## COLLATERAL DAMAGE

Megatons - Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Desig. | Pop. $\times 10^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48 | Seymour Johnson | N.C. | A1 | | | | | | | | | |
| | Goldsboro | | | 55 | 3.2 | 33 | 33 | 34 | 35 | 39 | 45 | |
| 49 | Grand Forks | N D. | A1 | | | | | | | | | |
| | Grand Forks | | | 58 | 17.3 | 1 | 2 | 2 | 4 | 8 | 20 | |
| 50 | Minot | N.D | A1 | | | | | | | | | |
| | Minot | | | 50 | 14.2 | 1 | 1 | 2 | 3 | 8 | 21 | |
| 51 | Lockbourne | Ohio | A1 | | | | | | | | | |
| | Columbus | | | 7?8 | 12.0 | 19 | 22 | 39 | 80 | 144 | 359 | |
| 52 | Wright-Patterson | Ohio | A1 | | | | | | | | | |
| | Dayton | | | 600 | 9.0 | 19 | 32 | 56 | 96 | 158 | 324 | |
| | Springfield | | | 127 | 14.2 | 7 | 9 | 12 | 17 | 22 | 49 | |
| | Fairborn | | | 2 | 2.0 | 17 | 21 | 21 | 21 | 21 | 21 | |
| | | | | | | | | | | | | |

COLLATERAL DAMAGE

Megatons-Optimum Air Burst

| No. | Target and Nearest City | State | Prior. Desig. | Pop. x10$^3$ | d mi. | 1 | 2 | 4 | 8 | 16 | 64 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 53 | Clinton-Sherman | Okla. | $A_1$ | | | | | | | | | |
| | Elk City | | | 26 | 12.6 | 1 | 1 | 2 | 3 | 7 | 15 | |
| 54 | Bergstrom | Texas | $A_1$ | | | | | | | | | |
| | Austin | | | 232 | 7.8 | 3 | 10 | 28 | 67 | 94 | 189 | |
| 55 | Biggs | Texas | $A_1$ | | | | | | | | | |
| | El Paso | | | 316 | 3.8 | 92 | 135 | 194 | 276 | 308 | 311 | |
| 56 | Carswell | Texas | $A_1$ | | | | | | | | | |
| | Fort Worth | | | 484 | 6.4 | 43 | 67 | 103 | 153 | 212 | 339 | |
| 57 | McChord | Wash. | $A_1$ | | | | | | | | | |
| | Tacoma | | | 408 | 5.1 | 31 | 51 | 87 | 125 | 173 | 274 | |
| | Total $A_1$ | | | 8799 | | 704 | 1031 | 1499 | 2202 | 3096 | 5127 | |
| 57 | Totals $A_0 + A_1$ | | | 12037 | -- | 1145 | 1689 | 2431 | 3473 | 4765 | 7582 | |
| | % Mortality | | | 100 | | 9.5 | 14.0 | 20.2 | 28.9 | 39.6 | 63.0 | |

# APPENDIX D

## COLLATERAL DAMAGE

### Blast Shelter Cost Computations

As a first approximation the cost of a program which provides blast shelters which protect against any size weapon (or less) can be obtained by taking the cost of a required shelter space at the center of population, multiplying by the total population at risk, and summing over the 57 targets. The following tables contain the results of such computations for 1-MT weapons and 8-MT weapons, include detail calculations for 10 large places and, based on these detailed caluclations, adjustments to other large places. Costs are based on the formula

$$\text{Cost per space} = \$50 + \$20\sqrt{p}$$

Where p = shelter psi rating

and 10 levels of shelter hardness (220, 100, 60, 40, 25, 20, 16, 12, 9, and 6 psi). Shelters are provided within 10 miles of GZ for 8-MT weapons and 5 miles for 1-MT weapons. Overpressures at greater distances are less than 5 psi, and we assume that blast shelters are not required. In addition, we assume people close to GZ ($<$ 1 mile for 8-MT and $<$ 0.5 mile for 1-MT) are able to disperse to shelters provided for them.

Population and distance data were taken from Appendix C. Cost figures are in millions of dollars. The number of spaces provided at each site is shown in parentheses above the cost figure.

## BLAST SHELTER COSTS

(No. of Spaces $\times 10^3$)
$ $\times 10^6$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. $\times 10^3$ | d mi. | Optimum Air Burst 1 MT | Optimum Air Burst 8 MT |
|---|---|---|---|---|---|---|---|
| 1 | Davis-Monthan | Ariz. | $A_o$ | | | | |
| | Tucson | | | 254 | 5.5 | (117)<br>13.1 | (220)<br>28.9 |
| 2 | Vandenburg | Cal. | $A_o$ | | | | |
| | Lompoc | | | 29 | 9.2 | (1)<br>0.2 | (21)<br>2.3 |
| 3 | Beale | Cal. | $A_o$ | | | | |
| | Marysville | | | 52 | 7.0 | (2)<br>0.3 | (40)<br>4.4 |
| 4 | Lowry | Colo. | $A_o$ | | | | * |
| | Denver | | | 813 | 5.2 | (334)<br>40.0 | (693)<br>93.7 |
| 5 | Mountain Home | Idaho | $A_o$ | | | | |
| | Mountain Home | | | 11 | 11.2 | - | (2)<br>0.2 |
| 6 | Schilling | Kan. | $A_o$ | | | | |
| | Salina | | | 79 | 3.2 | (51)<br>5.6 | (59)<br>8.5 |
| | | | | | | | |

Note: Detail cost calculations for targets designated by an asterisk (*) may be found on pages 12 through 21.

## BLAST SHELTER COSTS

(No. of Spaces x $10^3$)
$ x $10^6$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. x$10^3$ | d mi. | Optimum Air Burst | |
|---|---|---|---|---|---|---|---|
| | | | | | | 1 MT | 8 MT |
| 7 | Forbes | Kan. | $A_o$ | | | | |
| | Topeka | | | 152 | 6.7 | (3¼) 4.2 | (100) 12.3 |
| 8 | McConnell | Kan. | $A_o$ | | | | |
| | Wichita | | | 362 | 5.5 | (166) 18.6 | (314) 41.1 |
| 9 | Malstrom | Mont. | $A_o$ | | | | |
| | Great Falls | | | 70 | 5.2 | (1) 0.1 | (67) 8.1 |
| 10 | Lincoln | Neb. | $A_o$ | | | | |
| | Lincoln | | | 178 | 5.1 | (82) 9.2 | (154) 20.2 |
| 11 | Offutt | Neb. | $A_o$ | | | | |
| | Omaha | | | 539 | 9.7 | (41) 5.1 | (226) 25.8 |
| 12 | Walker | N.M. | $A_o$ | | | | |
| | Roswell | | | 51 | 6.0 | (1) 0.1 | (47) 5.2 |
| | | | | | | | |

## BLAST SHELTER COSTS

(No. of Spaces x $10^3$)
$ x $10^6$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. x$10^3$ | d mi. | Optimum Air Burst 1 MT | Optimum Air Burst 8 MT |
|---|---|---|---|---|---|---|---|
| 13 | Plattsburgh | N.Y. | $A_o$ | | | | |
| | Plattsburgh | | | 81 | 3.3 | (29) 3.3 | (48) 6.4 |
| 14 | Altus | Okla. | $A_o$ | | | | |
| | Altus | | | 45 | 3.6 | (26) 2.8 | (33) 4.4 |
| 15 | Ellsworth | S.D. | $A_o$ | | | | |
| | Rapid City | | | 53 | 8.0 | (1) 0.1 | (49) 5.0 |
| 16 | Dyess | Texas | $A_o$ | | | | |
| | Abilene | | | 117 | 6.5 | (2) 0.2 | (108) 12.0 |
| 17 | Fairchild | Wash. | $A_o$ | | | | * |
| | Spokane | | | 263 | 12.5 | (11) 2.6 | (80) 9.6 |
| 18 | Larson | Wash. | $A_o$ | | | | |
| | Moses Lake | | | 36 | 6.0 | (7) 0.9 | (23) 3.1 |
| | | | | | | | |

## BLAST SHELTER COSTS

(No. of Spaces x $10^3$)
$ x $10^6$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. x$10^3$ | d mi. | Optimum Air Burst 1 MT | Optimum Air Burst 8 MT |
|---|---|---|---|---|---|---|---|
| 19 | Francis E. Warren | Wyo. | $A_o$ | | | | |
| | Cheyenne | | | 53 | 1.8 | (49) 7.4 | (50) 12.3 |
| | TOTAL $A_o$ | | | 3238 | | (955) 113.8 | (2334) 303.5 |
| | | | | | | | |
| 20 | Blythville | Ark. | $A_1$ | | | | |
| | Blythville | | | 56 | 3.1 | (27) 3.0 | (38) 5.3 |
| 21 | Little Rock | Ark. | $A_1$ | | | | |
| | Little Rock | | | 237 | 12.3 | (10) 2.3 | (72) 8.7 |
| 22 | Travis | Cal. | $A_1$ | | | | |
| | Fairfield | | | 72 | 5.6 | (2) 0.2 | (35) 4.2 |
| 23 | Castle | Cal. | $A_1$ | | | | |
| | Merced | | | 54 | 7.5 | (10) 1.3 | (40) 5.1 |
| | | | | | | | |

## BLAST SHELTER COSTS

(No. of Spaces x $10^3$
$ x $10^6$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. x$10^3$ | d mi. | Optimum Air Burst | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 MT | 8 MT | |
| 24 | March | Cal. | $A_1$ | | | | | * |
| | San Bernardino Riverside | | | 470 | 8.8 | (13) 2.8 | (117) 14.0 | |
| 25 | Homestead | Fla. | $A_1$ | | | | | * |
| | Miami-Homestead | | | 253 | 23.5 | (22) 3.1 | (64) 9.3 | |
| 26 | McCoy | Fla. | $A_1$ | | | | | |
| | Orlando | | | 253 | 9.4 | (19) 2.4 | (106) 12.2 | |
| 27 | MacDill | Fla. | $A_1$ | | | | | * |
| | Tampa-St. Petersburg | | | 702 | 9.6 | (53) 6.6 | (296) 33.7 | |
| 28 | Eglin | Fla. | $A_1$ | | | | | |
| | Valpariso | | | 30 | 2.0 | (13) 1.6 | (27) 3.8 | |
| 29 | Turner | Ga. | $A_1$ | | | | | |
| | Albany | | | 79 | 4.0 | (66) 6.6 | (71) 9.2 | |
| | | | | | | | | |

BLAST SHELTER COSTS

(No. of Spaces $\times 10^3$)
$\$ \times 10^6$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. $\times 10^3$ | d mi. | Optimum Air Burst | |
|---|---|---|---|---|---|---|---|
| | | | | | | 1 MT | 8 MT |
| 30 | Hunter | Ga. | $A_1$ | | | | |
| | Savannah | | | 202 | 4.4 | (189)<br>18.9 | (194)<br>25.2 |
| 31 | Robins | Ga. | $A_1$ | | | | |
| | Macon | | | 173 | 12.8 | (22)<br>2.9 | (26)<br>4.9 |
| 32 | Bunker Hill | Ind. | $A_1$ | | | | |
| | Kokomo | | | 136 | 11.7 | (5)<br>0.7 | (36)<br>4.1 |
| 33 | Barksdale | La. | $A_1$ | | | | |
| | Shreveport | | | 254 | 6.1 | (58)<br>7.0 | (168)<br>20.6 |
| 34 | Chennault | La. | $A_1$ | | | | |
| | Lake Charles | | | 145 | 3.8 | (118)<br>13.2 | (126)<br>18.1 |
| 35 | Dow | Me. | $A_1$ | | | | |
| | Bangor | | | 125 | 2.0 | (59)<br>7.8 | (83)<br>14.4 |
| | | | | | | | |

## BLAST SHELTER COSTS

(No. of Spaces x $10^3$)
$ x $10^6$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. x$10^3$ | d mi. | Optimum Air Burst 1 MT | Optimum Air Burst 8 MT |
|---|---|---|---|---|---|---|---|
| 36 | Loring | Me. | $A_1$ | | | | |
| | Caribou | | | 47 | 9.2 | (3) 0.5 | (22) 2.6 |
| 37 | Presque Isle | Me. | $A_1$ | | | | |
| | Presque Isle | | | 36 | 1.0 | (17) 3.3 | (24) 6.2 |
| 38 | Westover | Mass. | $A_1$ | | | | |
| | Springfield | | | 530 | 5.2 | (169) 20.2 | (407) 51.4 |
| 39 | K.I. Sawyer | Mich. | $A_1$ | | | | |
| | Marquette | | | 48 | 11.7 | (2) 0.3 | (9) 1.1 |
| 40 | Selfridge | Mich. | $A_1$ | | | | |
| | Detroit | | | 1277 | 19.0 | (110) 7.1 | (319) 21.5 |
| 41 | Wurtsmith | Mich. | $A_1$ | | | | |
| | Small Towns | | | 18 | -- | (2) 0.3 | (9) 1.1 |
| | | | | | | | |

BLAST SHELTER COSTS

(No. of Spaces x $10^3$)
$ x $10^6$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. x$10^3$ | d mi. | Optimum Air Burst 1 MT | Optimum Air Burst 8 MT |
|---|---|---|---|---|---|---|---|
| 42 | Kincheloe | Mich. | $A_1$ | | | | |
| | Small Towns | | | 20 | -- | (2) 0.3 | (9) 1.2 |
| 43 | Columbus | Miss. | $A_1$ | | | | |
| | Columbus | | | 58 | 10.3 | (1) 0.2 | (6) 0.7 |
| 44 | Whiteman | Mo. | $A_1$ | | | | |
| | Warrensburg | | | 28 | 9.7 | (1) 0.2 | (6) 0.7 |
| 45 | Glasgow | Mont. | $A_1$ | | | | |
| | Small Towns | | | -- | -- | -- | -- |
| 46 | Pease | N.H. | $A_1$ | | | | |
| | Portsmouth | | | 86 | 3.2 | (30) 3.3 | (70) 8.6 |
| 47 | Griffiss | N.Y. | $A_1$ | | | | |
| | Rome | | | 103 | 2.5 | (74) 9.0 | (85) 14.1 |
| | Utica | | | 202 | 12.5 | (9) 2.0 | (62) 7.4 |

BLAST SHELTER COSTS

(No. of Spaces x $10^3$)
$ x $10^6$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. x103 | d mi. | Optimum Air Burst | |
|---|---|---|---|---|---|---|---|
| | | | | | | 1 MT | 8 MT |
| 48 | Seymour Johnson | N.C. | $A_1$ | | | | |
| | Goldsboro | | | 55 | 3.2 | (34)<br>3.8 | (40)<br>5.8 |
| 49 | Grand Forks | N.D. | $A_1$ | | | | |
| | Grand Forks | | | 58 | 17.3 | (2)<br>0.3 | (9)<br>1.1 |
| 50 | Minot | N.D. | $A_1$ | | | | |
| | Minot | | | 50 | 14.2 | (1)<br>0.2 | (7)<br>0.9 |
| 51 | Lockbourne | Ohio | $A_1$ | | | | |
| | Columbus | | | 728 | 12.0 | (31)<br>7.2 | (221)<br>26.6 |
| 52 | Wright-Patterson | Ohio | $A_1$ | | | | |
| | Dayton | | | 600 | 9.0 | (46)<br>5.6 | (253)<br>28.8 |
| | Springfield | | | 127 | 14.2 | (11)<br>1.6 | (32)<br>4.7 |
| | Fairborn | | | 21 | 2.0 | (21)<br>2.6 | (21)<br>4.3 |
| | | | | | | | |

BLAST SHELTER COSTS

(No. of Spaces x $10^3$)
$ x $10^9$

| No. | Target and Nearest City | State | Prior. Desig. | Total Pop. x$10^3$ | d mi. | Optimum Air Burst 1 MT | Optimum Air Burst 8 MT | |
|---|---|---|---|---|---|---|---|---|
| 53 | Clinton-Sherman | Okla. | $A_1$ | | | | | |
| | Elk City | | | 26 | 12.6 | (2)<br>0.3 | (9)<br>1.0 | |
| 54 | Bergstrom | Texas | $A_1$ | | | | | |
| | Austin | | | 232 | 7.8 | (3)<br>0.4 | (207)<br>24.1 | |
| 55 | Biggs | Texas | $A_1$ | | | | | |
| | El Paso | | | 316 | 3.8 | (305)<br>33.7 | (309)<br>43.2 | |
| 56 | Carswell | Texas | $A_1$ | | | | | * |
| | Fort Worth | | | 484 | 6.4 | (110)<br>13.3 | (319)<br>39.2 | |
| 57 | McChord | Wash. | $A_1$ | | | | | * |
| | Tacoma | | | 408 | 5.1 | (85)<br>9.2 | (270)<br>32.3 | |
| | Total $A_1$ | | | 8799 | | (1757)<br>205.3 | (4224)<br>521.4 | |
| 57 | Totals $A_0$ + $A_1$ | | | 12037 | -- | (2712)<br>319.1 | (6558)<br>824.9 | |
| | | | | | | | | |

| Dist. d. (mi.) | 8 MT | | | | 1 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ × $10^6$) | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ × $10^6$) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | | | | 5500 | 220 | 350 | 1.9 |
| 1.0 | 11300 | 220 | 350 | 4.0 | 5800 | 60 | 205 | 1.2 |
| 1.5 | 37900 | 100 | 250 | 9.5 | 37900 | 25 | 150 | 5.7 |
| 2.0 | 35900 | 60 | 205 | 7.4 | 35900 | 16 | 130 | 4.7 |
| 2.5 | 41600 | 40 | 175 | 7.3 | 41600 | 12 | 120 | 5.0 |
| 3.0 | 44300 | 25 | 150 | 6.6 | 44300 | 9 | 110 | 4.9 |
| 3.5 | 26800 | 20 | 140 | 3.8 | 26800 | 9 | 110 | 3.0 |
| 4.0 | 32100 | 16 | 130 | 4.2 | 32100 | 6 | 100 | 3.2 |
| 4.5 | 42500 | 16 | 130 | 5.5 | 42500 | 6 | 100 | 4.3 |
| 5.0 | 61100 | 12 | 120 | 7.3 | 61100 | 6 | 100 | 6.1 |
| 5.5 | 48700 | 12 | 120 | 5.9 | | | | |
| 6.0 | 22700 | 9 | 110 | 2.5 | | | | |
| 6.5 | 28100 | 9 | 110 | 3.1 | | | | |
| 7.0 | 31900 | 9 | 110 | 3.5 | | | | |
| 7.5 | 37700 | 9 | 110 | 4.1 | | | | |
| 8.0 | 49200 | 6 | 100 | 4.9 | | | | |
| 8.5 | 29100 | 6 | 100 | 2.9 | | | | |
| 9.0 | 47600 | 6 | 100 | 4.8 | | | | |
| 9.5 | 32900 | 6 | 100 | 3.3 | | | | |
| 10.0 | 31200 | 6 | 100 | 3.1 | | | | |
| TOTALS | 692600 | --- | --- | 93.7 | 333500 | --- | --- | 40.0 |

LOWRY AFB
DENVER, COLORADO

BLAST SHELTER COSTS

($50 + $20 $\sqrt{p}$ where p = psi)

| Dist. d. (mi.) | 8 MT | | | | 1 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | --- | --- | --- | 2000 | 220 | 350 | 0.7 |
| 1.0 | 2000 | 220 | 350 | 0.7 | --- | 60 | 205 | --- |
| 1.5 | 12800 | 100 | 250 | 3.2 | 12800 | 25 | 150 | 1.9 |
| 2.0 | 7300 | 60 | 205 | 1.5 | 7300 | 16 | 130 | 0.9 |
| 2.5 | 16500 | 40 | 175 | 2.9 | 16500 | 12 | 120 | 2.0 |
| 3.0 | 12900 | 25 | 150 | 1.9 | 12900 | 9 | 110 | 1.4 |
| 3.5 | 19200 | 20 | 140 | 2.7 | 19200 | 9 | 110 | 2.1 |
| 4.0 | 32800 | 16 | 130 | 4.3 | 32800 | 6 | 100 | 3.3 |
| 4.5 | 24500 | 16 | 130 | 3.2 | 24500 | 6 | 100 | 2.5 |
| 5.0 | 38100 | 12 | 120 | 4.6 | 38100 | 6 | 100 | 3.8 |
| 5.5 | 19300 | 12 | 120 | 2.3 | | | | |
| 6.0 | 22600 | 9 | 110 | 2.5 | | | | |
| 6.5 | 22800 | 9 | 110 | 2.5 | | | | |
| 7.0 | 28800 | 9 | 110 | 3.2 | | | | |
| 7.5 | 8700 | 9 | 110 | 1.0 | | | | |
| 8.0 | 14500 | 6 | 100 | 1.5 | | | | |
| 8.5 | 10500 | 6 | 100 | 1.1 | | | | |
| 9.0 | 11000 | 6 | 100 | 1.1 | | | | |
| 9.5 | 5300 | 6 | 100 | 0.5 | | | | |
| 10.0 | 4000 | 6 | 100 | 0.4 | | | | |
| TOTALS | 313600 | --- | --- | 41.1 | 166100 | --- | --- | 18.6 |

McCONNELL AFB
WICHITA, KANSAS

BLAST SHELTER COSTS

($50 + $20 $\sqrt{p}$ where p = psi)

D 14

| Distance (n.m.) | 8 MT | | | | 4 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (p.s.i.) | Shelter Space (s.f.) | Total Cost ($ x 10^6) | Total Pop. | Shelter Hardness (p.s.i.) | Shelter Space (s.f.) | Total Cost ($ x 10^6) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | | | | 5700 | 220 | 350 | 2.0 |
| 1.0 | 5700 | 220 | 350 | 2.0 | --- | 60 | 205 | --- |
| 1.5 | --- | 100 | 250 | --- | --- | 25 | 150 | --- |
| 2.0 | --- | 60 | 205 | --- | --- | 16 | 130 | --- |
| 2.5 | --- | 40 | 175 | --- | --- | 12 | 120 | --- |
| 3.0 | --- | 25 | 150 | --- | --- | 9 | 110 | --- |
| 3.5 | --- | 20 | 140 | --- | --- | 9 | 110 | --- |
| 4.0 | 4800 | 16 | 130 | 0.6 | 4800 | 6 | 100 | 0.5 |
| 4.5 | --- | 16 | 130 | --- | --- | 6 | 100 | --- |
| 5.0 | 800 | 12 | 120 | 0.1 | 800 | 6 | 100 | 0.1 |
| 5.5 | --- | 12 | 120 | --- | | | | |
| 6.0 | --- | 9 | 110 | --- | | | | |
| 6.5 | --- | 9 | 110 | --- | | | | |
| 7.0 | 6500 | 9 | 110 | 0.7 | | | | |
| 7.5 | --- | 9 | 110 | --- | | | | |
| 8.0 | --- | 6 | 100 | --- | | | | |
| 8.5 | 2300 | 6 | 100 | 0.2 | | | | |
| 9.0 | 23700 | 6 | 100 | 2.4 | | | | |
| 9.5 | 5400 | 6 | 100 | 0.5 | | | | |
| 10.0 | 30700 | 6 | 100 | 3.1 | | | | |
| TOTALS | 79900 | --- | --- | 9.6 | 11300 | --- | --- | 2.6 |

FAIRCHILD AFB
SPOKANE, WASHINGTON

BLAST SHELTER COSTS

($50 + $20$\sqrt{p}$ where p = psi)

| Dist. (mi.) | 8 MT | | | | 1 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | --- | --- | --- | 5800 | 220 | 350 | 2.0 |
| 1.0 | 5800 | 220 | 350 | 2.0 | --- | 60 | 205 | --- |
| 1.5 | --- | 100 | 250 | --- | --- | 25 | 150 | --- |
| 2.0 | --- | 60 | 205 | --- | --- | 16 | 130 | --- |
| 2.5 | --- | 40 | 175 | --- | --- | 12 | 120 | --- |
| 3.0 | 7300 | 25 | 150 | 1.1 | 7300 | 9 | 110 | 0.8 |
| 3.5 | --- | 20 | 140 | --- | --- | 9 | 110 | --- |
| 4.0 | --- | 16 | 130 | --- | --- | 6 | 100 | --- |
| 4.5 | --- | 16 | 130 | --- | --- | 6 | 100 | --- |
| 5.0 | --- | 12 | 120 | --- | --- | 6 | 100 | --- |
| 5.5 | 7600 | 12 | 120 | 0.9 | | | | |
| 6.0 | --- | 9 | 110 | --- | | | | |
| 6.5 | 5300 | 9 | 110 | 0.6 | | | | |
| 7.0 | 8800 | 9 | 110 | 1.0 | | | | |
| 7.5 | 16000 | 9 | 110 | 1.8 | | | | |
| 8.0 | 29200 | 6 | 100 | 2.9 | | | | |
| 8.5 | 11000 | 6 | 100 | 1.1 | | | | |
| 9.0 | 19600 | 6 | 100 | 2.0 | | | | |
| 9.5 | 4300 | 6 | 100 | 0.4 | | | | |
| 10.0 | 2000 | 6 | 100 | 0.2 | | | | |
| TOTALS | 116900 | --- | --- | 14.0 | 13100 | --- | --- | 2.8 |

MARCH AFB
SAN BERNARDINO - RIVERSIDE
CALIFORNIA

BLAST SHELTER COSTS

($50 + $20 $\sqrt{p}$ where p = psi)

| Dist. d. (mi.) | 8 MT | | | | 1 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | | | | --- | 220 | 350 | --- |
| 1.0 | 8300 | 220 | 350 | 2.9 | 8300 | 60 | 205 | 1.7 |
| 1.5 | --- | 100 | 250 | --- | --- | 25 | 150 | --- |
| 2.0 | --- | 60 | 205 | --- | --- | 16 | 130 | --- |
| 2.5 | --- | 40 | 175 | --- | --- | 12 | 120 | --- |
| 3.0 | 2900 | 25 | 150 | 0.4 | 2900 | 9 | 110 | 0.3 |
| 3.5 | 4600 | 20 | 140 | 0.6 | 4600 | 9 | 110 | 0.5 |
| 4.0 | --- | 16 | 130 | --- | --- | 6 | 100 | --- |
| 4.5 | 3100 | 16 | 130 | 0.4 | 3100 | 6 | 100 | 0.3 |
| 5.0 | 2600 | 12 | 120 | 0.3 | 2600 | 6 | 100 | 0.3 |
| 5.5 | 3800 | 12 | 120 | 0.5 | | | | |
| 6.0 | --- | 9 | 110 | --- | | | | |
| 6.5 | 16200 | 9 | 110 | 1.8 | | | | |
| 7.0 | 4200 | 9 | 110 | 0.5 | | | | |
| 7.5 | 7600 | 9 | 110 | 0.8 | | | | |
| 8.0 | --- | 6 | 100 | --- | | | | |
| 8.5 | --- | 6 | 100 | --- | | | | |
| 9.0 | --- | 6 | 100 | --- | | | | |
| 9.5 | --- | 6 | 100 | --- | | | | |
| 10.0 | 10600 | 6 | 100 | 1.1 | | | | |
| TOTALS | 63900 | --- | --- | 9.3 | 21500 | --- | --- | 3.1 |

HOMESTEAD AFB
HOMESTEAD, FLORIDA

BLAST SHELTER COSTS

($50 + $20 $\sqrt{p}$ where p = psi)

| Dist. d. (mi.) | 8 MT | | | | 1 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | --- | --- | --- | 4100 | 220 | 350 | 1.4 |
| 1.0 | 4100 | 220 | 350 | 1.4 | --- | 60 | 205 | --- |
| 1.5 | --- | 100 | 250 | --- | --- | 25 | 150 | --- |
| 2.0 | 4700 | 60 | 205 | 1.0 | 4700 | 16 | 130 | 0.6 |
| 2.5 | 8900 | 40 | 175 | 1.6 | 8900 | 12 | 120 | 1.0 |
| 3.0 | 4500 | 25 | 150 | 0.7 | 4500 | 9 | 110 | 0.5 |
| 3.5 | --- | 20 | 140 | --- | --- | 9 | 110 | --- |
| 4.0 | 12700 | 16 | 130 | 1.7 | 12700 | 6 | 100 | 1.3 |
| 4.5 | --- | 16 | 130 | --- | --- | 6 | 100 | --- |
| 5.0 | 18300 | 12 | 120 | 2.2 | 18300 | 6 | 100 | 1.8 |
| 5.5 | 13300 | 12 | 120 | 1.6 | | | | |
| 6.0 | 3700 | 9 | 110 | 0.4 | | | | |
| 6.5 | 9200 | 9 | 110 | 1.0 | | | | |
| 7.0 | 14100 | 9 | 110 | 1.6 | | | | |
| 7.5 | 22200 | 9 | 110 | 2.5 | | | | |
| 8.0 | 19100 | 6 | 100 | 1.9 | | | | |
| 8.5 | 31200 | 6 | 100 | 3.1 | | | | |
| 9.0 | 51600 | 6 | 100 | 5.2 | | | | |
| 9.5 | 33800 | 6 | 100 | 3.4 | | | | |
| 10.0 | 44200 | 6 | 100 | 4.4 | | | | |
| TOTALS | 295600 | --- | --- | 33.7 | 53200 | --- | --- | 6.6 |

MAC DILL AFB
TAMPA, FLORIDA

BLAST SHELTER COSTS

($50 + $20 $\sqrt{p}$ where p = psi)

| Dist. d. (mi.) | 8 MT | | | | 1 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | | | | 8100 | 220 | 350 | 2.8 |
| 1.0 | 8100 | 220 | 350 | 2.8 | --- | 60 | 205 | --- |
| 1.5 | 7400 | 100 | 250 | 1.9 | 7400 | 25 | 150 | 1.1 |
| 2.0 | 9700 | 60 | 205 | 2.0 | 9700 | 16 | 130 | 1.3 |
| 2.5 | 5800 | 40 | 175 | 1.0 | 5800 | 12 | 120 | 0.7 |
| 3.0 | 10600 | 25 | 150 | 1.6 | 10600 | 9 | 110 | 1.2 |
| 3.5 | 34100 | 20 | 140 | 4.8 | 34100 | 9 | 110 | 3.7 |
| 4.0 | 14200 | 16 | 130 | 1.8 | 14200 | 6 | 100 | 1.4 |
| 4.5 | 58700 | 16 | 130 | 7.6 | 58700 | 6 | 100 | 5.9 |
| 5.0 | 20800 | 12 | 120 | 2.6 | | | | |
| 5.5 | 22000 | 12 | 120 | 2.6 | | | | |
| 6.0 | 32300 | 9 | 110 | 3.5 | | | | |
| 6.5 | 32600 | 9 | 110 | 3.6 | | | | |
| 7.0 | 21800 | 9 | 110 | 2.4 | | | | |
| 7.5 | 44000 | 9 | 110 | 4.8 | | | | |
| 8.0 | 30500 | 6 | 100 | 3.1 | | | | |
| 8.5 | 16800 | 6 | 100 | 1.7 | | | | |
| 9.0 | --- | 6 | 100 | --- | | | | |
| 9.5 | 11400 | 6 | 100 | 1.1 | | | | |
| 10.0 | 25900 | 6 | 100 | 2.6 | | | | |
| TOTALS | 406700 | --- | --- | 51.4 | 169400 | --- | --- | 20.2 |

WESTOVER AFB
SPRINGFIELD, CHICOPEE,
HOLYOKE, MASS.

BLAST SHELTER COSTS

($50 + $20 $\sqrt{p}$ where p = psi)

| Dist. d. (mi.) | 3 MT | | | | 1 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | | | | 3900 | 220 | 350 | 1.4 |
| 1.0 | 3900 | 220 | 350 | 1.4 | --- | 60 | 205 | --- |
| 1.5 | --- | 100 | 250 | --- | --- | 25 | 150 | --- |
| 2.0 | 9300 | 60 | 205 | 1.9 | 9300 | 16 | 130 | 1.2 |
| 2.5 | --- | 40 | 175 | --- | --- | 12 | 120 | --- |
| 3.0 | 13900 | 25 | 150 | 2.1 | 13900 | 9 | 110 | 1.5 |
| 3.5 | 11500 | 20 | 140 | 1.6 | 11500 | 9 | 110 | 1.3 |
| 4.0 | 5400 | 16 | 130 | 0.7 | 5400 | 6 | 100 | 0.5 |
| 4.5 | 8900 | 16 | 130 | 1.2 | 8900 | 6 | 100 | 0.9 |
| 5.0 | 3300 | 12 | 120 | 0.4 | 3300 | 6 | 100 | 0.3 |
| 5.5 | 3400 | 12 | 120 | 0.4 | | | | |
| 6.0 | 19400 | 9 | 110 | 1.0 | | | | |
| 6.5 | 1300 | 9 | 110 | 0.1 | | | | |
| 7.0 | 10000 | 9 | 110 | 1.1 | | | | |
| 7.5 | 7300 | 9 | 110 | 0.8 | | | | |
| 8.0 | 10700 | 6 | 100 | 1.1 | | | | |
| 8.5 | 17900 | 6 | 100 | 1.8 | | | | |
| 9.0 | 26400 | 6 | 100 | 2.6 | | | | |
| 9.5 | 14600 | 6 | 100 | 1.5 | | | | |
| 10.0 | 17800 | 6 | 100 | 1.8 | | | | |
| TOTALS | 18500 | --- | --- | 21.5 | 56200 | --- | --- | 7.1 |

SELFRIDGE AFB
DETROIT, MICHIGAN

BLAST SHELTER COSTS

($50 + $20 $\sqrt{p}$ where p = psi)

| Dist. d. (mi.) | 8 MT | | | | 1 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ × $10^6$) | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ × $10^6$) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | | | | 6200 | 220 | 350 | 2.2 |
| 1.0 | 6200 | 220 | 350 | 2.2 | --- | 60 | 205 | --- |
| 1.5 | 3600 | 100 | 250 | 0.9 | 3600 | 25 | 150 | 0.5 |
| 2.0 | 8400 | 60 | 205 | 1.7 | 8400 | 16 | 130 | 1.1 |
| 2.5 | 4800 | 40 | 175 | 0.8 | 4800 | 12 | 120 | 0.6 |
| 3.0 | 17800 | 25 | 150 | 2.7 | 17800 | 9 | 110 | 2.0 |
| 3.5 | 10400 | 20 | 140 | 1.5 | 10400 | 9 | 110 | 1.1 |
| 4.0 | 11300 | 16 | 130 | 1.5 | 11300 | 6 | 100 | 1.1 |
| 4.5 | 22800 | 16 | 130 | 4.4 | 33800 | 6 | 100 | 3.4 |
| 5.0 | 13400 | 12 | 120 | 1.6 | 13400 | 6 | 100 | 1.3 |
| 5.5 | 14000 | 12 | 120 | 1.7 | | | | |
| 6.0 | 12700 | 9 | 110 | 1.4 | | | | |
| 6.5 | 14000 | 9 | 110 | 1.5 | | | | |
| 7.0 | 18200 | 9 | 110 | 2.0 | | | | |
| 7.5 | 24000 | 9 | 110 | 2.6 | | | | |
| 8.0 | 25800 | 6 | 100 | 2.6 | | | | |
| 8.5 | 40000 | 6 | 100 | 4.0 | | | | |
| 9.0 | 20500 | 6 | 100 | 2.1 | | | | |
| 9.5 | 16200 | 6 | 100 | 1.6 | | | | |
| 10.0 | 23800 | 6 | 100 | 2.4 | | | | |
| TOTALS | 318900 | --- | --- | 39.2 | 109700 | --- | --- | 13.3 |

CARSWELL AFB
FORT WORTH, TEXAS

BLAST SHELTER COSTS

($50 + $20 $\sqrt{p}$ where p = psi)

| Dist. d. (mi.) | 8 MT | | | | 1 MT | | | |
|---|---|---|---|---|---|---|---|---|
| | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) | Total Pop. | Shelter Hardness (psi) | Cost per Space ($) | Total Cost ($ x $10^6$) |
| 0.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| 0.5 | --- | --- | --- | --- | --- | 220 | 350 | --- |
| 1.0 | --- | 220 | 350 | --- | --- | 60 | 205 | --- |
| 1.5 | --- | 100 | 250 | --- | --- | 25 | 150 | --- |
| 2.0 | 8100 | 60 | 205 | 1.7 | 8100 | 16 | 130 | 1.1 |
| 2.5 | 6100 | 40 | 175 | 1.1 | 6100 | 12 | 120 | 0.7 |
| 3.0 | 17000 | 25 | 150 | 2.6 | 17000 | 9 | 110 | 1.9 |
| 3.5 | 9200 | 20 | 140 | 1.3 | 9200 | 9 | 110 | 1.0 |
| 4.0 | 2800 | 16 | 130 | 0.4 | 2800 | 6 | 100 | 0.3 |
| 4.5 | 14500 | 16 | 130 | 1.9 | 14500 | 6 | 100 | 1.5 |
| 5.0 | 26800 | 12 | 120 | 3.2 | 26800 | 6 | 100 | 2.7 |
| 5.5 | 35700 | 12 | 120 | 4.3 | | | | |
| 6.0 | 17400 | 9 | 110 | 1.9 | | | | |
| 6.5 | 9800 | 9 | 110 | 1.1 | | | | |
| 7.0 | 18800 | 9 | 110 | 2.1 | | | | |
| 7.5 | 16400 | 9 | 110 | 1.8 | | | | |
| 8.0 | 8600 | 6 | 100 | 0.9 | | | | |
| 8.5 | 21800 | 6 | 100 | 2.2 | | | | |
| 9.0 | 15500 | 6 | 100 | 1.6 | | | | |
| 9.5 | 26700 | 6 | 100 | 2.7 | | | | |
| 10.0 | 14900 | 6 | 100 | 1.5 | | | | |
| TOTALS | 270100 | --- | --- | 32.3 | 84500 | --- | --- | 9.2 |

McCHORD AFB
TACOMA, WASHINGTON

BLAST SHELTER COSTS

($50 + $20 $\sqrt{p}$ where p = psi)