FEDERAL EMERGENCY MANAGEMENT AGENCY

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Nuclear Attack Planning Base-1990 Final Project Report

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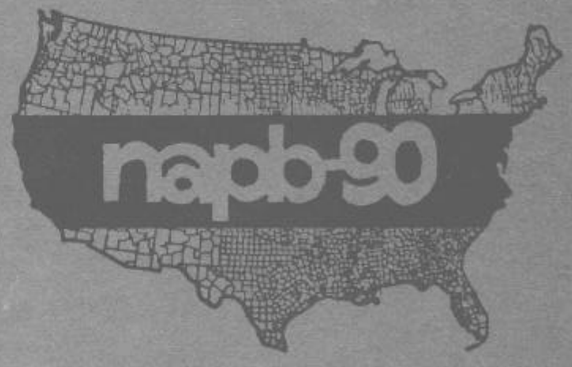


NUCLEAR ATTACK PLANNING BASE - 1990

E X E C U T I V E S U M M A R Y

PROJECT OVERVIEW

The NAPB-90 project was an in-house project of the Federal Emergency Management Agency (FEMA) carried out over a year and a half from early 1985 to 1986. The project was coordinated by the Office of Emergency Management Programs, State and Local Programs and Support Directorate, and involved professionals and experts from FEMA directorates and offices, other Federal departments and agencies, and the private sector.

The NAPB-90 is an estimate of the potential physical effects of a nuclear attack on the population of the United States in terms of the degree of the potential risk.

Three types of potential nuclear attack effects risks and the areas and populations affected by each are defined:

- The direct effects risk from blast overpressure generated by the explosion of a nuclear weapon;
- The potential thermal and secondary blast-ignited fire risk created by the combined effects of blast overpressure damage and the thermal pulse or fireball of a weapon; and
- The fallout risk from radiation generated by surface-burst weapons.

The development of the planning base followed detailed studies of all aspects of nuclear attack planning, but despite such efforts specific confidence limits cannot be assigned to either implicit or explicit assumptions used regarding targeting, weapon yields and designs, heights of burst, and delivery system accuracy and reliability. In short, NAPB-90 does not (and cannot) claim total realism.

PROJECT DEVELOPMENT

An initial study of Soviet military objectives, war-fighting scenarios, targeting strategies, and force applications provided the basis for many of the developmental procedures and policies of NAPB-90. In the development of the target base, for example, close attention was paid to frequent Soviet references to damage limitation strategies, particularly those involving non-target resources of the enemy. This element significantly influenced procedures used in making final possible enemy target selections.

NAPB-90 is a scenario-independent study since Soviet targeting priorities (as well as their strategic objectives) remain essentially the same regardless of the *a priori* scenario under which their weapons would be employed.

All of the NAPB-90 targets were developed and carefully edited to conform to both Soviet-declared strategic objectives and force deployment principles. Initial and subsequent iterations of the target base were compared against listings of projected 1990 Soviet strategic nuclear forces in order to assure logical weapon employments. All aim points finally selected were attacked using Soviet strategic targeting procedures to assure realistic weapon employment. In this respect, the following targeting factors were used in weapon selection and employment:

- The height of weapon detonation representing the height which would be selected by the Soviet strategic planner for weapon detonation;
- The Soviet views regarding expected surface characteristics of selected U.S. targets which would influence the extent of blast overpressures generated;
- The vulnerability of U.S. targets to blast overpressures assumed by the Soviet planner; and
- The probability of damage or destruction of the target influenced by the accuracy of the Soviet weapon and its probability of arrival on target.

In short, all Soviet weapons were employed as if by a Soviet strategic planner. Thus, NAPB-90 is not a "mirror-image" attack in which weapons and targets are chosen from a U.S. point of view.

RISK DEFINITIONS

Direct Effects - NAPB-90 defined the potential risk from nuclear weapon blast overpressures as the total area affected by 0.5 pound per square inch (psi) or more. This represents 727,112 square miles of the U.S. with an estimated resident population of 175.1 millions. Since NAPB-90 does not target population per se, the persons affected by blast overpressures reside in areas which are peripheral to or collocated with potential military and industrial targets.

Four degrees of the potential risk from blast overpressure were delineated, based on the severity of short-term threat from the blast wave itself and its potential to kill or injure; the potential long-term severity to survivors within the blast area; and the kind, degree and practicality of in-place and/or crisis-general measures necessary for protection.

- Very High Direct Effects Risk Areas were defined as areas surrounding target aim points which have the potential to experience blast overpressures equal to or greater than 10.0 psi from a nuclear detonation(s). Approximately 47.2 million persons (19 percent of the population) reside in Very High Direct Effects Risk Areas which cover approximately 46,352 square miles.
- High Direct Effects Risk Areas were defined as areas around a target aim point which have the potential to experience blast overpressures from a nuclear weapon detonation of equal to or greater than 5.0 psi

but less than 10.0 psi. Approximately 32.2 million persons (13 percent of the population) reside in High Direct Effects Risk Areas which cover approximately 49,896 square miles.

- Medium Direct Effects Risk Areas were defined as areas around target aim point which have the potential to experience blast overpressures from a nuclear weapon detonation(s) of equal to or greater than 2.0 psi but less than 5.0 psi. Approximately 50.3 million persons (21 percent of the population) reside in Medium Direct Effects Risk Areas which cover approximately 151,535 square miles.

- Low Direct Effects Risk Areas were defined as areas around target aim point which have the potential to experience blast overpressures from a nuclear weapon detonation(s) of equal to or greater than 0.5 psi but less than 2.0 psi. Approximately 45.4 million persons (19 percent of the population) reside in Low Direct Effects Risk Areas which cover approximately 479,329 square miles.

In sum, approximately 72 percent of the U.S. population is potentially affected by blast overpressures 0.5 psi or more, with 67 million persons living outside the total area defined as at direct effects risk.

Fallout Risk - The potential risk from fallout radiation generated by ground-burst weapons is vast and far-reaching. NAPB-90 defined the entire continental U.S. as under this potential risk, basing its risk assessment on the potential effect of fallout radiation on the resident population over a period of one week following the deposition of fallout and the efficacy of shelter protection to mitigate such exposure. Longer-term effects (additional cancer deaths and potential death in future progeny) were also considered.

To determine risk levels for U.S. counties, NAPB-90 employed the combined results of 12 "most-likely" wind patterns--one such pattern for each month of the year--and used the highest resulting radiation effect in each county as its potential risk level.

Four levels of potential fallout risk were defined:

- Very High Fallout Risk Counties were defined as those which have the potential to receive a one-week unprotected radiation dose of equal to or greater than 15,000 roentgens (R). The counties which were defined at this risk level have resident populations totaling 9.6 millions (4 percent of the U.S.) and cover approximately 421,669 square miles.

- High Fallout Risk Counties were defined as those which have the potential to receive a one-week unprotected radiation dose of equal to or greater than 6,000 roentgens but less than 15,000 roentgens. The counties which were defined at this risk level have resident populations totaling 49.2 millions (20 percent of the U.S.) and cover approximately 624,407 square miles.

- Medium Fallout Risk Counties were defined as those which have the potential to receive a one-week unprotected radiation dose of equal to or greater than 3,000 roentgens but less than 6,000 roentgens. The counties which were defined at this risk level have resident populations totaling 62.6 millions (26 percent of the U.S.) and cover approximately 618,811 square miles.

- Low Fallout Risk Counties were defined as those which have the potential to receive a one-week unprotected radiation dose of less than 3,000 roentgens. The counties which were defined at this risk level have resident populations totaling 120.8 millions (50 percent of the U.S.) and cover approximately 1,886,339 square miles.

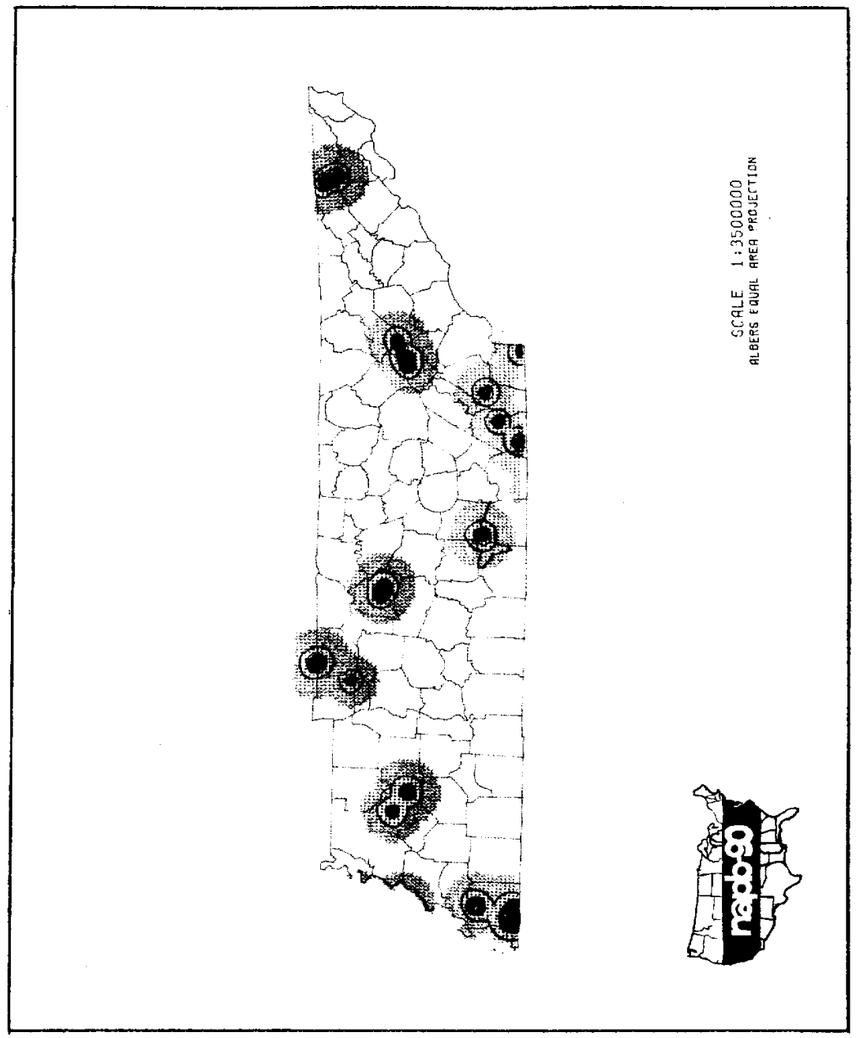
NAPB-90 does not recommend the types and degree of shelter protection best suited to the individual fallout risk areas, but rather delineates the short and long-term consequences of selecting shelter of varying quality, stressing that the ultimate aim is "zero exposure."

Fire Risk - The risk of potential thermal and secondary blast-ignited fires created is directly related to the risk from blast overpressures. Hence, NAPB-90 defined the fire risk as coexistent with that risk, delineating three degrees of risk:

- Very High Fire Risk Areas exist where blast overpressures equal or exceed 5.0 psi, that is, the areas defined as at very high and high direct effects risk. Survivors in these areas would almost certainly perish should any fires occur since search and rescue, evacuation, and fire fighting are considered almost impossible to accomplish.

- High Fire Risk Areas exist where blast overpressures are greater than 2.0 psi but less than 5.0 psi, that is, the areas defined as at medium direct effects risk. The characteristics of damage created by this range of overpressure (generally standing but heavily damaged buildings) are conducive to the generation and spread of mass fires. As in the Very High Fire Threat Area, emergency operations to assist survivors as well as to control or extinguish fires are almost impossible to accomplish.

- Medium Fire Risk Areas comprise the remainder of the area of potential blast overpressure, that is, the area experiencing equal to 0.5 psi but less than 2.0 psi. While blast-induced fires are less likely at this range of overpressure, thermal ignitions remain a distinct hazard, particularly when such ignitions occur indoors.



D I R E C T E F F E C T S R I S K A R E A S

FEMA REGION IV - TENNESSEE

Black Area: Equal to or greater than 5.0 psi
Ringed Area: Equal to or greater than 2.0 psi
Unringed Area: Equal to or greater than 0.5 psi

STATE OF TENNESSEE -- DIRECT EFFECTS RISK

Estimated 1985 Population: 4,746,516
Land Area: 40,930 square miles

COUNTY	VERY HIGH RISK GT 10 PSI POPULATION	AREA	HIGH RISK EQ/GT 5PSI LT 10PSI POPULATION	AREA	MEDIUM RISK EQ/GT 2PSI LT 5PSI POPULATION	AREA	LOW/NO* RISK EQ/GT .5PSI LT 2PSI POPULATION	AREA
Anderson	69 607	339						
Bedford					28 701	475		
Benton							15 088	392*
Bledsoe							9 278	407*
Blount							81 926	558
Bradley	70 601	327						
Campbell							35 490	479*
Cannon							10 725	266*
Carroll			28 302	600				
Carter							51 658	341*
Cheatham							23 557	303
Chester							12 837	289*
Claiborne							26 644	432*
Clay							8 061	227*
Cocke							29 318	432*
Coffee	40 569	429						
Crockett							13 895	266
Cumberland							31 190	682
Davidson	487 241	501						
Decatur							10 958	330*
DeKalb							13 881	291*
Dickson							31 624	491
Dyer							33 920	520
Fayette							24 623	705*
Fentress							15 603	498*

*Less than .5 psi overpressure

STATE OF TENNESSEE (Continued)

COUNTY	VERY HIGH RISK POPULATION	VERY HIGH RISK AREA	HIGH RISK POPULATION	HIGH RISK AREA	MEDIUM RISK POPULATION	MEDIUM RISK AREA	LOW/NO* RISK POPULATION	LOW/NO* RISK AREA
Franklin	33 382	543						
Gibson	48 338	602						
Giles							24 789	610*
Grainger							17 155	273*
Greene			56 054	619				
Grundy							14 085	361*
Hamblen							59 098	156*
Hamilton	282 988	539						
Hancock							6 751	480
Hardeman							23 322	670*
Hardin							22 314	578*
Hawkins			45 137	486				
Haywood							20 547	534*
Henderson							21 854	520
Henry							29 023	560*
Hickman							15 927	610*
Houston	7 011	200						
Humphreys							15 702	527
Jackson							9 146	308*
Jefferson							35 027	266*
Johnson							14 302	297*
Knox	331 840	506						
Lake							8 310	168*
Lauderdale							24 256	475
Lawrence							34 625	617*
Lewis							10 580	282*
Lincoln							26 229	571
Loudon					30 719	235		
McMinn			43 710	429				
McNairy							23 337	562*

*Less than .5 psi overpressure

STATE OF TENNESSEE (Continued)

COUNTY	VERY HIGH RISK POPULATION	VERY HIGH RISK AREA	HIGH RISK POPULATION	HIGH RISK AREA	MEDIUM RISK POPULATION	MEDIUM RISK AREA	LOW/NO* RISK POPULATION	LOW/NO* RISK AREA
Macon							15 667	307*
Madison							76 858	558
Marion					24 502	512		
Marshall							20 095	376*
Maury							51 863	616*
Meigs					7 787	189		
Monroe							30 048	648
Montgomery	88 788	539						
Moore			4 907	129				
Morgan					17 290	523		
Obion							32 980	550
Overton							18 095	433*
Perry							6 427	412*
Pickett							4 510	159*
Polk							13 605	437
Putnam							50 464	399*
Rhea							24 819	309
Roane	49 436	357						
Robertson							38 717	476
Rutherford							97 308	605
Scott							20 635	528*
Sequatchie							8 618	266
Sevier							47 229	590*
Shelby	796 450	772						
Smith							14 564	313*
Stewart	9 154	454						
Sullivan	145 705	415						
Sumner							92 025	529
Tipton			35 021	454				
Trousdale							5 488	114*

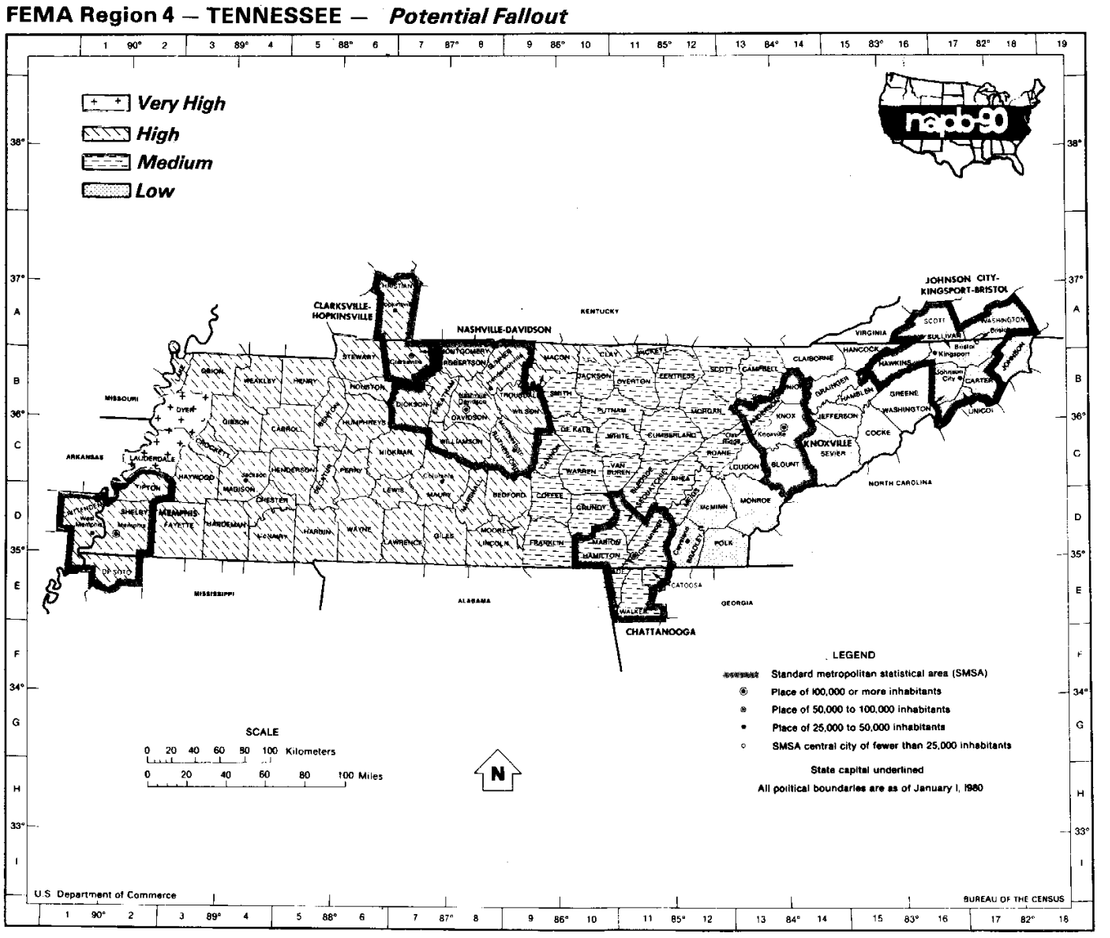
*Less than .5 psi overpressure

STATE OF TENNESSEE (Continued)

COUNTY	VERY HIGH RISK POPULATION	VERY HIGH RISK AREA	HIGH RISK POPULATION	HIGH RISK AREA	MEDIUM RISK POPULATION	MEDIUM RISK AREA	LOW/NO* RISK POPULATION	LOW/NO* RISK AREA
Unicoi							16 911	186*
Union							12 358	218*
Van Buren							4 782	273*
Warren							33 436	431*
Washington	92 699	326						
Wayne							14 115	734*
Weakley							33 395	581
White							19 814	373*
Williamson							68 284	584
Wilson							61 352	571
TOTAL STATE	2 549 809	6 849	213 131	2 717	108 999	1 934	1 874 577	29 430
							(888 913	11 507)
							(985 664	17 923)*

*Less than .5 psi overpressure

FEMA Region 4 — TENNESSEE — *Potential Fallout*



STATE OF TENNESSEE -- FALLOUT RISK

Estimated 1985 Population: 4,746,516
Land Area: 40,930 square miles

COUNTY	VERY HIGH RISK [GT 15000R] POPULATION	VERY HIGH RISK [GT 15000R] AREA	HIGH RISK [EQ/GT 6000R LT 15000R] POPULATION	HIGH RISK [EQ/GT 6000R LT 15000R] AREA	MEDIUM RISK [EQ/GT 3000R LT 6000R] POPULATION	MEDIUM RISK [EQ/GT 3000R LT 6000R] AREA	LOW RISK [LT 3000R] POPULATION	LOW RISK [LT 3000R] AREA
Anderson					69 607	339		
Bedford			28 701	475				
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STATE OF TENNESSEE (Continued)

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White					19 814	373		
Williamson			68 284	584				
Wilson			61 352	571				
TOTAL STATE	58 176	995	2 565 689	21 551	864 696	10 207	1 257 955	8 177