A. <u>General Overview</u> - The NAPB-90 project was an in-house effort of the Federal Emergency Management Agency (FEMA) carried out over a year and a half from early 1985 to 1986. The project was developed and coordinated by the Office of Emergency Management Programs, of the 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.

1. <u>Purpose</u> - The current nuclear attack planning base outlined in FEMA publication TR-82, "High Risk Areas for Civil Preparedness Nuclear Planning Purposes," which represented a 1975 assessment of the potential effects of nuclear attack through 1985. Since its publication, major changes have occurred which make this planning base obsolete. These changes are discussed below. NAPB-90 replaces TR-82 and provides a nuclear attack planning base for assessing and planning for preparedness measures for today and through 1990. The unprecedented destructiveness of strategic nuclear weapons and the possibility (however remote) of their use in war deserve the serious concern of government at all levels.

2. <u>Scope</u> - NAPB-90 is an estimate of the potential physical effects of a nuclear war on the population and land area of the United States in terms of the degree of the potential risk from these effects. In developing such risk assessments, the project incorporated publicly available data on Soviet nuclear warfighting objectives; the strategic nuclear arsenals available to carry out such an attack; and Soviet targeting objectives and force deployment procedures.

Three types of potential nuclear attack effects risks and the areas and populations affected by each are defined by NAPB-90:

- The potential direct effects risk from blast overpressure generated by the explosion of a nuclear weapon (measured in pounds per square inch [psi] over normal air pressure);

- The potential risk from thermal and secondary blast-ignited fires created by the combined effects of blast overpressure damage and the thermal pulse (or fireball) of a weapon; and

- The risk from potential fallout radiation generated by surface-burst nuclear weapons.

All attack effects were determined using the FEMA READY nuclear effects assessment system and the FEMA Population Grid File (PGF). All computer work was under the supervision of the Computer Systems Division, Office of Information Resources Management, Emergency Operations Directorate. In most instances, NAPB-90 potential risk areas were defined to match complementary preparedness measures necessary to mitigate weapon effects, as well as long-term steps to maintain life support in the threat area. Risk area definitions are found in Part 3, "Risk Definitions." Specifically identified areas and populations affected are outlined in Part 3.A. "Direct Effects Risk;" Part 3.B., "Fallout Risk;" and Part 3.C., "Thermal and Secondary Blast Fire Risk." Annexes A and B contain statistics and maps concerning these threats.

3. Limitations - NAPB-90 was developed after detailed studies of all aspects of nuclear attack planning. Despite such efforts, there is no way to assign specific confidence limits to either the implicit or the explicit assumptions used regarding targeting, weapon yields and designs, heights of burst, accuracy, and delivery system reliability. The only confidence which can be claimed by NAPB-90 is that it represents a credible estimate of the potential risk from a large-scale nuclear attack on the U.S., having been constructed on logical, studied assumptions and available emperical data. Hence:

- NAPB-90 cannot be used to predict how a nuclear war would be fought against the U.S. but merely identifies areas and populations which are at potential risk from nuclear weapon effects;

- NAPB-90 does not speculate on the strategic priority which might be given specific targets by Soviet planners (although an overriding assumption would be that destruction of U.S. strategic counterforce facilities would be a very high priority). The planning base, therefore, represents no specific war-fighting scenario;

- NAPB-90 acknowledges only the classes of targets used in the development of the planning base but does not identify individual targets by their strategic value (see Part 2.b., "Target Selection");

- NAPB-90 makes no assumptions regarding potential population casualties acknowledging only the numbers of residents, day-to-day populations within defined risk areas; and

- NAPB-90 does not purport to be totally predictive (100 percent correct) in its presentation of potential risks from direct effects, fire, and fallout. This is particularly true for fallout risk area definitions where the total risk following an attack would be driven by weather conditions at that time.

In short, no nuclear attack planning base or any study involving nuclear war can claim total accuracy since there is no way of knowing Soviet war plans.

B. TR-82 vs. NAPB-90 - As stated earlier, the purpose of the NAPB-90 project was to update and replace the nuclear attack planning base represented in FEMA publication TR-82, 1979. While a comparison of the differences between TR-82 and NAPB-90 is difficult since each base approached the problem of defining risk uniquely, the following is presented as illustrative of the differences in the approaches to define potential risks.

1. General Comparisons - While NAPB-90 projections on populations and areas subject to nuclear attack effects are configured differently than in TR-82, a general comparison of compatible data can illustrate the significant differences between the two bases.

To determine risk areas, NAPB-90 employed the FEMA Population Grid File (PGF) which divides the U.S. land area into squares of 2 minutes latitude and longitude. Each square is approximately 2 1/4 miles per side, or roughly 5 square miles in area. The center of each square is used as a reference point for all resources within the square. A total of approximately 115,000 such points constitute the entire file.

Overpressure computations were done at 2-mile intervals from the assumed ground zero (detonation point or AGZ) of a weapon for total distances of 25 miles in all compass directions. These generated 2-mile intervals from the AGZ coincide with the grids of the PGF.

Fallout computations were done at 10-mile intervals, effectively at each corner of a 10-mile grid using approximately 55,000 such points.

The basic data of each grid point are the resident population of the square and standard Bureau of the Census geographic codes (State, county, minor civil division, and Standard Metropolitan Area, as applicable). In addition, applicable resources data were identified by geographic location (i.e., latitude and longitude coordinates), summarized, and "attached" to the appropriate PGF point. Finally, overpressure and fallout effects were overlayed on the PGF for effects analysis.

,The developers of TR-82 used the bounding limit of 2.0 psi overpressure as a definition of risk from nuclear detonations. The reason for this choice is sound, but NAPB-90 expanded and refined this single definition of blast risk. This bounding limit, however, provides a basis for a general comparison between NAPB-90 and TR-82. There were 829 whole counties which the TR-82 planning base defined as having at least one PGF point at 2.0 psi or more overpressure.

Using the same measurement for comparison of the two planning bases, there were 326 counties included in this risk definition in the NAPB-90 but which were not so identified in the TR-82 base, i.e., newly identified as at this risk level. Conversely, 190 counties at this risk level in TR-82 were no longer identified at this risk level in NAPB-90.

In sum, a total of 972 counties--a net increase of 136 counties--was identified at this risk level by NAPB-90.

Using estimated 1985 populations of only those PGF points in both planning bases which meet the 2.0 or more psi risk definition provide another comparison between the two bases:

	TR-82	NAPB-90
Population at 2 psi risk or greater	155.86 Million	129.74 Million
Population outside 2 psi risk area	85.79 Million	111.91 Million
Total 1985 U.S. population	241.65 Million	241.65 Million

As stated earlier, the reasons for this difference are numerous but can be summarized by stating that NAPB-90 was developed from a strategic targeter's force application viewpoint (how weapons would logically be used against targets). By contrast, the TR-82 planning base weapon employments deliberately created a "worst-worst" risk environment through the employment of all weapons in both air- and ground-burst modes for each aim point.

A secondary but important reason for this difference can be found in the weapon yields employed by both planning bases. The average assumed yield of all weapons used in NAPB-90 is slightly less than 1 megaton, reflecting the trend in Soviet (and in U.S.) strategic inventories toward smaller, more accurate weapons. By contrast, TR-82 employed then-current, high-yield Soviet weapons with yields as high as 20 megatons.

2. General Characteristics - The NAPB-90 and TR-82 planning bases have the following general characteristics in common, in opposition, or singularly:

TR-82	NAPB-90
° Risk assessment (see below) based upon "worst-worst" weapon employment	° Risk assessments based upon estimates of Soviet weapon employment
° Target priorities by class acknowledged but not used in application to preparedness programs (all risk areas assumed to be at equal risk)	° SAME; no change
° Illustrated publication showing maps with 2 psi blast envelopes (red) and high fallout risk counties (green)	° TO BE DETERMINED
° Planning base information made available for unlimited distribution to State and local governments and the public	° SAME; deployment to be determined

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3. <u>Target Classes</u> - The NAPB-90 and TR-82 planning bases have the following target class characteristics in common, in opposition, or singularly:

TR-82	NAPB-90
° Selection of target classes based on the following criteria in descending order of priority:	° Selection of target classes based on recent data and the following headings:
-- U.S. Military Installations	-- Strategic Military Installations
-- NO COMPARABLE CLASS (included in target class above)	-- Non-Strategic, Other Military Installations and Bases
-- Military-Support Industry, Transportation, and Logistics	-- SAME, less Transportation and Logistics
-- Other basic industries and facilities that contribute significantly to maintaining U.S. economy	-- NO COMPARABLE CLASS
-- Population concentrations of 50,000 or more (Bureau of Census urbanized areas) not otherwise targeted	-- NO COMPARABLE CLASS
-- NO COMPARABLE CLASS	-- Ports
-- NO COMPARABLE CLASS	-- Petroleum Refineries
-- NO COMPARABLE CLASS	-- Political
-- NO COMPARABLE CLASS	-- Electric Power Plants
-- NO COMPARABLE CLASS	-- Chemical Industries
° Based on 1980 projections of Soviet capabilities; weapon employments developed considering active U.S. defenses, vulnerability, and time-sensitivity of targets; maximized target destruction; minimized weapons employed	° Virtually the same technique; used current-to-1990 Soviet weaponry; time-sensitivity of targets not a consideration
° Probable targets reviewed to eliminate isolated military and industrial facilities considered of marginal significance	° Editing of target classes done to conform with perceived Soviet strategic principles

° States given an opportunity
  to present justification for
  addition or deletion of targets
  they deemed at risk from
  nuclear attack effects; approved
  or disapproved at national level

° Virtually the same; methods
  of implementation to be
  determined

4. **Assessments** - The NAPB-90 and TR-82 planning bases have the following
risk assessment characteristics in common, in opposition, or singularly:

<table>
<tr><td align="center">TR-82</td><td align="center">NAPB-90</td></tr>
<tr><td>° All weapons air burst to maximum ground range of 10.0 psi overpressure to attain worst case</td><td>° Weapons employed in accordance with perceived Soviet force application and targeting principles</td></tr>
<tr><td>° Blast envelopes depicted risk areas subject to a 50 percent or greater probability of receiving 2.0 psi overpressure or more</td><td>° Four direct effects risk levels identified (see Part 3.A., "Direct Effects Risk")</td></tr>
<tr><td>° Risk from thermal fire assigned to extent of 2.0 psi risk area</td><td>° Thermal and secondary blast fire fire risk identified (see Part 3.C., "Thermal and Secondary Blast Fire Risk")</td></tr>
<tr><td>° All weapons ground burst to maximize fallout radiation for worst case</td><td>° Fallout radiation risk determined from ground-burst weapons only</td></tr>
<tr><td>° High-risk fallout areas (whole counties) designated where there was 50 percent or greater probability of receiving an H+1 dose rate of 10,000 R or greater per hour for any of four seasonal winds (1975 publication only)</td><td>° Four fallout radiation risk levels identified (see Part 3.b., "Fallout Risk")</td></tr>
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