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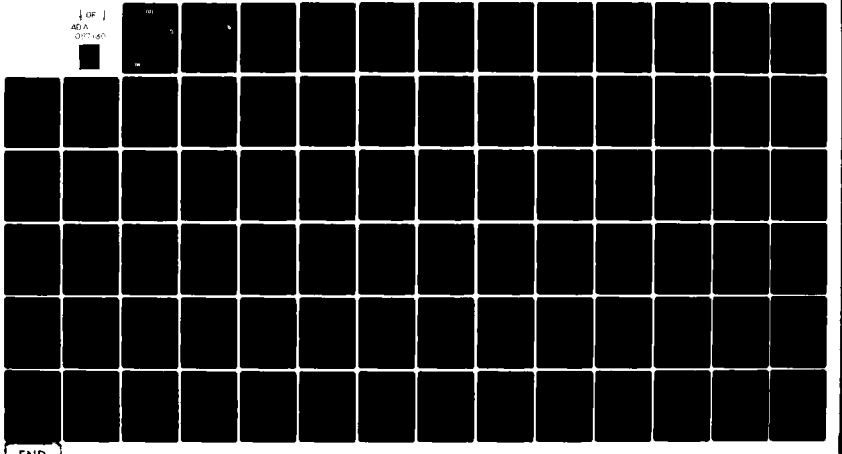

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RECEPTION AND CARE PLANNING FOR WIDELY DISPERSED POPULATIONS

Cecil H. Davis
William W. Chenault

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Final Report
Contract DCPA01-78-C-0193
Work Unit 4821G

March 1980

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RECEPTION AND CARE PLANNING FOR WIDELY DISPERSED POPULATIONS

by

Cecil H. Davis and William W. Chenault

For
Federal Emergency Management Agency
Washington, D.C. 20472

Final Report—March 1980
Contract DCPA01-78-C-0193
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The report examines the numerous factors affecting the capacity of communities to absorb and care for evacuees, and illustrates the impact of a greater dispersal of the evacuee population on preparedness activities related to the reception and care of evacuees. The report concludes that the existing civil defense Reception/Care guidance is fully adaptable to the requirements of a more dispersed evacuee population; on the other hand, a widespread dispersal would preclude using much of the host area's infrastructure, and would require the mandatory billeting of evacuees in private homes.

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RECEPTION AND CARE PLANNING FOR WIDELY DISPERSED POPULATIONS

TABLE OF CONTENTS

LIST OF TABLES

RECEPTION AND CARE PLANNING FOR WIDELY DISPERSED POPULATIONS

–Introduction and Summary–

The evacuation of large population centers imposes a complex hosting burden on the communities that receive and support the evacuees. The Defense Civil Preparedness Agency–now a part of the Federal Emergency Management Agency–has published extensive and detailed guidance that describes the steps in planning and organizing such an operation.

This report describes many of the factors that would influence the hosting capacity of reception areas. In particular, the present study has examined the adaptability and suitability of the current Reception/Care guidance for evacuations involving a "thinly spread" or highly dispersed evacuee population.

Current Reception/Care Guidance

Reception and Care Planning Guidance for Host Communities (CPG-2-8-14 and 15, March 1977) provides (1) the checklists and forms used to write Reception/Care plans, (2) step-by-step instructions for preparing plans, (3) organization charts and job descriptions for host area Reception/Care organizations, and (4) the training and orientation materials needed to gradually or quickly staff such a hosting organization, should international events ever lead to such contingency measures. Developed by Human Sciences Research, Inc., [1] the guidance defines comprehensive Reception/Care planning as preparedness for *organizing and managing the relocated population*–a complex task which breaks down into the following functions:

- receiving and registering evacuees in host areas;
- lodging evacuees in congregate care facilities (and in any private dwellings volunteered by host area residents);
- sheltering the evacuee and resident populations from fallout hazards;

[1] William W. Chenault and Cecil H. Davis, *Reception and Care Planning Guidance for Host Communities* (4 vols., McLean, Virginia: Human Sciences Research, Inc., 1976).

- feeding the relocated population distributed in congregate lodging or shelter facilities;
- providing other essential services required by special populations or groups such as the aged, the infirm, the handicapped, or families and individuals needing special supports during a relocation period.

The Reception/Care guidance is probably the most detailed of the several planning aids produced by the civil defense Crisis Relocation Planning (CRP) program. The Reception/Care materials describe and illustrate how to divide a host county into Districts (approximately 10,000 evacuees and residents) and Lodging Sections (roughly 2,500 people). Organizational structures are defined at the County, District, Lodging Section, and facility levels for each of the essential services listed above. The guidance has been found to be adaptable to diverse local circumstances but it also contains a planning "format" which can be used to create a fill-in-the-blanks type of plan on a crash basis.

Several of the options built into the Reception/Care guidance have been of special interest in this project—notably, the option to utilize volunteered private residences for hosting evacuees, and the option to relocate and host evacuees as organizational units.

Volunteered private residences. The CRP program is geared to the hosting of evacuees in public buildings and shelters. Historically, however, people have exhibited a willingness to share their homes with disaster victims, and a substantial percentage of Americans indicate in attitude surveys that they would do so in a crisis relocation operation.[2] The guidance recognizes this possibility, providing for a limited number of Reception/Care staff who would interact with private home owners and their guests. On the other hand, the guidance does not now provide detailed information on the numerous special features of host evacuee relations when large numbers of people are housed in volunteered private residences.

Organizational relocation. The CRP program is also geared to the standard or typical methods of receiving and caring for evacuees. Thus, people are assumed to arrive as families, individuals, or small groups, are processed and registered at reception centers, and are then assigned to predesignated mass care facilities. Research has demonstrated, however, that the movement and hosting of organizational units—employees plus their dependents—

[2]See, for example, R. L. Garrett, *Civil Defense and the Public: An Overview of Public Attitude Studies* (DCPA Research Report No. 17, December 1976); and J. Nehnevajsa, *Issues of Civil Defense: Vintage 1978—Summary Results of the 1978 National Survey* (Center for Social and Urban Research, University of Pittsburgh, 1979).

can greatly simplify a massive relocation effort, generate "already organized" evacuee groups, and provide organized risk area resources which could be used in host areas.[3] The current guidance incorporates the procedures—and describes Reception/Care functional units—that could be used to implement this option for a substantial portion of the evacuee population.

The Distribution of Evacuee Populations in Host Areas

Crisis relocation guidance and plans—notably, their Reception/Care elements—would have the effect of concentrating the evacuee population in the larger of the host communities around the evacuated areas. That is, the larger towns in a host county—or certain facilities or natural features offering good fallout protection—would usually receive the bulk of the evacuee population allocated to that county. This tendency to cluster evacuees in certain locations is readily explained. The larger towns, especially those serving large trading areas, have the bulk of the infrastructure, the public buildings, and the commercial facilities needed to house, feed, and support evacuees during an extended stay.

The full utilization of existing infrastructure and facilities, therefore, would serve to create an evacuee-plus-resident population which is more concentrated than the resident population of host areas. On the other hand, the post-relocation population would be much less concentrated than in its normal configuration. (Approximately 60 percent of the total American population would be moved from higher-risk areas to surrounding host areas.) And both evacuees and host area residents would now be located apart from the country's principal (non-population) targets.

Reducing the Vulnerabilities of Concentrated Populations in Host Areas

An attacker seeking to maximize population damage—and confident that U. S. relocation plans would be implemented—*could* elect to target the larger of the evacuee-plus-resident concentrations in host areas. The two logical responses to such a possibility

[3]William G. Gay and William W. Chenault, *Crisis Relocation: Distributing Relocated Populations and Maintaining Organizational Viability* (McLean, Virginia: Human Sciences Research, Inc., 1974).

would be to (1) construct blast shelter in higher-density host areas or (2) further disperse the host area population. Since CRP is being pursued as a low-cost alternative to a blast shelter program, the only option within existing cost limits is (or might be) greater dispersal of host area populations.

A thorough cost-effectiveness analysis of dispersal options would be a complex matter. In addition to the numerous assumptions and variables built into nuclear effects studies—targeting, weapons distribution, population posture, etc.—such a study would have to consider the management of large-scale protective and support activities during a relocation period. If the host area population were more widely dispersed, how much more costly or difficult would it be to prepare or upgrade fallout shelter, distribute essential goods and services, arrange for commuting, provide attack warning, secure public cooperation, and generally manage or control the population's activities? And would these costs be justified by the resulting reductions in the vulnerability of the evacuee-plus-resident population of host areas?

Objectives of the Present Study

More limited objectives have guided this initial effort, which is concerned more with the feasibility than the costs of wider dispersal. The study has been concerned with two questions:

> At a general level, what factors would influence the feasibility of planning and operating a Reception/Care effort for widely dispersed populations?
>
> Specifically, is the current Reception/Care guidance adaptable to the wider-dispersal problem?

Approach

Part One of the study addresses the general question, focusing on the availability of lodging and shelter capacity to be "gained" in rural areas versus the capacity which

would be "lost" if the evacuee-plus-resident populations of host towns were limited by some arbitrary ceiling. The HSR staff selected nine host area counties which display substantial variations in location, climate, geography, ethnicity, socioeconomic characteristics, housing quality and construction, and other factors affecting the implementation of a hosting operation. Using data on these "typical" counties, the report considers the implications of wider dispersal for the vulnerability of the population, the planning and implementation of Reception/Care services, the use of private homes and basements, and use of organizational relocation to increase the effectiveness or reduce the burdens of an evacuation operation.

Part Two of the study illustrates the effects of wider dispersal on Reception/Care planning. While developing the current Reception/Care guidance, HSR staff prepared a prototype plan for Fremont County, Colorado.[4] The present study illustrates how those same evacuees and organizations would be allocated if limits were placed on the concentration of evacuees-plus-residents in the several towns which formerly received the bulk of the evacuees.

Conclusions

- Wider dispersal of evacuees involves potentially serious reductions in the usable congregate care and shelter space available in host area towns and small cities.
- Replacement of the lost space is often possible. But use of thinly spread facilities and private homes in rural areas would require more extensive planning, and would entail more "judgment calls" by planners and operators working in local contexts.
- Rural hosting would depend on a mandatory policy concerning use of private homes and basements, as opposed to a policy of using large buildings while relying on a portion of local residents to volunteer their homes. Mandatory home-sharing would be required both to obtain sufficient spaces and to make the planning process sufficiently predictable and specific.
- Many of the larger homes in rural areas should be used as small mass care facilities.

[4]William W. Chenault, Cecil H. Davis, Karen E. Cole, *Prototype Reception/Care Plan to Meet the Welfare, Shelter, and Related Needs of Populations Affected by Crisis Relocation: Reception/Care Plan for Fremont County* (McLean, Virginia: Human Sciences Research, Inc., 1975).

- Institutionalized and other dependent populations should be allocated to the larger towns with their medical, nursing home, and other potential congregate lodging facilities.
- Wider dispersal would require larger Reception/Care staffs and more elaborate mechanisms for distributing essential goods and services.
- Wider dispersal requires greater reliance on expedient shelter and presents a more difficult task of constructing, upgrading, inspecting, and managing shelters.
- The existing Reception/Care guidance is readily adaptable to the wider dispersal of host area populations. The current guidance defines Reception/Care jurisdictions–Districts, Lodging Sections, etc.–to cover the entire land area of a host county (though evacuees are concentrated in the larger towns or special facilities). The same Reception/Care units would therefore encompass the larger and more rural areas receiving evacuees. The major adjustments required to accomodate a wider dispersal would include:

  –incorporation in Reception/Care plans of provisions for evacuating any host communities whose preattack populations are too concentrated–*i.e.*, wider dispersal would, in effect, create new risk communities within some host counties.

  –revision of procedures for allocating institutional or other dependent populations to the larger of the (remaining) host communities–or those with the best medical, nursing home, and other facilities.

  –merging some presently defined Lodging Sections and Districts, where wider dispersal serves to substantially reduce the total evacuee-plus-resident population of those jurisdictions.

  –division or subdivision of presently defined Sections or Districts where they would now receive substantially greater evacuee populations.

  –increased staffing for the Lodging Aide function–the personnel working with homeowners and evacuees in private homes–and reduced staffing for congregate care positions such as Facility Managers.

- redesign of the feeding arrangements to reflect the wider dispersal of population, including any measures required to manage the distribution and preparation of food in private homes.

- increased staffing and more detailed specifications for functions relating to the routing of evacuee traffic, supervision of commuter traffic, and registration/assignment of evacuees.

- Organizational relocation, as defined and defended in the most recent report on that concept,[5] offers still-more-important advantages in a relocation involving widely dispersed populations. Given the more difficult problems of managing, controlling, and supporting widely dispersed evacuees, organizational relocation can serve to increase the self-help capabilities of pregrouped evacuees and provide pre-organized manpower and other resources to rural Reception/Care authorities.

The extent of the additional burdens imposed by wider dispersal suggests that it be undertaken only if the probabilities of a very large, population-focused attack are considered to be substantial. Even then, a more rigorous analysis might suggest that improved fallout shelter or blast shelter could be a competing option. On the other hand, the existing guidance provides a suitable framework for organizing Reception/Care services for widely dispersed populations. The adjustments required for wider dispersal should also be considered in relation to the crisis relocation problem in the Northeast, the Los Angeles area, and other densely populated regions where dispersal to the very rural areas is often required to accommodate evacuees under the current CRP concept.

[5]William W. Chenault and Cecil H. Davis, *Organizational Relocation* (McLean, Virginia: Human Sciences Research, Inc., 1978).

PART ONE
IMPLICATIONS OF WIDER DISPERSAL FOR RECEPTION/CARE PLANNING

Introduction

The feasibilityof dispersing evacuees widely depends, first, on the capacity of rural or outlying areas to lodge and shelter evacuees and, second, on the capability of a Reception/Care operation to organize, manage, and support that more widely dispersed population. The initial sections below examine potential hosting capacity in terms of housing characteristics of rural areas, the socioeconomic factors that would affect hosting operations, and other factors affecting the vulnerability of host area populations. Later sections describe procedures for computing hosting capacity and discuss the implications of these data for Reception/Care planning and operations.

Nine Host Counties

To examine and describe the problems posed by wider dispersal, HSR staff selected a total of nine counties across the country that would receive significant numbers of evacuees—and that present a diversity of hosting and relocation problems. The selection reflected the staff's knowledge of the variety of hosting situations found in the CRP program, with particular reference to the following considerations:

Location: The counties should represent most major regions but exclude the very-high-density areas such as the Northeast. The special relocation problems of the intensively urbanized sections would include the use of rural housing and facilities, even without an effort to further disperse evacuees. The present effort is concerned with the *differences* between the present guidance and that for a more dispersed population, and the inclusion of the densely populated regions would tend to obscure those differences.

Geography: The counties to be examined should represent a range of conditions, including variations in land area, terrain, accessibility, and climate.

Social and Economic Characteristics: The counties should display the variety found across the country with respect to the composition of population, ethnic make-up, socioeconomic status, economic base, and social organization. Furthermore, these host counties should similarly illustrate the range of such differences between the host and the evacuee populations which would merge during a relocation operation.

Demography: The counties should represent varying levels of population density and mixes of urban, suburban, rural nonfarm, and farm population.

Housing: Both capacity and quality should vary among the counties, which should exhibit the country's principal housing kinds, sizes, types of construction, quality of utilities, availability of basements, etc.

Finally, the counties used to illustrate the factors affecting wider dispersal should also depict a range of considerations peculiar to the contrast between a concentrated versus a dispersed evacuee-plus-resident population. Current CRP doctrine has generally assumed that potential target areas (cities) over 50,000 population are to be relocated, but the concentration of evacuees in the larger host towns is allowed to create host area concentrations of over 50,000. A policy of wider dispersal would effectively limit host area concentrations to some (presumably lower) figure. Since such a standard has not been defined, the HSR staff assumed that towns might be limited to a total post-relocation population of 50,000; 25,000; 15,000; 10,000; or leven lower.

Table I below summarizes essential data (from the 1970 *Census of Population)* on the nine counties examined here.

Table I: Nine Host Counties

County	State	Principal City	Co. Area Sq. Mi.	County Population	Pop. per Sq. Mi.	Metropolitan Risk Area
Athens	Ohio	Athens	504	54,889	108.9	Columbus, OH
Butte	California	Chico	1,645	101,969	62.0	Sacramento, CA
Coconino	Arizona	Flagstaff	18,540	48,326	2.6	Phoenix, AZ
Fremont	Colorado	Canon City	1,561	21,942	14.1	Colorado Springs, CO
Grady	Oklahoma	Chickasha	1,096	29,354	26.8	Oklahoma City, OK
Knox	Illinois	Galesburg	728	61,280	84.2	Peoria, IL
Prince Edward	Virginia	Farmville	357	14,379	40.3	Richmond, VA
Robeson	North Carolina	Lumberton	949	84,842	89.4	Fayetteville, NC
Wasco	Oregon	The Dalles	2,381	20,133	8.5	Portland, OR

Factors Affecting Capacity to Host and Shelter Evacuees

The following sections examine the principal factors that relocation planners would consider while planning for a wider dispersal of evacuees in these representative counties. General physical and socioeconomic conditions are treated first, then the more readily quantified factors related to population and housing. The principal objective here is to describe these factors and the diversity of circumstances affecting host area planning. A secondary objective is to illustrate how Census data can be used to develop initial estimates of hosting capacity. The concluding section describes formulae for computing hosting capacity from readily available Census data.

Physical and Socioeconomic Factors

Representing most major sections of the United States, the counties range in land area from 357 to 18,450 square miles, in population from 14,000 to over 100,000 people, and in population density from 2.6 to nearly 110 persons per square mile. Their principal urban centers range in size from Farmville, Virginia, whose 4,240 residents represent less than 30 percent of the county population, to Galesburg, Illinois, whose 33,800 citizens represent well over one-half of the Knox County population.

The nine counties also illustrate wide variations in climate, topography, and the suitability and accessibility of their settled areas for hosting evacuees. The winter season would affect the utilization and improvisation of lodging, shelter, and expedient shelter in all of the counties, but some winter months would call for special planning provisions and reduced use of natural or man-made facilities in the northern and mountainous counties.

Topographical features range from the flat lands of Illinois and North Carolina to the rugged mountains and canyons of the Arizona and Colorado counties. In between fall the prairies of Oklahoma, the rolling hills of Athens County, Ohio, and the combination of mountains and farm lands in Butte County, California, and Wasco County, Oregon. Planners would often find these features correlating with population density, usable housing, and accessibility via transportation arteries within the counties.

The diverse economies of the counties also demonstrate how these factors interrelate with the infrastructure, housing quality and quantity, and other elements of interest to relocation planners. Robeson, in North Carolina, is heavily agricultural and presents numerous small housing units. Fremont and Coconino Counties, by contrast, have little market agriculture in relation to their large areas, but the Grand Canyon and Royal Gorge are among the major tourist attractions which affect the supply of housing and its (seasonal) accessibility.

Contrasted with Fremont and Coconino Counties, with their large, rugged, sparsely inhabited areas, the predominantly agricultural counties present a wide spread of population and a reasonable balance among towns, small towns, and farms. Robeson, Athens, Butte, and Knox are examples, while Grady and Prince Edward fall near this common model. Of the nine counties, Wasco comes closest to a truly diversified economy. Its agricultural base includes wheat farming, cattle and sheep ranching, and the raising of fruits and vegetables. Its industry (aluminum) and commerce are supported by a transcontinental railway and its principal city, The Dalles, serves as a port and gateway to the vast inland area of central Oregon.

The nine counties, in sum, present a cross-section of the economic characteristics of the principal U. S. counties that would be used to host evacuees in a crisis relocation. None is predominantly industrial. (The use of a 50,000-population cut-off for probable targets would tend to leave out counties with a substantial industrial base.) Indeed, the county which comes closest to the urban industrial standard, Wasco, is also near a potential target: The Dalles Dam, a major hydroelectric and water transportation facility on the Columbia River. In general, the counties present two patterns of population distribution, with the evenly inhabited agricultural areas contrasting with sparsely inhabited areas of rugged terrain and limited economic activity.

The social and ethnic make-up of these host counties reflects the economic and other factors discussed above. Planners for a wide dispersal would naturally be sensitive to the subtler, attitudinal factors which affect host-evacuee relationships. Experience suggests that the "cruder" cross-racial or ethnic differences do not tend to be operative in

emergency circumstances, but cultural and life-style differences (perhaps overlapping with the quality of housing or accommodations) would influence host-evacuee relations. Even more important than the relocation situation, itself, would be the normal or precrisis circumstances in which citizens would become familiar with plans and begin formulating attitudes which would later influence their behavior in a crisis period.

Given such considerations, it is worthwhile to look at the distribution of "white" versus "non white" population in the nine counties. (The Census classifies non-white residents as Negro, Indian, Japanese, Chinese, Filipino, and Other--a breakdown which overlooks many ethnic differences but indicates roughly the cultural diversity found within the nine counties.) The 1970 Census indicates the nine counties have a non-white population averaging 8,669, or about 18 percent of their total population. Robeson (North Carolina) has the largest number (48,568) and percentage (57.3) of non-whites, of whom about 84 percent (40,701) live in rural areas of the county. This rural population breaks down into 24,807 Indians, 15,215 Negroes, and 679 "Other." At the other extreme is Fremont (CO), where non-whites were 395 or 1.8 percent of the total population. Athens (OH), Grady (OK), and Wasco (OR) show very small percentages of non-whites, of whom relatively few are classified as rural. Coconino (AZ) and Prince Edward (VA), however, have large non-white populations that reside, predominantly, in the rural areas of those counties. As the following sections will suggest, these large "rural non-white" populations often correlate with housing and other factors which would influence the planning and implementation of hosting operations.

Population Factors

Both population and housing data from the Census can be used to describe the hosting problems and the hosting capacity in areas affected by wider dispersal. Two distinctions reflected in the data are especially important: (1) rural versus urban and (2) rural farm versus rural non-farm. "Urban" population and housing are found in incorporated places of 2,500 or more inhabitants, and in the densely populated fringes of urban areas, whether incorporated or not. Within "rural" areas, farm and non-farm residents are further classified on the basis of number of acres and the value of farm products marketed. For most States, the 1970 Census also segregates out the rural population in places of 1,000 to 2,500 inhabitants.

Very detailed and intricate analyses of such data can produce fine distinctions concerning the capacity and quality of dwellings. For example, some nonmetropolitan communities show an evolving pattern of large or new dwellings which can be classified as rural nonfarm, while the more traditional "farm houses" in some counties may be showing signs of decline or dilapidation. In other counties, however, new nonfarm units may be small or seasonal, while the traditional farm homes may offer more spacious accommodations. Some of these variations will be considered in the next section, which discusses both "number of rooms" and "plumbing facilities" as indicators of hosting capacity.

The present section focuses on the distribution of population. How spread out are the residents? Wherever possible, the county populations are considered with reference to "places of 1,000 to 2,500" and "other rural," while "farm" population is broken out of the rural category to indicate (usually) outlying residences offering greater capacity than other rural housing.

The subsections below compare and contrast the nine counties with respect to four sets of variables related to hosting capacity: (1) urban versus rural population, (2) places of 1,000 to 2,500 population, (3) farm population, and (4) the population in group quarters. The data summarized in Tables II and III (on the following page) are from the 1970 *Census of Population.*

Table II: Urban, Rural, and Farm Population

County	State	Urban Population	Rural Population	In Places of 1,000 to 2,500	Other Rural	Farm
Athens	Ohio	28,409	26,480	4,806	21,674	1,350
Butte	California	65,008	36,961	4,876	32,085	3,767
Coconino	Arizona	26,117	22,209	5,628	16,581	2,005
Fremont	Colorado	14,851	7,091	1,805	5,286	719
Grady	Oklahoma	14,176	15,178	4,150	11,028	4,287
Knox	Illinois	43,032	18,248	*	*	5,898
Prince Edward	Virginia	4,240	10,139	*	*	2,061
Robeson	North Carolina	23,171	61,671	7,236	54,435	17,266
Wasco	Oregon	10,423	9,710	2,329	7,381	1,530
Averages		**25,492**	**23,076** **	**4,405** **	**21,210** **	**4,321**

*Data are not given in the 1970 Census.
**Average rural population would equal total of "1,000-2,500" plus "other rural" if missing data were available

Table III: Population in Group Quarters

County	State	Total County		Rural Areas Only		
		Pop. in Group Quarters	Percent of Total Pop.	Pop. in Institutions	Pop. in Other Group Quarters	Total Pop. in Group Quarters
Athens	Ohio	10,139	18.5%	99	113	212
Butte	California	3,664	3.6	53	16	69
Coconino	Arizona	3,626	7.5	0	4	4
Fremont	Colorado	2,025	9.2	34	45	79
Grady	Oklahoma	565	1.9	47	11	58
Knox	Illinois	3,066	5.0	132	4	136
Prince Edward	Virginia	2,214	15.4	35	572	607
Robeson	North Carolina	1,028	1.2	213	679	892
Wasco	Oregon	776	3.9	22	20	42
Averages		**3,010**		**70**	**163**	**233**

Urban Versus Rural Population. Private and governmental organizations and facilities, it was noted in the Introduction, tend to be clustered in the cities and towns. This simple fact, coupled with the current policy of using private homes only sporadically and on a volunteer basis, largely explains why the current CRP guidance and plans tend to concentrate evacuees in host county population centers.

Examination of the nine counties indicates both the overall extent of their urban concentration and the great diversity of population densities and distributions which would have to be reflected in a policy of wider dispersal. Thus, the overall density of the population ranges from 108.9 persons per square mile in Athens (OH) to 2.6 in Coconino (AZ). Urban and rural populations are roughly equivalent in Athens, Grady (OK), and Wasco (OR), whereas Knox (IL) and Fremont (CO) show urban areas having over two-thirds of the total population. The rural population exceeds the urban only in Grady, Robeson (NC) and Prince Edward (VA), though the latter two are over 70 percent rural. Even the enormous Coconino County shows an urban population of over 60 percent. Clearly, any policy which severely limits the size of post-evacuation population centers would have to contend with the fact of very small rural populations in most of these "rural" counties.

Places of 1,000 to 2,500 Population. Compared to the remainder of the rural population, these small towns offer modest but important advantages–a few public or private buildings, a location on a map, better or more predictable access to transportation arteries and communications systems, and a collection of available manpower, to mention the most obvious or common examples. For a widely dispersed population, they would often constitute familiar and readily located foci of organization.

Somewhat surprisingly, these small communities represent a relatively constant eight to twelve percent of the population in six of the nine counties. (Butte, in California, shows only about five percent of its people in these very small towns, and for two counties the 1970 data don't distinguish this portion of the rural population.)

Farm Population. This seemingly familiar category–now about five percent of the American population if very small marketers are included–exhibits enormous variance among the nine counties. Robeson County's 17,266 farm residents represent over 20 percent of its population, but Fremont's 719 or three percent is much closer to the nine-

county (and national) average of five percent. By and large, the disparate farm population represents only about ten percent of the total rural population of these counties. Given the assumption (realistic in most of the counties) that the farm population offers better facilities than the rural nonfarm population, it becomes apparent that the hosting resources outside small towns are not only scattered and therefore difficult to utilize, but meager as well.

Population in Group Quarters. Group accommodations represent one of the most interesting resources available to relocation planners. This category includes institutions ranging from military installations and penitentiaries to schools, mental hospitals, and special care facilities. It also includes nursing homes, boarding houses, homes for the aged or unattached children, and a variety of other (usually small) facilities housing nonfamily groups of people.

From Table III above (page 15), the nine counties show wide variations in both the numbers and percentages of population in group quarters. The ten thousand people so housed in Athens County (OH) represent 18.5 percent of the County's population, while Grady (OK), Robeson (NC), and Butte (CA) show a maximum of 3.6 percent.

A large group-quartered population normally indicates a large civilian institution or military installation. Thus, 1,800 of Fremont's 2,025 people in group quarters are housed in Canon City's Colorado State Penitentiary. Such institutions—mental hospitals, schools, etc.—can often provide lodging space and feeding facilities for large numbers of evacuees. Smaller institutions, including homes for the aged, nursing homes, and boarding houses, can usually provide some lodging space plus other essential facilities and services. In a massive evacuation, both large and small congregate lodging facilities could also provide essential "core" services for evacuees housed in other, perhaps improvised, quarters around these facilities.

With respect to maximum dispersal, however, the most impressive statistic from Table III is the negligible capacity of group quarters located outside the smaller and medium-sized towns. Purely "rural" areas do not have significant populations in group quarters.

Housing Factors

Both the *Census of Housing* and related series on socioeconomic characteristics of the population can be used to infer detailed descriptions of hosting capacity. The data examined in this section are from the *1970 Census of Housing*, excepting certain plumbing data for Robeson County (NC), which were extrapolated from 1960 housing data.

Definitions. "Urban housing" refers to dwellings in incorporated places of 2,500 or more inhabitants, plus housing in the densely populated urban fringe, whether incorporated or not. "Rural housing" is all other housing, divided between "farm" and "nonfarm" residences on the basis of the number of acres and the value of sales of farm products. Generally, occupied rural housing units on 10 acres or more, or reporting even small sales of farm products, are "farm" residences. Other rural housing, including all vacant units, are classified as "rural nonfarm." (Obviously, there are many additional technical considerations and subtleties associated with these definitions; the Census publications for any particular State should be consulted for finer distinctions.)

The structural characteristics of housing units also bear on determinations of capacity. Thus, a housing unit is a house, apartment, or one or more rooms intended for separate occupancy—residents do not live or eat with other occupants of the same structure; they have direct access from outside or through a common hall, or there is cooking equipment for their exclusive use. The count of whole rooms in a housing unit includes living rooms, recreation rooms, dining rooms, bedrooms, kitchens, finished attic or basement rooms, lodgers' rooms, or rooms used for offices by residents. Not counted as rooms are unfinished basements, porches, bathrooms, storage areas, unfurnished attics, laundry or furnace rooms, etc.

Finally, the data considered in this section describe "year round housing units," excluding those migratory and seasonal units which may not be suitable for lodging evacuees in all seasons. Local planners would have to assess the livability of any such structures on the basis of their characteristics, the need for space, and the availability and quality of non-housing structures.

Quantity and Quality of Housing. The lodging and (nearby) sheltering of evacuees are the first concerns of evacuation planners. As Tables IV and V on the following pages will suggest, the Housing Census can be used to estimate the availability of housing, its distribution and general quality. (The Housing Census, it should be noted, is not precisely consistent with the population data. When working with all of these data, planners must be attentive to the explanations accompanying Census tables—particularly, where data are based on samples rather than actual counts. Sample data incorporate ranges of error that may be increased when certain categories of data are compared, multiplied, or otherwise used in calculations.)

Key variables in the housing data for host counties include the rural-urban distribution of dwellings, numbers and percentages with basements, numbers of especially large dwellings, and percentages of units with complete plumbing.

Rural-urban distribution is also found in the population data, of course, but a comparison of Tables IV and V indicates how the housing data can more qualitatively indicate the resulting differences in capacity. Wider dispersal of evacuees implies greater use of "rural" dwellings and (usually) of "farm" units. This fact has differing imports for the nine counties. Thus, half of Athens County dwellings are rural and they tend to be larger (more rooms) than the urban homes. Coconino County, on the other hand, shows about 40 percent rural units, which are smaller and much more crowded than the urban dwellings. Fremont County's rugged terrain is suggested by the very few "farm" households and the fact that fewer than one-third of the dwellings are outside urban areas.

Table IV: Housing Units–Entire Counties

Counties	Yr.-Round Units	Median No. Rooms	Units Over Five Rooms	Units With All Plumbing	Units With Basements	Residents/ Occu. Unit
Athens (OH)	16,525	5.0	6,393	13,731	8,477	2.9
Butte (CA)	37,652	4.7	9,501	36,857	6,363	2.8
Coconino (AR)	14,424	4.2	3,288	12,200	865	3.6
Fremont (CO)	7,618	4.8	2,225	7,229	3,672	2.8
Grady (OK)	11,062	4.9	3,404	10,463	8,706	2.8
Knox (IL)	20,956	5.2	8,473	19,497	17,540	2.9
Prince Edward (VA)	4,371	5.3	2,017	3,027	1,442	3.1
Robeson (NC)	24,046	4.8	8,487	13,386	421	3.8
Wasco (OR)	7,127	4.9	2,533	6,874	3,000	3.0
Averages	15,976		5,147	13,696	5,610	

Table V: Rural Occupied Housing Units

Counties	Total Rural Units	Non-Farm				Farm			
		No. Units	Med. No. Rooms	Units Over Five Rooms	Persons Per Unit	No. Units	Med. No. Rooms	Units Over Five Rooms	Persons Per Unit
Athens (OH)	8,456	7,983	5.1	3,325	3.1	473	5.7	387	3.2
Butte (CA)	12,046	10,887	4.8	3,101	3.0	1,159	5.7	634	3.2
Coconino (AR)	5,726	5,345	3.8	1,184	3.9	381	1.5	12	5.3
Fremont (CO)	2,181	1,976	4.8	634	3.2	205	4.9	61	3.5
Grady (OK)	5,084	3,704	4.8	1,045	3.0	1,380	5.2	586	3.1
Knox (IL)	5,890	4,032	5.6	1,889	3.1	1,858	6.5	1,389	3.2
Prince Edward (VA)	2,817	2,212	5.4	1,104	3.3	605	6.1	412	3.4
Robeson (NC)	14,342	11,159	5.0	2,991	4.3	3,183	5.5	1,570	4.3
Wasco (OR)	2,988	2,506	4.9	923	3.3	482	6.0	309	3.2
Averages	6,615	5,534		1,800		1,081		596	

Basements represent usable or upgradable shelter. The Census data on the numbers and percentages of dwellings with basements can indicate whether such potential shelters are spread across the area in which residents and evacuees would be lodged. The lower the percentage of homes with basements, the more likely is it that large "pockets" of the emergency population would require expedient shelter.

The figures in Table VI below give the number of units with basements as a percent of total units in each of three categories: urban, rural non farm and rural farm. NOTE: These figures are approximations. The 1970 Census provides whole-county and rural figures only. In Table VI, the percentages of units with basements in 1960 have been applied to the number of housing units reported in 1970.

Table VI: Number and Percent of 1970 Housing Units with Basements (Extrapolated from 1970 and 1960 Data)

COUNTY	Urban		Rural Non farm		Rural Farm	
	Units with Basements	Percent of Urban Units	Units with Basements	Percent of Non farm Units	Units with Basements	Percent of Farm Units
Athens (OH)	3,709	45.9	4,409	55.2	359	75.8
Butte (CA)	4,125	16.1	2,042	18.7	796	68.6
Coconino (AR)	429	4.9	413	7.7	23	6.0
Fremont (CO)	2,469	45.4	1,104	55.8	99	48.2
Grady (OK)	4,359	72.9	3,260	88.0	1,087	78.7
Knox (IL)	12,368	82.0	3,617	89.7	1,555	83.6
Prince Edward (VA)	404	25.9	838	37.8	200	33.0
Robeson (NC)	170	1.7	195	1.7	56	1.7
Wasco (OR)	1,593	38.4	1,204	48.0	203	42.1

These data indicate that the percentage of units with basements tends to go upward as one moves outside the urban centers, and that a few counties–Robeson, Coconino, Prince Edward–offer relatively little basement shelter in any category. Only in Butte County, however, does the "farm" category show a marked increase over the urban areas and their fringes.

Countering this tendency toward increasing percentages of basements in rural areas, it should be noted, is the increased difficulty of utilizing such space for shelter. It is one

thing to shelter a town's population in half or more of its basements–they are located near the lodgings without basements. In suburban and farm areas, a movement from non-basement homes to basements may be lengthy and time-consuming. Overall, the larger percentage of non-urban basements is more than offset by the greater requirements to organize and move evacuees to those basements.

The especially large rural dwelling offers another potentially critical resource when planning for dispersal. The larger dwelling unit may serve as a small congregate care facility, an organizational or Lodging Section headquarters, or a feeding station for evacuees lodged in less spacious or poorly equipped dwellings. Finally, for purely lodging purposes, the larger unit normally has more room to add evacuees to the present residents.

One convenient measure of this resource is the Housing Census data on units with eight or more rooms. Listed below are the numbers of these dwellings in each of the counties, their rural parts, and the "occupied farm" units within these totals.

	total large units	in rural areas	on farms
Athens (OH)	1,241	581	80
Butte (CA)	1,120	475	82
Coconino (AR)	451	189	6
Fremont (CO)	406	121	10
Grady (OK)	383	169	74
Knox (IL)	1,831	913	519
Prince Edward (VA)	493	339	107
Robeson (NC)	-	-	197
Wasco (OR)	581	262	189

These units would be among the first to be considered for use in Reception/Care plans for congregate facilities and headquarters locations.

Perhaps a more revealing indicator of lodging capacity is the percentages of units having five or more rooms. Table VII below gives these percentages for whole counties, their rural portions, and (within rural) the non farm and farm categories.

Table VII: Percentage of Housing Units with Five or More Rooms

COUNTY	Entire County	Total Rural	Non farm	Farm
Athens (OH)	38.7%	43.9%	41.7%	81.8%
Butte (CA)	25.2	31.0	28.5	54.7
Coconino (AR)	25.6	20.9	22.2	0.3
Fremont (CO)	29.2	31.9	32.1	29.8
Grady (OK)	30.8	32.1	28.2	42.5
Knox (IL)	40.4	55.7	46.9	74.6
Prince Edward (VA)	46.1	53.8	49.9	68.1
Robeson (NC)	35.3	31.8	20.5	49.3
Wasco (OR)	35.5	41.2	36.4	63.9

Note that fully eight of the nine counties show larger residences in their farming or "most rural" areas. Assuming that problems of organization, service, and supply can be handled, these widely scattered rural dwellings offer significant amounts of lodging capacity per unit. A glaring exception, however, is Coconino County. Over 60 percent of that County's rural population (28 percent of its total population) is nonwhite, including roughly 2,500 Native American families. In this case, the nonwhite population correlates with smaller units, and many Indian families occupy the Hogans traditional to Navajo people. Not only the sizes and layouts of these dwellings, but the customs and mores of this traditional life style, would be factors in the placement of evacuees.

Finally, any preliminary assessment of lodging capacity should refer to Census tabulations on the availability of structures with modern plumbing. Listed below are each county's percentages of units with all plumbing in the entire county, its rural area, its rural nonfarm category, and its rural farm category. (Robeson data are approximate, representing its 1960 data augmented by the average change of the other eight counties.)

Table VIII: Units with All Plumbing

	County	Rural Part	Rural Nonfarm	Rural Farm
Athens (OH)	83.1%	74.2%	73.9%	78.3%
Butte (CA)	97.9	97.1	96.9	98.3
Coconino (AR)	84.5	71.0	73.9	20.2
Fremont (CO)	94.9	91.0	90.4	95.1
Grady (OK)	94.6	93.0	92.7	93.5
Knox (IL)	92.6	91.0	90.1	93.2
Prince Edward (VA)	69.3	62.0	62.5	59.3
Robeson (NC)	60.4	48.1	44.8	60.3
Wasco (OR)	96.5	93.8	94.3	91.3

Again, the data suggest a general parity between the urban and the several rural categories, with seven of the counties showing from 83 to 98 percent of their homes with all plumbing. However, Coconino, Robeson, and Prince Edward data reflect the overall poverty and limited facilities of many people in Robeson and Prince Edward, the relatively worse facilities in Robeson's rural nonfarm category, and the staggeringly lower quality of Coconino's farm units. To assume anything approaching full utilization of these facilities is to require 10-20 percent of rural evacuees to share less-than-fully-modern dwellings.

Before writing off a certain percentage of housing units as undesirable or unusable, however, it should be noted that all of the preceding figures have referred to the "occupied" and "year-round" dwellings reported in the Census. The 1970 Census also reported "unoccupied units" and vacant "seasonal and migratory" units which might offset the short-fall in usable occupied units for most counties. Excepting Robeson, for which data are not readily available to the planner, these figures for eight counties are as follows: Athens–838 year-round plus 20 seasonal and migratory units; Butte–1,197 plus 458; Coconino–1,541 plus 384; Fremont–305 plus 3; Grady–439 plus 10; Knox–289 plus 14; Prince Edward–329 plus 5; Wasco–355 plus 162.

The distribution of these unoccupied units varies markedly, however. Athens, Butte, Grady, and Knox Counties show only about one percent of their housing as unoccupied. Coconino, Prince Edward (and presumably Robeson), with large impoverished

populations, show from 10 to 25 percent vacancies, though one would be hesitant to count on much readily-usable space from these figures. Fremont and Wasco, on the other hand, show 10 percent or more of their dwellings as unoccupied, and such space would be well worth further examination in these scenic, vacation-setting types of counties.

Determination of Lodging Capacity in Private Residences

The preceding discussions of population, housing, and other factors have indicated many of the characteristics which would affect capacity to lodge, shelter, and support evacuees in private homes. The Census data are suggestive of capacity at a gross level, and the diligent planner could trace many (but not all) of these factors down to fairly small Census units.

On the other hand, the Census does not tell us precisely *which* of the larger units have all plumbing, *and* basements, *and* certain numbers of present occupants. The planner would like to identify, at a preliminary stage, the approximate numbers in each residential category and its capacity to house and shelter evacuees. Later, for detailed planning on the spot, the planner must identify those particular eight-room homes that have basements, modern plumbing. etc.

In planning to disperse evacuees across small towns and rural residences, the estimation of available resources becomes both more important and more difficult. Thus, in computing basements available for potential sheltering, it has been noted that an urban host community's basements may usually be assumed to be near those residences lacking basements. In rural areas, this assumption does not hold. Similarly, it cannot be assumed that large rural dwellings, modern facilities, etc., will be distributed evenly through the pattern of rural housing.

As a result, the planner must often reduce the Census figures for dwellings or rooms available to account for an absence of shelter (basements), plumbing, accessibility, or other factors which may render a certain percentage of the available dwellings unusable. The preceding discussions have suggested how these factors may variously affect the capacity of rural areas to absorb evacuees. By and large, something like 80-90 percent of the private

residential space in most counties would be found acceptable, though the figure would be substantially lower in some (especially, poor) counties. The planner would have to make this determination for each individual host county, taking account not only of the conditions noted above but also of the sheer need for spaces–the more dire the need, the more necessary is it to force evacuees into poorer facilities, and to plan for expedient shelter and other measures to alleviate the shortcomings.

Granting these uncertainties, it remains possible to estimate the lodging capacity of host areas from generally available Census data. The calculation is based on the simple formula that an individual dwelling can house a stipulated number of people per room (the "occupancy rate") after subtracting the kitchen. Given a stipulated occupancy rate, the number of evacuees who can be lodged in a residence is thus:

-the number of rooms
-minus the kitchen
-multiplied by the assumed occupancy rate
-minus the number of residents already living there.

Assuming an occupancy rate of three per room, a five-room house with four residents could lodge eight evacuees: 5 rooms minus 1 kitchen = 4 rooms; times 3 per room equals 12 occupants; minus 4 residents equals 8 evacuees.

This same formula can be used to calculate the lodging potential of any Census area, but certain refinements and assumptions are required to take account of (a) unsuitable dwellings and (2) the fact that Housing Census data are often reported for median numbers rather than average numbers. The formula below requires an assumption of the percent of units which are usable. It also assumes that the median number of rooms per dwelling is close to the average number. (Half of the total units would have more than the median-number of rooms, half would have fewer. Subtracting one kitchen from each unit, therefore, disproportionately reduces the rooms available in smaller dwellings–a conservative factor built into the formula below.)

The following three-stage calculation should be used to determine the capacity of a jurisdiction or area to lodge evacuees.

1. **Estimate total usable dwellings.** Given such factors as quality, need, and accessibility, assume a percentage of available dwellings will prove usable for lodging evacuees. The percentage will normally fall in the range of 80 to 90 percent. Multiply this percentage times total units to obtain *total usable units.*

2. **Stipulate an emergency occupancy rate.** From inspection of the number of evacuees allocated to a county, compared to the number of residential rooms *and other facilities available,* the planner can determine the approximate required occupancy rate—*i.e.,* number of evacuees-plus-residents to be housed in each residential room, excluding kitchen.

3. **Calculate the number of residential spaces available for evacuees in each jurisdiction.**
   a. Multiply the total residential units times the percentage assumed usable (1 above) to obtain the jurisdiction's *usable housing units.*
   b. Multiply usable housing units ("a" above) times the median number of rooms (less kitchen) per housing unit. For example, where the Census gives a median of five rooms per unit, multiply four times the usable housing units. This result is the *total rooms available for evacuees plus residents in usable dwellings.*
   c. Multiply total rooms available ("b" above) times the occupancy rate determined in Step 2 above. This result is the *total emergency lodging spaces* available in the usable residences.
   d. Multiply the Census figure for "occupants per housing unit" times the usable housing units determined in "a" above. This result is the total residents now occupying the usable housing units.
   e. Subtract total residents or occupants ("d" above) from total emergency spaces in usable dwellings ("c" above) to obtain total evacuee spaces in usable dwellings at the assumed occupancy rate.

The use of the formula is illustrated by reference to Table IV (page 19). Athens County, the first line, shows 16,525 year-round housing units. (Step 1) Assume 90 percent will be usable housing units for evacuees. (Step 2) From inspection of risk and host data, assume an occupancy rate of two persons per room will accommodate evacuees to be assigned to private residences. (Step 3-a) Multiply 90 percent times the year-round units to obtain 14,872 usable housing units. (Step 3-b) Multiply 14,872 times 4 rooms–*i.e.*, the median of 5 rooms per unit, minus the kitchen–to obtain a total of 59,488 rooms available for evacuees plus residents. (Step 3-c) Multiply rooms available times the assumed occupancy rate of two per room–Step 2 above–to obtain total emergency lodging spaces numbering 118,976. (Step 3-d) Multiply 2.9 residents per occupied room–from Table IV–times the 14,872 usable housing units to obtain 43,129 current residents. (Step 3-e) Subtract 43,129 residents from 118,973 emergency spaces to obtain 75,844 spaces for evacuees in available residences.

This formula, it should be emphasized can be applied to Census jurisdictions of any size. To the extent that Reception/Care Divisions, Districts, and Lodging Sections are drawn to coincide with Census boundaries, the same determination of available lodging spaces (at any assumed occupancy rate per room) can be made for the Reception/Care units. Such calculations are made for Fremont County subdivisions in Part II of this report.

A Note on Comparisons of the Nine Counties with National Averages

Before summarizing the implications of the above-discussed characteristics for evacuation planning and dispersal, it should be noted that the nine counties selected for examination are reasonably representative of the diverse host areas to be found across the United States. This point was advanced early in Part I, and will now be re-iterated by reference to the several categories of Census data discussed in the above sections.

Observing the similarities and differences between these counties and the nation as a whole, it must be remembered that "host" counties are, almost by definition, more rural in nature than an "average" county. Granting this factor, the nine counties summarized

in Table IX below present striking similarities to national patterns. These similarities between national and nine-county averages, it should also be noted, mask some striking differences among the data presented above for the nine counties individually. The national data, of course, mask still greater differences, and host county planners would have to be alert to them.

Table IX: Nine-County versus National Averages

Category		Nine-County Average	National Average
Rural Population		47.5%	21.9%
Farm Population		5.0%	5.2%
Housing Units: 5 or More Rooms:	County-wide	32.2%	37.8%
	Rural	27.2%	40.6%
	Rural Farm	51.1%	55.0%
Housing Units: 8 or More Rooms:	County-wide	0.05%	0.08%
	Rural	0.06%	0.10%
	Rural Farm	13.6%	15.8%
Median No. Rooms per Housing Unit:	County-wide	4.87%	5.0%
	Rural	4.9%	5.2%
	Rural Nonfarm	4.9%	5.1%
	Rural Farm	5.23%	5.7%
Persons per Occupied Unit:	County-wide	3.1%	3.1%
	Rural	3.36%	3.3%
	Rural Farm	3.6%	3.4%
Units with All Plumbing:	County-wide	85.7%	93.5%
	Rural	77.0%	83.8%
	Rural Farm	77.3%	84.4%
Seasonal and Migratory Units:	County-wide	0.009%	0.011%
	Rural	0.022%	0.044%

Implications of Dispersal for Reception/Care Planning

This examination of nine representative host counties has indicated many of the problems inherent in a policy of maximum dispersal. Essentially, they are problems associated with reduced hosting capacity, coupled with requirements for more elaborate and far-flung systems for delivering emergency services. This section will highlight the major problem areas, then outline the principle inplications for Reception/Care planning.

Problem Areas

A policy of dispersing evacuees to rural areas must be based on considerations of vulnerability, maximum allowable concentrations, and the implications of these factors for the use of scarce lodging and shelter resources in outlying areas.

Vulnerability. Emergency populations in host areas are rendered more or less "vulnerable" as a function of targetting assumptions, location *vis a vis* presumed targets, terrain, population distribution, and availability of fallout shelter. Clearly, the nine counties illustrate the diverse location and terrain factors which would affect vulnerability of host counties across the country.

With respect to population concentration, the counties illustrate a range of pre-emergency distributions. Characteristically, host populations and infrastructures are concentrated in one or a few principal towns. Furthermore, the Census data indicate these concentrations are understated by the data on "urban" population. Often, several adjacent towns, plus a surrounding "rural nonfarm" population, constitute a highly concentrated population living in a relatively small area.

Fallout shelter in the form of home basements is widely available in most sections of the country, but it is not distributed evenly through the housing inventory. If all or most homes were used for lodging, the consideration of movement-to-shelter times would lead to a more extensive reliance on expedient shelter construction in rural areas. Presumably, planners for dispersal would also rely more heavily on mines, caves, and natural features adaptable to fallout shelter. Overall, a dispersed emergency population presents much more

complex issues of locating or building shelter, followed by a more difficult process of matching evacuees with shelter and moving them to it in a timely, organized manner.

Maximum Allowable Concentrations. Alternative policies could fix maximum concentration in terms of emergency population per community, some pre-established square-mile area, or allowable evacuees up to these limits. Thus, a community or square-mile area might be limited to 10,000 or 20,000 or 30,000 people, or a community might be allowed to retain its resident population but absorb evacuees only up to such a limit.

In any case, a dispersal policy would require standards or criteria for handling the problem of population concentration within a geographical area–*i.e.*, translating existing population data on political units and their surrounds into data on population falling within a radius of assumed ground zeros. If the policy required that maximum concentrations be held under 25 or 30 thousand, many host counties would be faced with evacuating part (but not all!) of the residents in their own principal communities–a proposition which taxes the imagination with its implications for the complexity and credibility of the evacuation.

Finally, the data on the nine counties–as well as the apparent problem of high evacuee-to-host ratios in many sections of the country–indicate that many counties would not be able to live within even a very generous limit on concentration. These counties would be forcing very large numbers of evacuees on their smaller communities and rural areas, while using only a portion of the lodging/shelter capacity in their principal communities. Carrying this argument one step further, greater dispersal would produce greater and more apparent inequities in the sharing of the burden across host communities.

Implications for the Use of Lodging/Shelter Resources. Whereas the present policy relies on non-residential facilities supplemented by a selective use of volunteered private dwellings, a policy of dispersal would depend on the mandatory use of the only major lodging resource in rural areas and small communities--*i.e.*, the planned, compulsory use of private homes. Depending on the risk-to-host population ratios in various sections of the country, occupancy rates of two, three, or more persons per room could be required. Furthermore, given the paucity of non-residential and specialized-care facilities in rural areas, many homes would have to be used as mini congregate care facilities, feeding stations, Reception/Care

headquarters, or otherwise adapted to the needs of an enormously enlarged population in areas lacking sufficient infrastructure for their resident populations.

Reception/Care Planning for Dispersal

While dispersal poses enormous problems, it remains a potentially needed option. Around the country's more densely populated "corridors," moreover, it may be necessary to utilize *both* the principal communities and the rural or outlying resources for hosting evacuees. In these circumstances, what adaptations or changes would be required in the current Reception/Care guidance?

1. **Mandatory use of private homes.** Outlying areas, by and large, lack any suitable alternative resource—barring such high evacuee loads that recourse must be had to barns or makeshift structures. Furthermore, the credibility of evacuation planning must be assumed to depend heavily on the evacuee's perception of reasonably suitable accommodations at the end of his/her journey. Finally, mandatory home-sharing would be necessary in order to predict the quantities of usable lodging and shelter when planning the distribution of evacuees.

2. **Reception/Care Jurisdiction and Boundaries.** In the current guidance, R/C Districts and Lodging Sections are drawn to encompass roughly 10,000 and 2,500 evacuees plus residents. A distribution across private homes in outlying areas would result in different boundaries, or adjustments in existing boundaries. On the other hand, the same population limits would still apply, and the existing units are drawn to encompass the entire land area of host counties (even though their evacuees may be concentrated in a small part of a District or Lodging Section). In this respect, the guidance is readily adaptable to dispersal.

3. **Reception/Care Services or Functions.** The guidance is based on the fundamental needs of large evacuee populations, and these would not change. Reception/Care Services would continue to be organized around the functions of Lodging; Shelter; Feeding; the Special Services required by the aged, handicapped, or other special populations; Personal Services required to meet a variety of daily needs; Registration of evacuees; construction or upgrading of shelter; and Auxiliary Services relating to public information, morale, etc.

4. **Reception/Care Organization.** In principle, the organizational format would not change. The current guidance defines District-level, Lodging Section, Feeding, and other R/C units which can be expanded or contracted (the "accordion" principle) to serve larger or smaller groups of evacuees and residents. Dispersal would, in effect, require more and smaller service-delivery units within each functional area. For example, populations in special circumstances -such as infirm or handicapped people -could be spread widely in private residences or clustered in a number of the larger homes. Logistics, oversight, and service delivery would require more extensive planning, transport, and staff resources. Feeding, on the other hand, would be shifted from reasonably centralized locations to a combination of small feeding stations and the preparation of meals in homes. As a result, services for evacuees in a dispersed population would resemble those for residents in the non-dispersal distribution.

5. **Staffing.** The Reception/Care District organization, pre-dispersal, might be responsible for 5-10 thousand evacuees clustered in perhaps 50 buildings used for congregate lodging. Each of these facilities would be under a Facility Manager, who might also have assistants, and the larger facilities would often have units of the Lodging/Shelter, Feeding, or other R/C Services. A rural District, post-dispersal, might be serving 5-10 thousand evacuees spread across 2,500 or more homes and interacting closely with the original residents. Clearly, supervision and service delivery would require substantially larger staffs, and the fragmented evacuee population could not as readily organize to help staff the R/C Services or augment them within facilities.

6. **The Facility Manager.** One of the "building blocks" of the pre-dispersal arrangement, this position could virtually disappear in many outlying areas.

7. **The Lodging Aide.** Now responsible for orchestrating the distribution of some evacuees into volunteered private residences, this position would be charged with policing and monitoring evacuee-host relations in compulsorily shared homes. Given both the logistics of the task and the wide range of social interactions involved, dispersal would require much heavier staffing of the Lodging Aide and related functions.

8. **Interaction with Other Crisis Relocation or Emergency Services.** Just as Reception/Care organizations would face a much more complex task, so would the Public Safety, Health, Supply, and other agents of the evacuation effort. The fundamental problems would be those of linking services with recipients, policing population movements, transporting supplies and people to (more) service-delivery points, and maintaining orderly process in two highly stressed, suddenly intermingled populations of evacuees and hosts. The more fragmented Reception/Care units at all levels would be communicating and cooperating with similarly more fragmented organizations conducting these related operations. Again, the implication is that dispersal would require more detailed planning, more complex organization, and larger staffs.

9. **Organizational Relocation.** This option has been recommended in order to transfer already-organized evacuee groups to host areas, preserve organizational integrity for risk-area operations, reduce needs for host area emergency staff (by using the organization's people to help serve their own groups), and provide organized manpower pools that can be used to help staff official emergency organizations in hard-pressed host areas. Dispersal, while it reduces the possibilities for lodging whole organizations in the same facility, places a still greater premium on the advantages of organizational relocation. Indeed, the host areas contemplated for dispersal have still fewer resources than the larger towns envisioned in the current guidance. Planning for dispersal should, therefore, emphasize organizational relocation, designate certain lodgings as Relocation Headquarters of predesignated organizations, and distribute an organization's employees and dependents in homes near that Headquarters.

Virtually all of the above-listed implications serve to point up the greater complexity and difficulty of managing an effective relocation to remoter host areas. On the other hand, they also indicate how the present Reception/Care guidance is adaptable to the dispersal option. In Part II of this report, Reception/Care planning for dispersal in one county is illustrated and contrasted with a pre-dispersal plan for the same host area.

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INTRODUCTION AND SUMMARY
RECEPTION AND CARE PLANNING
FOR
WIDELY DISPERSED POPULATIONS

by

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For
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PART TWO
RECEPTION AND CARE PLANNING FOR WIDER DISPERSAL– AN ILLUSTRATIVE CASE

Reception/Care planning for lodging, sheltering, feeding, and otherwise supporting evacuees is a reasonably straightforward process that has been spelled out in the formal guidance documents used for Crisis Relocation Planning, or CRP. This guidance was used to develop a detailed, prototype Reception/Care plan for a hypothetical evacuation of some 38,000 residents of Colorado Springs to nearby Fremont County, Colorado, whose normal population equals about one-half the number of evacuees assigned to it in the prototype plan. The following sections illustrate how that evacuation plan would be modified to disperse the same evacuee population more widely. Specifically, these sections describe:

- The official Reception/Care planning guidance and the steps by which such a plan is produced.
- The original or "pre-dispersal" plan for Fremont County–a plan that clusters evacuees in the County's principal population centers.
- "Dispersal" planning for a re-allocation of Fremont's evacuees, creating a new distribution of population across the County's more sparsely populated areas.

The objective in Part II is to illustrate what wider dispersal implies for Reception/Care planning. What complexities are introduced into the planning process? Is the existing guidance adaptable to planning for wider dispersal? How does a more widely dispersed evacuee population compare with the distribution before dispersal? What kinds of "costs"–in terms of Reception/Care staffing, the acceptability of hosting arrangements, etc.–are suggested by a detailed plan for wider dispersal?

Fremont County was selected for the illustration because (1) its prototype plan follows closely the current Reception/Care guidance and (2) its mountainous terrain and large sparsely-settled areas pose a difficult test of the wide-dispersal option. From the discussion in Part I, it should be apparent that each of the nine counties would present special

problems. Indeed, the more widely dispersed is the evacuee population, the more likely is it that local situations will pose special problems. None of the counties, however, offers more concentrated hosting resources– resident population and facilities–relative to the potential land area over which evacuees might conceivably be dispersed.

Another objective of this work is to demonstrate the use of Census materials to create reasonably good "first-cut" evacuation and Reception/Care plans. The existing prototype plan for Fremont County was entirely a "desk-top" planning exercise. Subsequent checks in the field suggested that it closely reflected the "real world." In this study, again, there is the desire to suggest how the use of readily available source materials can reduce the time and costs required to produce evacuee allocations and Reception/Care plans which would closely reflect the environment in which such an operation would be planned and carried out.

Reception/Care Planning Guidance

The formal guidance for Reception/Care planning is contained in *Reception and Care Planning Guidance for Host Communities.* Written by William W. Chenault and Cecil H. Davis, this material was originally prepared by Human Sciences Research, Inc. (HSR), under contract to the Defense Civil Preparedness Agency (DCPA). The four-volume HSR report, submitted in 1976, was subsequently published by DCPA in two volumes (CPG 2-8-14 and 15) in March 1977. (Volumes I-III of the HSR material appear in the first DCPA, now FEMA, volume; Volume IV appears as the second FEMA volume.)

The Reception/Care guidance is designed for use in planning, training, and actual operations. It is also designed to facilitate a gradual or rapid development of an operational plan, depending on such factors as the amount of resources available and the extent of public interest, response, and participation. The guidance contains packets of sample forms that can be used to create "fill in the blanks" plans, organizational and staffing charts, materials for media presentations, and a complete working description of an operating county-level Reception/Care organization. The four volumes of guidance are briefly described below.

I. *An Overview of Reception/Care Planning and Training Guidance* (27 pp.). The first volume outlines the contents of the entire four-volume package, then describes modules of training materials geared to the general public and each category of staff in the county's Reception/Care organization. The training materials, which are drawn from other portions of this same guidance, are presented in two variants of each module–one for training under normal conditions, one for "crash" training efforts.

II. *Planning Steps and Instructions* (53 pp.). A sequence of sixteen planning steps describes in detail the preparation of a host county Reception/Care plan, beginning with the allocation of evacuees to the county, and ending with the maintenance and updating of the county plan. These steps describe explicitly the use of the *Planning Format* described below.

III. *Planning Format* (17pp. plus 85 pp. of appendices). This volume includes the complete text of a "fill in the blanks" host county Reception/Care plan and one copy of each form, list, etc., needed to write and update such a plan. These forms include packets of materials for each Division, District, and Lodging Section into which the county is divided. The packets include the Reception/Care organizational structure for each unit, and spaces for entering the appropriate maps, data on evacuee assignments, and the names of individual jobholders as Reception/Care positions are filled. Copies of packets for each Reception/Care operating unit would be made available at the unit's headquarters for use as operational guidance and in "crash" or on-the-job training sessions.

IV. *Tables of Organization [and] Staff Responsibilities* (182 pp.). This reference book presents model tables of organization for all Reception/Care units and an individual job description for each position in a fully operational host county Reception/Care organization. Copies of relevant job descriptions would be appended to the descriptive packages for each unit. The Introduction provides a succinct overview of the Reception/Care planning process, written at a level suitable for presentation to local audiences of officials and interested laymen.

Reception/Care Jurisdictions

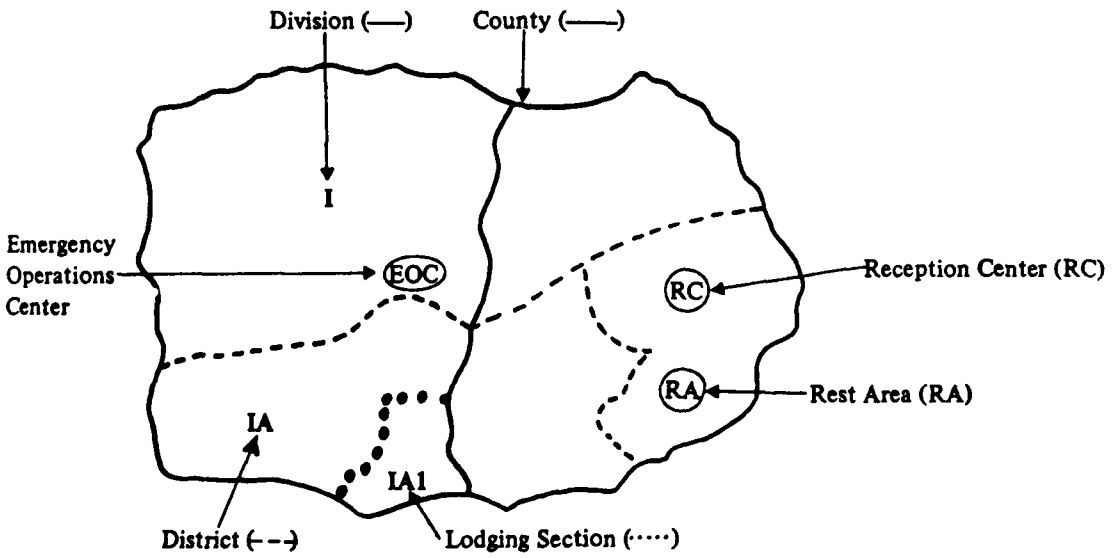
The guidance describes how to divide a host county into successively smaller geographical units, each with its own headquarters, table of organization, and staffing plans. These units would include:

Divisions. Each containing two or more Reception/Care Districts (see below).

Districts. Geographical areas where lodging (and potential shelter) facilities would accommodate an emergency population of approximately 10,000 (original residents as well as evacuees).

Lodging Sections. A subdistrict area and headquarters responsible for approximately 2,500 evacuees-plus-residents.

As illustrated in the diagram below; the Reception/Care system would be headquartered in or near a host county's Emergency Operating Center (EOC), would contain one or more staffed Reception Centers for incoming evacuees, and might contain one or more staffed Rest Areas which would assist evacuees transiting the county to more distant host counties. Note that every part of a host county's land area would fall within the boundaries of a Lodging Section, which would be part of a District unit, which in turn would report upward to a Division headquarters or the county's Reception/Care Coordinator in the EOC.



Reception/Care Services

Five essential categories of Reception/Care Services are staffed at the county, district, and lodging-section levels. Those five services involve (1) the management of Lodging and fallout shelter, (2) the provision of Feeding services, (3) Registration of evacuees, (4) Special Services for populations with special needs, and (5) a variety of Personal Services responsive to various individual needs. Other Reception/Care functions relating to such matters as public information and shelter upgrading are staffed largely at the county and district levels, while the division headquarters is essentially an administrative convenience used in those counties which divide into a large number of districts.

As noted previously, Volume IV of *Reception and Care Planning Guidance for Host Communities* provides complete tables of organization and job descriptions for each unit and position at the county, division, district, and lodging section levels.

Reception/Care Planning Steps

Using the forms and materials provided in Volume III of the guidance, the development of a host county Reception/Care plan involves a sequence of 16 steps, which are described in Volume II. Those steps include:

1-3. Work with risk area and other host area planners to describe the county's expected evacuee population—the number of evacuees, their travel routes, and any special characteristics of the expected evacuee population.

4. Describe or map the county's inventory of facilities potentially usable as congregate lodging and/or fallout shelter.

5. Coordinate shelter plans for evacuees and local residents.

6. Rank order the facilities available to lodge, shelter, feed evacuees.

7. Allocate evacuees to the preferred/best facilities.

8. Divide the county into Divisions (if desired), Districts, and Lodging Sections, based on the new distribution of the resident-plus-evacuee population resulting from Step 7 above.

9. Select headquarters facilities for each jurisdiction defined in Step 8, and select appropriately located facilities for use as Reception Center(s) and Rest Area(s).

10. Complete assignment forms indicating–for each facility selected to lodge or shelter evacuees (Step 7)–the number of evacuees assigned, the Reception Center whence they would come, and the Division, District, and Lodging Section in which the facility is located (Steps 8 and 9).

11. Insert maps and description of each Division, District, and Lodging Section in the "packet" for each Reception/Care unit, indicating all facilities used, numbers of evacuees, etc. (Appropriate forms for each "packet" appear in Volume II of the guidance.)

12. Develop a general table of organization and job description for each unit and staff position. (Except as modified to meet local circumstances, this mateial appears intact in Volume IV of the guidance.)

13. Complete the specific descriptive "packet" for each of the county's several Districts, Lodging Sections, and other Reception Care units. (The "packets," collected in the County Plan but with copies available for each specific Reception/Care unit, include a map of the area, lists of subordinate units, headquarters addresses, lists of facilities used by evacuees, tables of organization, job descriptions, etc.)

14. Develop an operational checklist of responsibilities before and during a crisis. (Again, the guidance presents a detailed checklist which can be used "as is" in most local settings.)

15. Complete main plan. (The standard 17-page plan in the guidance includes a limited number of "blanks" for entering summary data on the numbers of evacuees, map of Reception/Care jurisdictions, etc.–information now available from the appended "packets" and other forms completed in the above steps.

16. Continue development of the plan, updating provisions and entering names of staff personnel as these are identified before or during a crisis period.

Following these steps, Reception/Care planners or local officials can create, fairly rapidly, an overall county plan which could be completed in greater detail should a crisis occur. Similarly, the process of staffing such an emergency organization can be approached incrementally. The plan allows for successively higher levels of staffing, ranging from a low of two or three identified position-holders to several hundred personnel in a fully operational Reception/Care organization for a large county receiving many evacuees.

The Organizational Relocation Option

As noted in the Introduction to this report, the concept of organizational relocation can be a major factor in crisis relocation. Prior to a crisis or evacuation, specific risk area organizations may be assigned to pre-designated host area facilities. In the event of evacuation, such an organization's workers and their dependents would travel directly to their pre-designated host area quarters.

The Reception/Care guidance and forms allow for, and encourage, the use of this option. Specifically, an "organizational assignment form" indicating the organization, number of evacuees, and host facility would be inserted in the "packet" for the Lodging Section in which that facility is located.

Sharing of Private Residences

The guidance takes account of the commonly observed tendency (and widely expressed willingness) of host area residents to share their homes–in the case of fallout shelter, *their basements*–with arriving evacuees. In each Lodging Section, the position of Lodging Aide is charged with "matching" evacuees with volunteered private residences, registering this re-assignment from congregate lodging facilities, and monitoring the special conditions and relationships created by such a practice.

Summary

The Reception/Care guidance provides detailed steps and virtually "fill in the blanks" planning materials that can be used to develop comprehensive host county plans for the lodging, sheltering, and support of evacuees. Because the guidance emphasizes the use of the "best" existing buildings and service outlets to provide congregate care, however, its use has the effect of clustering evacuees in host county population centers. That is, evacuees would utilize the existing buildings and infrastructure, which are located near the people who normally use them.

The following major sections describe, first, a case in which evacuees are distributed and hosted in accordance with this guidance and, second, the changes required to distribute evacuees more evenly across the total geographical area of the same host county.

A Typical "Pre-Dispersal" Reception/Care Plan

Prototype Reception/Care Plan to Meet the Welfare, Shelter, and Related Needs of Populations Affected by Crisis Relocation is a detailed Reception/Care plan for Fremont County, Colorado.[6] The hypothetical plan was constructed by the authors of the formal Reception/Care guidance and is consistent with it in all but minor details, though the formal guidance was prepared simultaneously and further refined after the Fremont document appeared.

Certain characteristics of the Fremont prototype plan deserve special mention. To illustrate the concept of organizational relocation, the authors assumed that a large proportion of Fremont's evacuees arrived as organizational groups. Thus, all but about 3,000 of the 38,000 Colorado Springs residents evacuated to Fremont were assumed to be employees or dependents associated with private or governmental organizations. A number of these organizational groups were assigned to congregate lodging facilities near several of Fremont's Reception/Care District headquarters, and it was assumed that these evacuees would provide large segments of the Reception/Care staff for those units of the host county emergency organization. This unusual feature, however, in no way effected the distribution of evacuees, who were concentrated in public and private facilities located near the County's population centers.

The following sections briefly describe the overall Fremont County prototype plan, the Reception/Care jurisdictions outlined in it, and the distribution of residents and evacuees across those jurisdictions. This, of course, was the "pre-dispersal" plan; there were no constraints on the concentration of population at particular points within the County.

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[6]By Chenault, Davis, and Cole (McLean, Va.: Human Sciences Research, Inc., 1975).

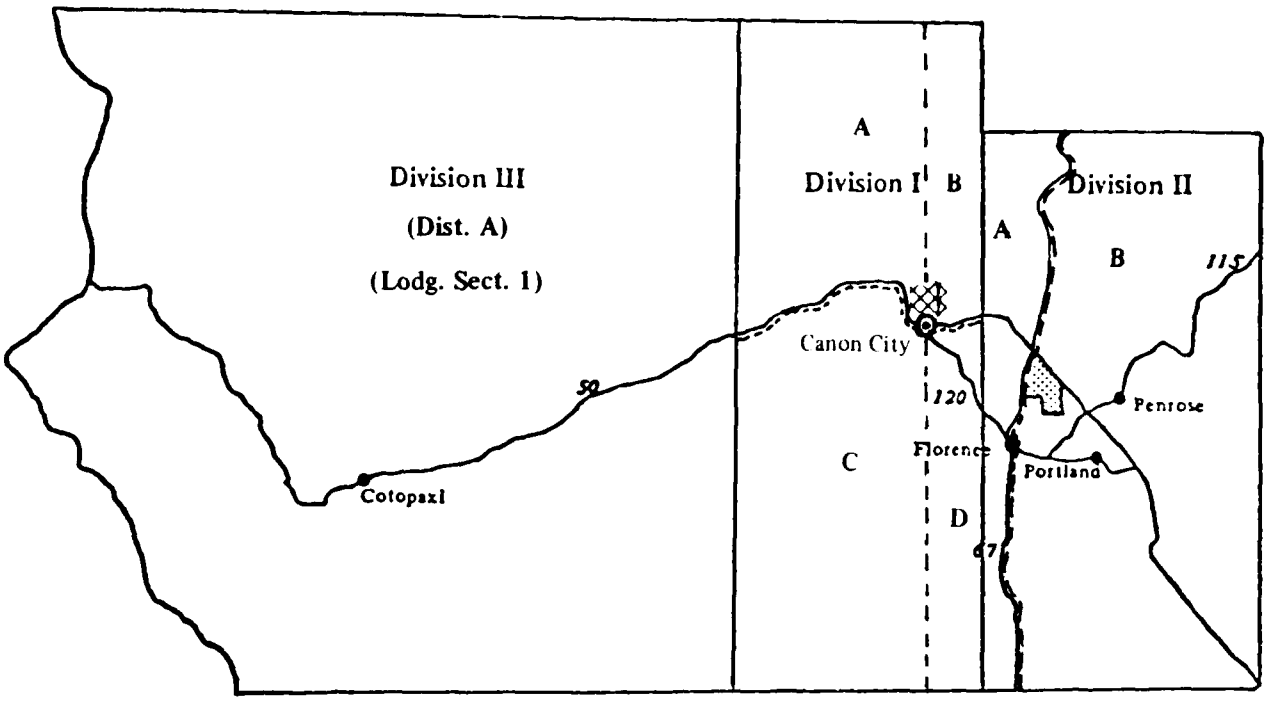
The Pre-Dispersal Plan for Fremont County

The prototype plan assumed that Fremont County, with a 1970 population of 21,942 residents, would receive 37,807 evacuees from the Colorado Springs Metropolitan Areas. Evacuating families and individuals--nonorganizational evacuees--would enter the County from the northeast, via a single major highway and proceed to a Reception Center at a local airport in the east-central portion of the County. From here, most would proceed a few miles westward to Canon City, which with its environs accounts for two-thirds of the County's population. Other evacuees would proceed southeastward to Florence (2,846) and very small communities such as Penrose. Organizational evacuees would follow the same routes but proceed directly to their assigned buildings in or near these same towns.

Reception/Care Jurisdictions

Examination of Fremont County Census data and maps indicated only a few population clusters, especially large congregate care facilities, transportation arteries, and natural barriers. The development of a set of Reception/Care jurisdictions was, therefore, a relatively straightforward process. The map on the following page indicates the R/C Divisions and component Districts into which the County was divided, while the following maps of Canon City and Florence indicate the component Lodging Sections into which R/C Districts were divided within the two principal populated areas.

RECEPTION/CARE DIVISIONS IN FREMONT COUNTY



Map indicates the Fremont County Emergency Operations Center and the approximate boundaries of R/C Divisions I (Canon City area), II (Florence-Penrose area), and III (Cotopaxi western area).

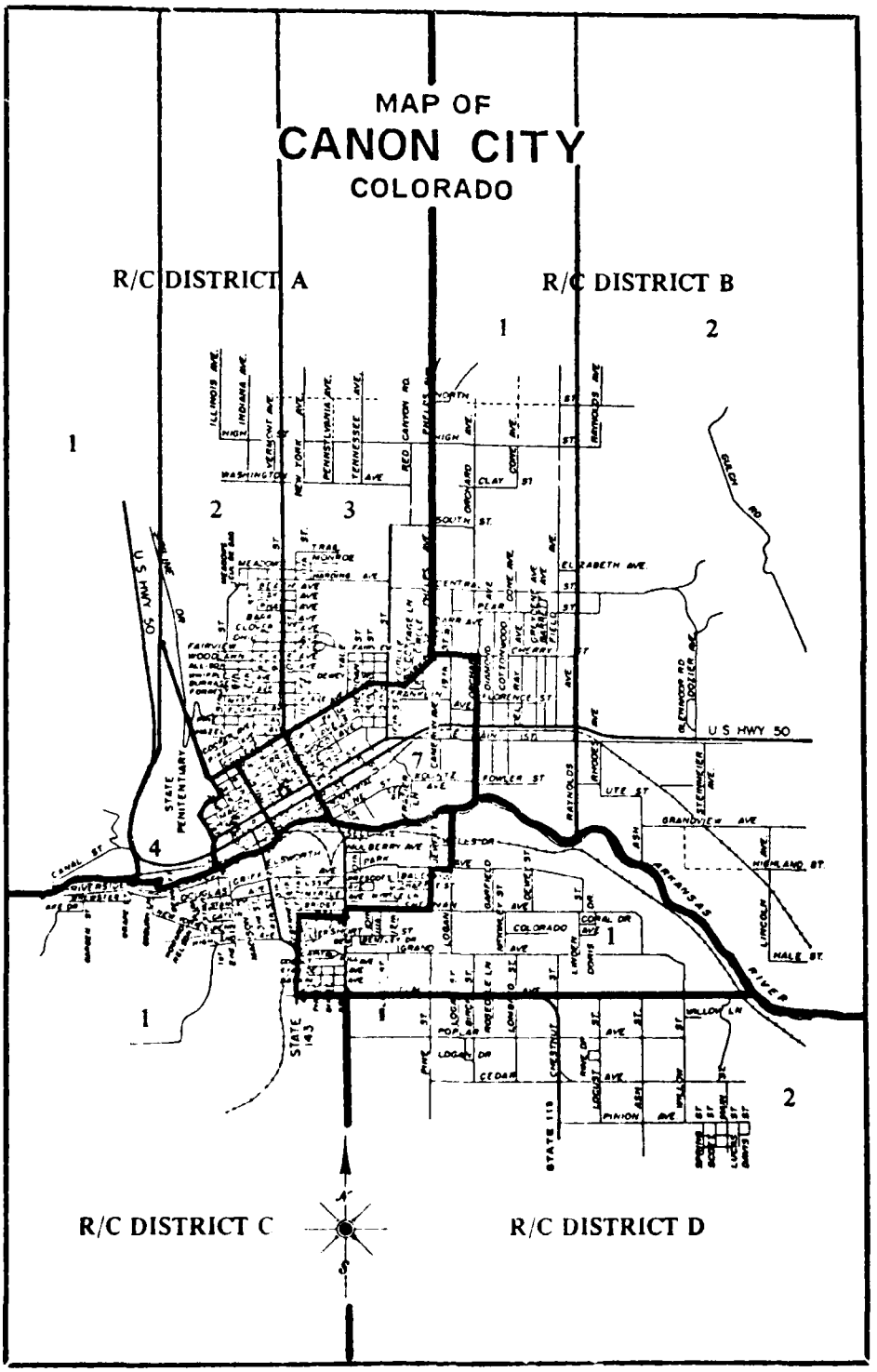
Capital Letters and dashed lines indicate the four R/C Districts (A, B, C, D) in Division I and the two Districts (A, B) in Division II. The large but sparsely settled Division III is treated as a single District and Lodging Section, operating from the Division III Headquarters.

Legend

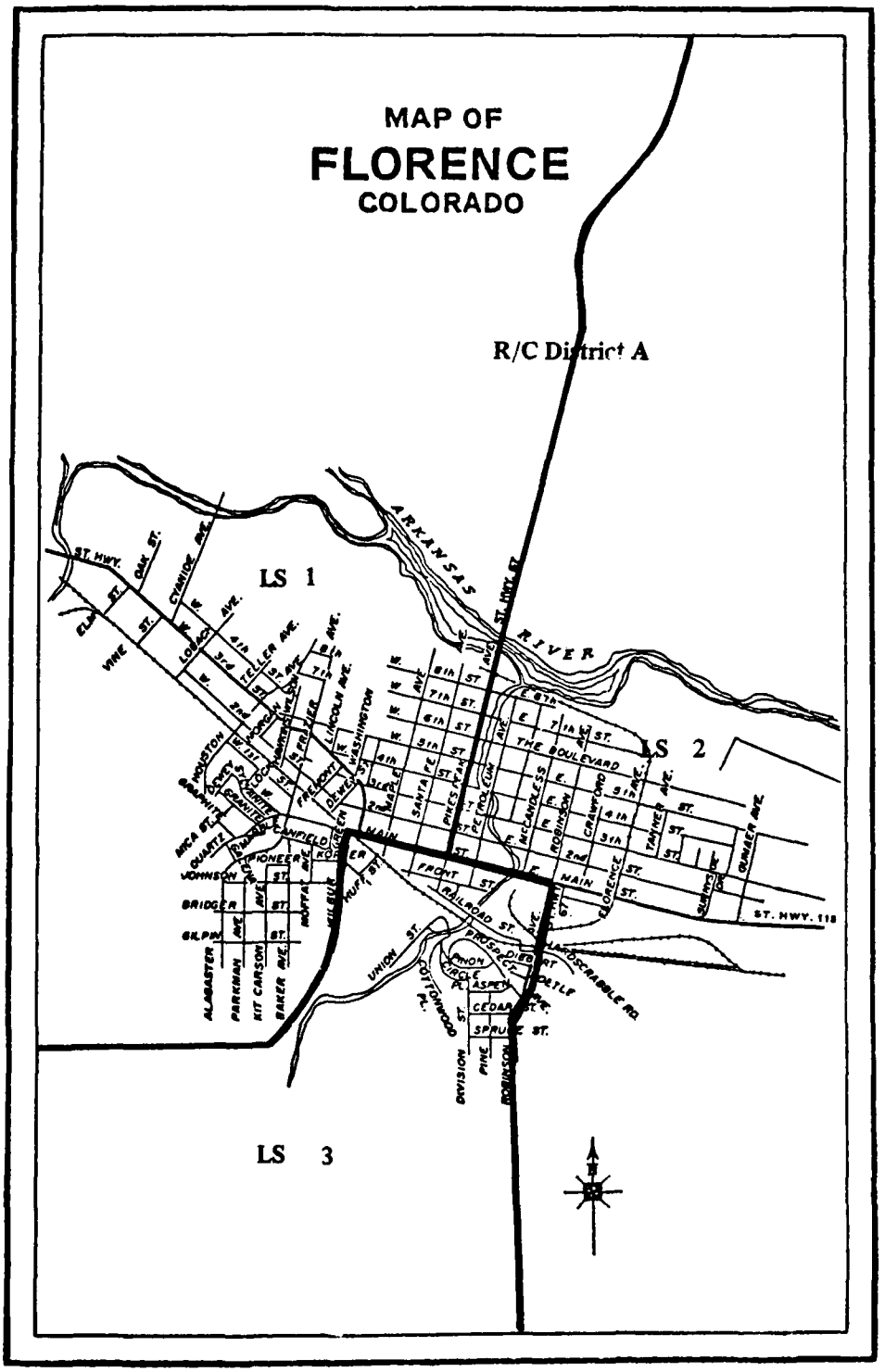
- Airport
- Royal Gorge Rest Area
- Fremont County Emergency Operating Center
- A, etc. Reception/Care District
- ---- District Boundary
- ——— Division Boundary

R/C DISTRICTS AND LODGING SECTIONS: CANON CITY

(Lodging Sections indicated by arabic numerals)



R/C DISTRICTS AND LODGING SECTIONS: FLORENCE



Division I includes Canon City and its suburban communities of East Canon, Prospect Heights, Lincoln Park, and Brookside, as well as the spacious State Penitentiary in Canon City and the Royal Gorge camping grounds, which would be used as a Rest Area for transiting evacuees moving westward through the County. The vast majority of the Division's 1970 population (15,787 residents) live in the Canon City area. Accordingly, the Division's four **Districts** were drawn to divide Canon City. **Other Jurisdictions**. District A, which includes the City's central business district, was divided into seven Lodging Sections. Districts B and D were divided into two Lodging Sections each. District C includes only a single Section, which would operate from the District Headquarters.

District II, covering the eastern quarter of the County, includes the smaller communities of Florence, Penrose, and Portland, as well as the Fremont County Airport, which would be used as the County Reception Center for all (non-organizational) evacuees entering the County. **Other Jurisdictions**. District A, including the town of Florence, was divided into three Lodging Sections. District B was divided into two Lodging Sections--one each focussed on the towns of Penrose and Portland.

District III covers the mountainous western half of the County. Reflecting the paucity of existing structures and facilities, this Division was not subdivided: District-level and Lodging Section functions would be performed from the Division Headquarters.

As indicated on the three maps--and in accordance with the formal Reception Care guidance--all R/C jurisdictions were defined to include the entire land area of the County or the next-higher R/C unit. Thus, while the four Districts in Division I were focussed on the Canon City area, their boundaries reach outward to encompass the surrounding land area. Similarly, the Lodging Sections near the edge of the populated areas also include the surrounding countryside. This fact becomes important when considering a shift of evacuee population among the several R/C jurisdictions to obtain a more highly dispersed population.

Evacuee Assignments (Pre-Dispersal)

The above-described R/C jurisdictions were defined to reflect available congregate care and fallout shelter facilities in the County. That is, the jurisdictions reflect the *capacity* of their respective areas to house, feed, and shelter evacuees in public buildings, commercial establishments, and other suitable facilities.

No evacuees would be housed, fed, or sheltered in private homes or basements under the pre-dispersal plan. (On the other hand, the R/C plan made provision for transferring evacuees into volunteered private quarters, to the extent these became available.)

Evacuee assignments in the (hypothetical) pre-dispersal plan were quite specific. For example: The Organizational Assignment Form for the Colorado Springs Yellow Cab Company showed a total of 75 employees plus an estimated 142 dependents. Approximately 120 of these evacuees would be lodged in VFW Post 4061, located at 1021 Main Street in Canon City, while the remainder would be housed nearby in the building of the First Federal Savings and Loan at 801 West Macon Street. All would receive their meals in a restaurant located at 700 Main. In the event of a move to shelter (immediate attack threat), these evacuees would also use the same restaurant facility, which had been shown in the Civil Defense Fallout Shelter Survey to possess sufficient fallout shelter spaces. The Organizational Assignment Form showed these lodging locations as falling within R/C Division I, District A, Sections 6 and 7, respectively.

For "unattached" (non-organizational) evacuees, assignments were also to designated buildings. For these evacuees, however, families and individuals would be assigned as they passed through the County Reception Center, whose staff would route evacuees to the next-best facility until its capacity was reached. For each such facility, the Assignment Form for Families and Individuals indicated the number to be assigned for congregate lodging, followed by the facilities where this group would be sheltered and fed. Again, the Form indicated the Division, District, and Lodging Section responsible for the individual congregate lodging facility.

All together, the Assignment Forms in the pre-dispersal plan described specific facility assignments for the nearly 38,000 evacuees to Fremont County. Reflecting the distribution of the best available facilities (other than private dwellings), the plan distributed evacuees across the County as follows:

Division I	29,595	evacuees in	107 congregate lodging facilities
Division II	7,574		41
Division III	638		4

Each of the Divisions, it has been noted above, was divided into a sufficient number of R/C Districts and component Lodging Sections to insure appropriate spans of control and

adequate emergency services. The pre-dispersal plan indicated–for each Division, District and Section - the total complement of staff positions, down to and including the Facility Managers of each congregate lodging and shelter listed on the evacuee assignment forms described above.

Also reflected in the Fremont pre-dispersal plan are provisions for locating designated groups of evacuees in or near facilities where their services would be utilized during an emergency. For example: Hospital staffs were relocated near medical facilities, and the personnel of several Colorado Springs school systems were housed near the headquarters of R/C Districts that would have used these evacuees to staff emergency functions.

In sum, the pre-dispersal plan could make specific assignments of evacuees to facilities which could not only accommodate them well but could also utilize their services in an emergency operation. And it could make these arrangements without necessarily scattering evacuees among private homes–a distribution that reduces their cohesiveness as organizational groups. The following section questions whether these advantages can be maintained when evacuees are more widely distributed;–a process which reduces population density, but also sacrifices a part of existing infrastructure and facilities.

Reception/Care Planning for Population Dispersal

Approximately 95 percent of Fremont County's 1970 resident population live in a strip some 25 miles in length and varying in width from four to eight miles. The mountainous western half of the County was home to only 724 residents, and the entire County contained only 207 occupied farm housing units. The twenty-one thousand people in eastern Fremont were concentrated in the Canon City area (16,676), to which can be added some 4,500 small town and rural non-farm residents clustered in the eastern communities of Florence, Portland, Penrose, and neighboring burgs.

These eastern Fremont communities are separated by short distances and flat (or merely hilly) terrain. Lincoln Park, Brookside, and Royal Gorge are about two, three, and five miles from Canon City proper. Penrose and Portland are about 12 miles from Canon City and six from Florence. The County's principal roads connect these communities; many outlying areas are virtually inaccessible.

Viewed from the standpoint of potential vulnerability to nuclear weapons, the concentration of evacuees in these existing centers would be troublesome—if the region were targeted. The following table gives the distribution of evacuees and residents (and the ratio of evacuees to residents) that would result from the pre-dispersal relocation plan.

Division	Evacuees	Residents	Ratio
I	29,595	15,787	1.87
II	7,574	5,431	1.39
III	638	724	0.88

The table suggests the variation in hosting ratios that results from placing evacuees in existing structures. Given the above discussion of distances—especially, the concentration of Division I population in Canon City—the table also points up the vulnerability of these concentrations to direct weapons effects.

Again, such vulnerability can be attributed only with the assumption of direct weapons effects in this evacuation area. Planning for greater dispersal will always reflect a

trade-off between this assumption–that evacuee concentrations would be targetted–and the far greater ease with which fallout-only protection can be provided in existing population centers.

The following discussion addresses, first, the process of determining a capacity for dispersing evacuees more widely than follows from the "natural" course of using existing infrastructure (transportation arteries, communications facilities, structures, etc.). The section then concludes with a comparison of the population distributions that would result from the normal or pre-dispersal approach versus a wide-dispersal distribution.

Throughout this discussion, the reader should bear in mind that even this assumed dispersal does not involve the construction of new congregate lodging facilities or "camps" where no facilities now exist. Rather, the dispersal option described here would only utilize existing homes and buildings (though this dispersal would probably increase substantially the need to construct expedient fallout shelter). In other words, this dispersal option is described conservatively, *understating* the problems of complexity, feasibility, cost and credibility that would accompany efforts to place people in areas which lack any facilities at all.

Assessing the Host County's Capacity for Greater Dispersal

"Greater dispersal" in Fremont County obviously requires a redistribution of the evacuees clustered in the Canon City area to other parts of the County. The 1975 pre-dispersal plan provided for the assignment of evacuees to known and available congregate lodging facilities throughout the County–and that original plan sought to disperse evacuees to the extent consistent with the available congregate facilities. Therefore, it may safely be assumed that *additional* congregate lodging facilities are not available outside the Canon City area.[7]

This fact of life–the absence of substantial, additional congregate space–would pertain in most host areas and points to a solution which has important policy and operational implications:

[7]If additional congregate lodging space should be available at the time of dispersal, it could be held in reserve as a backup resource to help overcome problems arising from miscalculations in predetermined lodging assignments to private residences, or be used as a resource in the adjustment of lodging assignments to achieve a better distribution of evacuees belonging to organizational groups, etc.

> Planning for wider dispersal must assume the predictable use of space in private homes and basements. It must be assumed, then, that the use of private residences for emergency lodging (and shelter) would be mandatory.

Making this assumption, the first step in dispersal planning for Fremont County is an assessment of lodging space in private homes outside the Canon City area.

The 1970 Census of Population (General Population Characteristics) provides the following data on the population and numbers per household for the six Census Subdivisions that comprise Fremont County. The Reception/Care Divisions were defined to coincide closely (though not precisely) with the boundaries of these Census areas.

Census Subdivision	R/C Division	Population	In Group Quarters	In Households	Number of Households	Persons per Household
Canon City	I	9,206	1,888	7,318	2,940	2.49
East Canon	I	3,090	79	3,011	980	3.07
South Canon	I	3,459	10	3,449	1,109	3.11
Florence	II	4,117	48	4,069	1,333	3.05
Penrose/Portland	II	1,347	0	1,347	389	3.46
Cotopaxi	III	723	0	723	255	2.84

Since the households in Division I are clustered in the Canon City area, any "dispersal"of that area's evacuee (or evacuee-plus-resident) population would involve the distribution of evacuees (and possibly residents) from Division I into the private households located in Division II, District A (Florence and its adjacent rural area), Division II, District B (Penrose, Portland, and their adjacent rural areas), and Division III (Cotopaxi and the western half of Fremont County).

The calculation of congregate lodging, shelter, and feeding capacity in Divisions II and III private residences now becomes a matter of pursuing the following steps:

- Determining the numbers of evacuees that could be lodged in these private residences, assuming alternative total numbers of persons per room.

- Adjusting the above distribution to reflect such factors as the quality of usable housing, availability of fallout shelter, or capability to feed and otherwise support the post-dispersal population.

- Transferring evacuees (and possibly residents) from Division I to the private residences in II and III—up to the level of crowding which is either feasible or which serves to equalize population densities in the populated areas of I, II, and III.

The calculation of evacuees that could be housed in a given dwelling is a straightforward procedure, involving the assumption of an occupancy rate (example: 2 persons per room), multiplying that rate times the number of rooms (less kitchen), and the subtraction of residents from the total. Thus, with an occupancy rate of two persons per room, a five-room house occupied by a family of four could accept four additional people (5 rooms - 1 kitchen = 4 rooms x 2 per room = 8 occupants - 4 residents = 4 evacuees). At three persons per room, the same house could accommodate eight evacuees (4 rooms x 3 people = 12 occupants - 4 residents).

Using Census data, the same calculation can be made to determine the capacity of private residences in a given jurisdiction. Thus, Reception/Care Division II, District A (which corresponds to the Florence Subdivision in the Census) shows

-a total of 1,333 housing units
-averaging 4.6 rooms
-averaging 3.6 rooms (excluding kitchens), or
-a total of 4,799 rooms to be occupied, with
-an average of 3.05 residents per housing unit, or
-a resident population (3.05 x 1,333) of 4,079, or
-0.85 residents per room.

Bringing the occupancy rate up to one person for each of the available rooms would involve assigning 720 evacuees to these homes (4,799 rooms - 4,079 residents). If the occupancy rate were raised to two persons per available room, an additional 4,799 evacuees could be accommodated.

The table below summarizes the additional lodging spaces available--under various occupancy rates--in the three Reception/Care Districts that would have to absorb any population transferred from the Division I or Canon City area. Note that these figures assume all housing units are fully usable.

Table X

Lodging Capacity in Private Residences at Alternative Occupancy Rates

	Div.II,Dist.A (Florence)	Div.II,Dist.B (Penrose/Portland)	Div.III,Dist.A (Cotopaxi)	Totals
Housing Units	1,333	389	255	1,977
Rooms/Unit (not kitchens)	3.6	3.7	3.7	3.7
Total Rooms	4,799	1,439	944	7,182
Residents per Room	.85	.94	.77	.85
Resident Population	4,079	1,352	724	6,155
EVACUEE SPACES AT				**TOTAL SPACES**
1 person per room	720	87	220	1,027
2 persons per room	5,519	1,526	1,164	8,209
3 persons per room	10,318	2,965	2,108	15,391
4 persons per room	15,117	4,404	3,052	22,573
5 persons per room	19,916	5,843	3,996	29,755

These capacities, however, are only the rawest maximum numbers for each rate of occupancy. Before determining actual and usable capacity in private residences, the planner must consider such factors as:

- The total evacuee-plus-resident populations of host jurisdictions.
- The feasibility of using all of the private residential space which is available at a given occupancy rate.
- The fallout shelter requirements of evacuees.
- The provision of meals for the total evacuee population.
- Requirements for supporting services.

Total Emergency Population. To the evacuees lodged in private homes must be added the resident population in those homes, the resident population in group quarters, and the evacuee population already (in this case) assigned to non-residential congregate care facilities. These figures represent, for each R/C jurisdiction, a population base to which alternative numbers of "residential" evacuees would be added to create the total emergency population which would have to be maintained and supported during a crisis relocation. For the three R/C jurisdictions under consideration, these figures are readily obtained from the Census (1970) and the pre-dispersal evacuation plan for Fremont County.

	Div.II,Dist.A (Florence)	Div.II,Dist.B (Penrose/Portland)	Div.III,Dist.A (Cotopaxi)	Total
Household Residents	4,069	1,347	723	6,139
Residents/Group Quarters	48	0	0	48
Evacuees/Cong. Facilities	4,570	3,001	638	8,209
Total	8,687	4,348	1,361	14,396

These pre-dispersal emergency populations indicate that the populations of the three jurisdictions have more than doubled under the pre-dispersal plan. Adding these numbers to those in the preceding table will give the poter ıl emergency population at the various assumed levels of occupancy in private residences. For example, adding evacuees to a level of two persons per room would add 5,519 evacuees in the Florence area, 1,526 in Penrose/Portland, and 1,164 in Cotopaxi. For the three jurisdictions, these 8,209 added

evacuees would create a total emergency population of 22,605, nearly quadrupling the normal population and doubling the pre-dispersal evacuee population. Jumping to an extremely high occupancy rate–five persons per room–would add 29,755 evacuees to the 8,209 in congregate facilities, thereby imposing some 38,000 evacuees on about 6,000 original residents.

Estimating Usable Space in Private Residences. The maximum residential lodging space (at each occupancy rate) does not, of course, reflect the quality, location, or accessibility of housing. To a certain extent, limitations attributable to such factors may be offset by the availability of unoccupied dwellings and new construction since the last Census. Planners must also make judgments about unusual categories of facilities–trailer parks, seasonal or vacation housing, etc–that would *predictably* be accessible throughout the year. In most cases, furthermore, it is advisable to review the Housing Census data or survey local housing conditions, to consider plumbing and other indicators of housing quality, and then to reduce the assumed occupancy rate to take account of limitations inherent in the general distribution, styles, and quality of a community's housing inventory.

In many evacuation situations, finally, the planner must also weigh factors of quality and crowding against the alternatives. If a community must absorb very great numbers of evacuees, even its least suitable housing will usually be preferable to makeshift construction, the use of farm buildings, or like approaches to emergency lodging.

Planners considering the extent of crowding to be permitted in private residences can most easily hedge against limitations of quality by assuming that only a certain percentage of private dwellings will in fact be used to lodge evacuees. For example, if it is assumed that in the three Fremont jurisdictions only 90 percent of the private residences would in fact prove usable, their total emergency populations would be reduced by 1,436 evacuees (at two persons per room), by 2,872 (at three per room), or by 3,590 (at four per room). Some housing will always be inconvenient to other services, remote from fallout shelter, or used for other purposes (such as congregate feeding). It is better to limit the estimated capacity *first* by assuming some whole units are not used, *then* to proceed to a determination of the necessary rate of occupancy in the remaining units.

Fallout Shelter. The 1975 pre-dispersal plan identified fallout shelter spaces for all of Fremont's incoming evacuees. For lodgers in each of the congregate lodging facilities, that plan specified fallout shelter spaces in the same or a nearby facility. The Civil Defense survey of non-residential buildings provided readily usable data for this purpose, and the matching of evacuee groups to this relatively limited number of facilities was a straightforward process.

When large numbers of evacuees are dispersed into private homes, the identification of shelter spaces is a more complex task. Ideally, a plan for wide dispersal should be based on a survey of the shelter capabilities in the homes themselves–*i.e.*, basements which can be used, or upgraded, to provide sufficient fallout shelter for nearby residents. At the planning stage, these home-shelter resources would be added to the identified fallout shelter in non-residential buildings. The total emergency population of residents plus congregate-lodged evacuees plus residence-lodged evacuees would then be compared to the inventory and distribution of fallout shelter spaces.

At this point in the process, two operational considerations became paramount. First, and most obviously, the eventual distributions of population and shelters must allow for a short (15-30-minute) move to shelter. Second, a widely distributed residential population presents relatively more complex problems of control, communications, population management, etc. Excepting residential evacuees who are sheltered in the basement of the *same* residence, many small clusters of people must now distribute themselves across shelters in other homes or public shelters. To insure that such a process would work involves both more detailed planning and closer operational control than are needed for a pre-dispersal plan.

In sum, a dispersal of evacuees to private residences makes more difficult the planned allocation of shelter. The distribution of shelter, in turn, must be reflected in the planned distribution of evacuees into congregate facilities and private residences. Complicating the planning process, furthermore, may be the requirement to construct expedient shelter in some neighborhoods in order to utilize the supply of residential housing. None of these problems is difficult, of course, but each represents an additional consideration which must be built into the planning process for the dispersal of evacuees into residences.

For this illustrative case, it has not been possible to perform a survey or detailed calculation of shelter spaces in the three Fremont jurisdictions of interest. From an on-site examination of the area in 1975, however, it appears that basement shelters would be widely available. Additional spaces could also be created via construction of expedient shelters. Therefore, considerations of shelter availability have not been used to limit the maximum number of lodging spaces available in private homes.

Food and Water. The Freemont pre-dispersal plan identified eating establishments for use by evacuees in each congregate lodging facility. (Eating establishments are of course distributed more or less proportionately to the general population—hence, the available congregate care facilities.) Dispersal of evacuees out of the Canon City area—to private residences in Divisions II and III—would place a severe burden on the capacity of eating establishments in those areas. However, planners here, and in most host areas, would have available a range of potential solutions. Nine small eating establishments in Division II and one in Dividion III were not used by congregate lodgers in the original plan. These would be pressed into service. Meals could also be prepared in Canon City establishments and carried to outlying areas. Certain homes with well-equipped kitchens could be designated as congregate feeding establishments. Or, more likely, additional supplies of food could be channeled to all homes through local food stores. Again, the problems posed by wider dispersal are the qualitative ones involving more detailed plans and more carefully monitored operations.

Other Reception/Care Services. In addition to lodging, shelter, and feeding, a Reception/Care Service must meet minimum essential needs for a wide variety of other services required by special populations (*i.e.*, disabled, elderly), personal services (cleaning, pet care, etc.), and information (on missing persons, emergency regulations, etc.). A wider dispersal and the use of private lodgings tends to fractionate the delivery process, increase the number of required service outlets, and require additional staff and resources to deliver the services or monitor their acceptable performance by evacuees themselves.

Summary of Factors Affecting Utilization of Private Residences. Lodging and shelter are the essential factors determining the distribution of evacuees. Given adequate lodging and at least the means to rapidly produce shelter, it is possible (almost without exception) to meet all other emergency needs through imaginative planning and the intelligent use of manpower and resources.

Having said this, the planning and operational implications of wider dispersal are significantly more taxing than in the pre-dispersal situation. Essentially, people under stress are spread out in smaller groups, yet require the same supporting services. Careful planning is required to seek reasonable and efficient methods for providing services, regulating communication and transportation, and monitoring and managing the behavior of masses of people in many small groups. Clearly, a condition of wide dispersal calls for more planning, more staff, and more complex organizational procedures in the Reception/Care and other emergency services.

Comparing the Pre-Dispersal and Dispersed Emergency Populations in the Illustrative Case

After determining the *capacity* of outlying areas (with few available congregate care facilities), it remains to determine (1) the preferred redistribution of the emergency population, among the numerous options available, (2) the best approach to dispersal planning–*i.e.*, what groups would move from Division I, and whether the evacuation should proceed in one stage or two stages, and (3) the Reception/Care Divisions, Districts, Lodging Sections, and their organizational apparati required to manage the dispersed population.

The Preferred Dispersal for Fremont County

A national policy requiring wider dispersal of evacuees would necessarily provide guidelines which would be used by planners to set limits on the maximum concentrations of emergency (total) population in host areas. Such guidelines would be based on the assumption that an enemy would target population centers in host areas. Examples of such guidelines include:

- Limiting the resident-plus-evacuee population within any area of (?) square miles to a total of 10,000 people. 20,000. Etc. This approach would often require relocating some residents in some host counties.
- Allowing host communities to remain intact, whatever their concentration, and adding evacuees only to those communities that do not reach the allowable concentrations stipulated above. In other words, stipulate limits for population concentration but do not enforce those limits on the resident population of the host counties themselves.
- Requiring a reasonably uniform distribution of emergency population across the small subareas of a host county, with or without provisions for moving some residents out of their host communities.

From the data presented in both parts of this report, certain generalizations can surely be made about the implications of any such policy governing the allowable concentrations of emergency populations. First, to require the relocation of some portion of host area residents would introduce enormous difficulties and make the population relocation effort more complex, less credible, and less manageable. Second, as the limits on allowable concentrations of evacuees become smaller, the problems presented would vary substantially among host counties. Counties comprised of numerous small towns, each surrounded by capacious rural houses, offer the ideal but uncommon pattern. Third, any distribution which does not use existing buildings and residences–*i.e.*, putting evacuees in presently unsettled areas–entails enormous expenditures and efforts over and above the already substantial levels associated with any evacuation.

The Fremont County case illustrates a number of the typical problems that would be faced by many host counties. Thus:

> In Division I, Canon City and its suburbs have a resident population of 15,755. To reach a maximum population of 10,000 in that small area would require shifting 5,755 residents, *plus* 29,595 pre-dispersal evacuees, to residential quarters in Division II and III. These 35,000 people are nearly six times the resident population of Division II and III.
>
> But Divisions II and III already have a pre-dispersal evacuee population of 8,212, added to their 6,155 residents. Of these 14,367 people,

Division II has 13,005, of whom 8,652 are concentrated in Florence. A limit of 10,000 per community would allow Florence to absorb only 1,348 additional evacuees from Canon City, yet Florence represents the best option for housing additional evacuees in Division II.

Terrain and current population distribution rule out the use of much of the land area in all three Divisions - unless evacuees and residents are to be camped in presently unsettled and inaccessible regions of this mountainous and chilly area.

Limiting dispersal to Fremont's existing residential *and* congregate facilities yields a minimum community concentration of about 30,000. That is, even using a high occupancy rate for Division III's few residences, any concentration below 30,000 in the Canon City area produces an emergency population over 30,000 in Division II's Florence/Portland/Penrose area.

A few of the options available to dispersal planners are suggested by the following table, which describes the resulting emergency populations for the Three Divisions when the residential occupancy rates in Divisions II and III are raised to 1, 2, and 3 persons per room. These figures assume that 100 percent of the rooms in II and III are utilized.

Table XI

Emergency (Total) Population per Division at 1, 2, and 3 Persons per Room in II and III

	Division I	Division II	Division III
Pre-Dispersal Population	45,382	13,005	1,362
At 1 per Room in II and III	44,355	13,812	1,582
At 2 per Room in II and III	37,173	20,050	2,526
At 3 per Room in II and III	29,991	26,288	3,470

By using all congregate space in Divisions II and III, and transferring 15,391 evacuees from Division I into private residences in II and III, Fremont County is left with about 30,000 people in I and nearly 30,000 in the combination of II and III. This result assumes three persons per room in II and III. To further reduce population densities in I and II, it would be necessary to add evacuees to Division III by crowding more than 3 persons into each residential room.

For the remainder of this exercise, it is assumed that relocation planners would elect the three-per-room option. The post dispersal population allocated to each Division would then include the following numbers of original residents, evacuees in congregate facilities, evacuees in private residences and total emergency population.

Table XII

Post-Dispersal Emergency Population of Fremont County

	Division I (Canon City Area)	Division II (Florence/Portland/Penrose)	Division III (Cotopaxi)
Original Residents	15,787	5,431	724
Evacuees/Congregate	14,239*	7,574	638
Evacuees/Residences	0*	13,248	2,108
Total Emerg. Population	30,026	26,253	3,470

*The Division I or Canon City evacuees remaining after dispersal could, of course, be placed in private residences as well. This option, which should be pursued for reasons of equity, has not been worked out in detail because it clearly poses much less severe crowding and management problems than those illustrated for the other Divisions.

Given the preferred distribution of the dispersed evacuees, it remains to consider the best methods for producing the desired pattern of dispersal. The following section addresses that problem.

Approaches to a More Widely Dispersed Emergency Population

The principal steps in Reception/Care planning, as stipulated in the official guidance, were listed earlier in Part II of this report (pp. 41-42 above). Steps 1-3 describe how to determine the allocation of evacuees to a particular host county. The next several steps are of concern here and include:

- Describe or map the county's inventory of usable congregate lodging and shelter facilities.
- Coordinate shelter plans for evacuees and residents.
- Rank order facilities available for lodging, shelter, and feeding.
- Allocate evacuees to the preferred/best facilities.

Planning for dispersal merely expands on this logical process by including private residences in the lodging/shelter inventory, then limiting the allocation of evacuees per community to some maximum figure based on the vulnerability to weapons effects and the availability of usable spaces. This process has been described above and has resulted in the assumed distribution of evacuees described in Table XII above. That is, roughly 30,000 evacuees-plus-residents will be lodged, sheltered, and fed in Division I (The Canon City area), and roughly the same number will live in congregate facilities and private homes in Divisions II and III.

Given the target distributions, the following sections consider the process of making specific assignments or re-assignments of evacuees to achieve the desired level of dispersal. Two general topics are addressed: (1) movement in stages and (2) specific reassignments of evacuees from Division I to Divisions II and III to create the post-dispersal emergency population of Fremont County.

One-Stage *versus* Two-Stage Movements. Evacuees could be routed directly to dispersal locations, or they could move first into a pre-dispersal pattern, then move again as conditions worsened or as reception areas developed greater administrative and physical capabilities to support wider dispersal. Both approaches carry certain complexities and both would undoubtedly be used to some extent as host areas proved variously capable of gearing up rapidly to receive evacuees. Factors to be considered in planning for dispersal include organizational relocation, the orderly processing of non-organizational evacuees, and the adaptability of Reception/Care plans to the handling of spontaneous evacuees.

> **Organizational Relocation.** The assignment of an organization's employees and their dependents to a pre-designated host area address has been advocated in order to achieve such advantages as: maintenance of organizational viability in a fluid situation; potential use of already-organized (risk area) manpower in emergency operations; reduced burden of dealing with a mass of individuals and families; reduced threat to host area residents; and increased specificity of

host area addresses for risk area residents considering, planning, or carrying out an evacuation movement. **In Dispersal Planning**: Organizational relocation is still more preferable to a mass movement of individuals. Pre-existing organizational structures would facilitate either a one-stage or two-stage movement. And the organizational capacity thus acquired would be especially needed in smaller communities gearing up to receive large numbers of evacuees.

Non-Organizational Evacuees. These evacuees, perhaps the bulk of the population, can only receive lodging assignments after reaching a host area Reception Center. For them, a two-stage movement would be a forbidding challenge, implying assignment to a congregate facility, their registration and organization within that facility (including arrangements for seeking shelter, obtaining meals, seeking special services, etc.), followed by a secondary movement through another Reception Center, followed by an assignment to specific homes or congregate facilities, followed by a process of adapting to that eventual condition. **In Dispersal Planning**: Planners should seek to establish secondary Reception Centers in host Districts and Lodging Sections. Congregate facilities at or near these Centers should be equipped to serve as "holding areas" while residential assignments are being made. Evacuee movement would be to a major Reception Center, where evacuees would be allocated to these secondary Centers, from which evacuees would move into residences or congregate facilities.

Spontaneous Evacuation. Any relocation plan should make provision for spontaneous evacuation in the period immediately before such a relocation is formally ordered. To the extent possible, these evacuees should be channeled to facilities in a manner consistent with the distribution of evacuees that will eventually be required. **In Dispersal Planning**: The major Reception Centers and local Reception Centers should be located such that spontaneous evacuees can be cared for in the Districts where they would eventually reside. The most readily obtainable congregate facilities should be set aside for this potential use in each District, and incoming spontaneous evacuees should be assigned to such facilities in the Districts where their organizations or neighborhood groups would eventually be assigned.

Given the above considerations, the pre-dispersal Fremont plan would be modified as follows. (1) The inventory of lodging, shelter, and feeding locations would include private homes and basements, (2) evacuees would be distributed in accordance with these available resources, holding concentrations in any community to the minimum feasible population density, and (3) Lodging Sections, Districts, and Divisions would be demarcated for the resulting evacuee-plus-resident population. Within each District, (4) a local Reception Center would be designated, preferably (5) in or near a congregate facility which could lodge incoming

evacuees while other facilities were being prepared and staffed– or while evacuees were being placed in private residences. (6) Headquarters for evacuating organizations would be designated as receiving points for these evacuees, and (7) organizational evacuees would move from these headquarters into designated congregate facilities or nearby private homes.

This procedure for dispersal seeks to minimize the secondary movement of evacuees *between* Reception/Care jurisdictions. Non-organizational evacuees would move through two Reception Centers rather than one. Organizational evacuees would still move directly to their host area headquarters, but might remain in local "holding" facilities until their final lodging area was prepared.

None of these arrangments, it should be noted, alters the general R/C organizational pattern described in the existing relocation guidance. However, dispersal planning calls for a more detailed study of host areas (including residences and basements), and a more detailed exercise of "matching" evacuees to widely scattered homes and nearest available shelter, feeding, and other services. Evacuee movements are more complex, and their destinations are seldom specific–factors which would affect the credibility of the effort and the amount of oversight needed during movement. Finally, compared to its alternative, dispersal clearly calls for substantial additional staff during the movement phase (for example, to operate more reception or processing centers), as well as in the lodging and shelter phases (to "police" and organize a more scattered emergency population).

Re-Assignments of Pre-Dispersal Evacuees to Create a More Widely Dispersed Population in Fremont County. The pre-dispersal Fremont Reception/Care Plan assigned all evacuees to congregate lodgings, none to private homes. The great majority of the evacuees were assigned as members of organizational groups. The heavy concentration of population in Division I (Canon City) reflected the relatively greater number of potential congregate facilities in that area. In Divisions II and III, all available congregate care facilities were filled to capacity.

To create the new population distribution required for dispersal, then, would involve moving evacuees out of congregate facilities in Division I and into private residences in Divisions II and III. A total of 15,391 evacuees would be, in effect, transferred out of

the Canon City area in Division I, leaving Division I with 14,239 evacuees in congregate lodging facilities. At three persons per room, 13,248 of the transferred evacuees would be added to Division II (Florence/Portland/Penrose), which would also continue to support 7,574 other evacuees in congregate lodgings. 2,108 would be added to Division III (Cotopaxi), which would also have 638 other evacuees in congregate facilities.

The following criteria would govern the selection of Division I evacuees for re-assignment.

> First, the number to be moved would be determined by reference to official guidelines specifying maximum concentrations, coupled with an appraisal of the lodging and other facilities available in low-concentration areas. These factors have been discussed earlier: in this case, it has been assumed that some 30,000 people can remain in the Canon City area—the number required to hold residential crowding to three persons per room in the other communities.
>
> Second, the selection should allow the retention and consolidation of only the best congregate lodging and other facilities formerly used in Division I.
>
> Third, re-assignments should serve to maintain the maximum integrity and viability of organizational groups—and allow the use of organizational groups to help perform Reception/Care functions in the newly enlarged communities which are weak in the resources and infrastructure needed during the emergency.
>
> Fourth, unattached families and individuals (non-organizational evacuees) are considered last. This "most-difficult-to-manage" population is re-assigned as necessary to fill in the left-over lodging and shelter spaces in facilities or neighborhoods assigned to organizational groups.

(As these criteria are applied to this illustrative case, of course, the reader should bear in mind that they would normally be applied in making an *initial* distribution of evacuees across a host county. That is, planning for greater dispersal would normally be the *only* plan for distributing evacuees.)

Prior to dispersal or re-assignment, Division I evacuees are lodged in a total of 107 congregate facilities. Many of these have insufficient shelter space to accommodate their own congregate lodgers; therefore, an attack warning would necessitate moving to another facility, or substantial shelter-upgrading or construction of expedient shelter. Furthermore, many of the 107 facilities also lack kitchens or other feeding facilities. Finally, many of the buildings

are small and provide very few lodging spaces; these would require formal assignments of Reception/Care managers and staff, and provide relatively fewer opportunities to recruit supplemental staff from the emergency residents themselves.

The objective in selecting evacuees for re-assignment would be to retain the best and largest facilities, and those offering the best combination of lodging, shelter, and feeding services within the facility itself. By inspection of the Evacuee Assignment Forms in the pre-dispersal plan, it becomes apparent that 33 of the 107 facilities could lodge the 14,239 evacuees who must remain in Division I. Of these 33 facilities, only four would not be able to provide feeding services and shelter space for all of the evacuees lodged within them. Indeed, the average number of evacuees per congregate facility in Division I would rise from 277 to 432.

By contrast, the 74 Division I facilities that would now be closed had either no shelter space or insufficient shelter spaces for their lodgers. Sixty-two of the 74 buildings had no kitchens or other feeding facilities. Fifty-three of the now-closed facilities had lodging capacities of fewer than 200 persons each. Forty-six of these lodged fewer than 150 evacuees, 30 housed fewer than 100, and nineteen held fewer than 75 people. Following dispersal, then, Division I's Reception/Care management and operational burdens would be reduced by a greater amount than the halving of the evacuee population would imply. This result would also hold if Division I evacuees were now redistributed to private residences, since these residences would be near the congregate lodging facilities with their built-in shelter and feeding resources.

The redistribution from Division I would include 14,534 members of 17 organizational groups. The selection represents an effort to keep organizations intact, to keep certain organizations as close as possible to the Colorado Springs risk area (to which they would commute), and to utilize certain organizational groups (governmental, health-related, etc.) to help provide services in Divisions II and III. Organizational evacuees to be moved would all be members (employees plus dependents) of ten organizations–a total of 6,431 evacuees–and part of seven other organizations–8,103 evacuees. Division I would retain six intact organizations (4,584 evacuees) and parts of seven other organizations (8,845 evacuees). A total of 822 evacuees not attached to organizations would also be moved out of Division I, which would now retain 810 of these unattached individuals.

New Reception/Care Requirements to Accommodate the Dispersed Population

The movement of over 15,000 evacuees out of Division I would sharply decrease its Reception/Care burden while even more sharply increasing that of II and III. The extent of this shift is apparent when the newly dispersed evacuees are allocated to the "old" or pre-dispersal Reception/Care Districts in II and III. Thus:

> Division II, District A (Florence area) would receive 10,318 *additional* evacuees—the number required to bring all residences to an occupancy rate of three persons per room. The new evacuees include 9,963 members of eleven organizations, plus 355 nonorganizational evacuees.
>
> Division II, District B (Portland/Penrose area) would receive *additional* evacuees numbering 2,921 members of three organizations, plus nine unattached individuals.
>
> Division III, District A (Cotopaxi area) would receive *additional* evacuees numbering 1,650 organizational members (five organizations), plus 458 unattached individuals.

In sum, the emergency population (residents plus evacuees) of Divisions II and III are more than doubled, while that of Division I is cut by about 50 percent. Clearly, the pre-dispersal Reception/Care Districts and their component Lodging Sections must be adjusted to manage these substantially different populations.

The steps in defining Reception/Care jurisdictions are spelled out in the official guidance. Essentially, they are as follows:

> First, the distribution of evacuees is determined by the availability of lodging. For the dispersed population, this now includes spaces available in private residences at the assumed occupancy rate of three per room.
>
> Second, Districts and their component Lodging Sections are drawn to encompass emergency (total) populations of approximately 10,000 and 2,500, respectively. These numbers, however, may vary considerably, depending on such factors as geographical features, transportation arteries, and the desirability of sheltering and feeding evacuees in the same unit in which they are lodged.

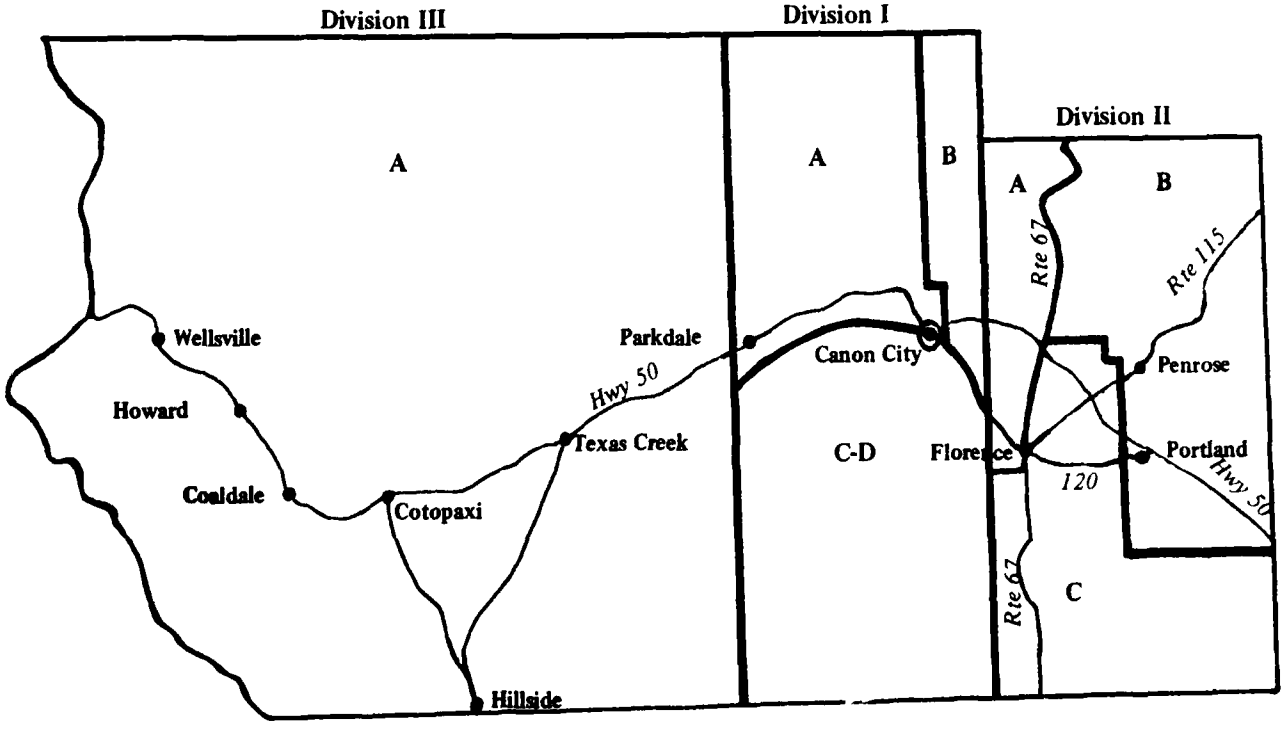
In the present case, the distribution of the dispersed emergency population has been determined by the locations of residences in all three Divisions, by the selection of 33 congregate lodging facilities to be retained in Division I, and by the distribution of congregate facilities and residential rooms available for evacuees in Divisions II and III.

The definition of Districts and Lodging Sections for the dispersed emergency population is a matter of applying the numerical and other criteria noted above. The result of this process is illustrated on the map following, which shows that Division III remains unchanged, Division II now includes an additional District C by dividing the former District A into A and C, and Division I drops one of its four Districts by combining C and D into District C-D.

The more complex adjustments at the Lodging Section level are suggested by the table on the following page, which lists the new populations of original residents, congregate-lodged evacuees, and residence-lodged evacuees for each Reception/Care jurisdiction.

FREMONT COUNTY, COLORADO

Post-Dispersal R/C Jurisdictions



I, II, III Divisions
A, B. C, C-D Districts

Table XIII: Post-Dispersal Population

R/C Jurisdictions Dispersal Population	No. of Lodg. Sects. (pre-dispersal)	Residents	Evacuees Congregate	Evacuees Residence	Emergency Population
Div. I, Dist. A.	(7)	**9,206**	**9,009**	**0**	**18,215**
Lodg. Sect. 1	(2)		1,061	0	
Lodg. Sect. 2	(same)	not	1,520	0	not
Lodg. Sect. 3	(same)	calcu-	2,250	0	calcu-
Lodg. Sect. 4	(2)	lated	2,571	0	lated
Lodg. Sect. 5	(same)		1,607	0	
Div. I, Dist. B.	(2)	**3,122**	**4,332**	**0**	**7,454**
Lodg. Sect. 1	(same)	not	1,996	0	not
Lodg. Sect. 2	(same)	calcu-	2,336	0	calcu-
		lated			lated
Div. I, Dist. C-D	(3)	**3,459**	**898**	**0**	**4,357**
Lodg. Sect. 1	(3)	3,459	898	0	4,357
Div. II, Dist. A	(1)	**1,638**	**3,282**	**4,141**	**9,061**
Lodg. Sect. 1		358	1,870	906	3,134
Lodg. Sect. 2		459	1,472	1,163	3,034
Lodg. Sect. 3		821	0	2,072	2,893
Div. II, Dist. B	(2)	**1,352**	**3,001**	**2,930**	**7,283**
Lodg. Sect. 1		628	381	1,357	2,366
Lodg. Sect. 2		129	2,155	282	2,666
Lodg. Sect. 3		595	465	1,291	2,351
Div. II, Dist. C	(2)	**2,441**	**1,291**	**6,177**	**9,909**
Lodg. Sect. 1		573	520	1,448	2,541
Lodg. Sect. 2		655	100	1,657	2,412
Lodg. Sect. 3		584	551	1,488	2,623
Lodg. Sect. 4		629	120	1,584	2,333
Div. III, Dist. A	(1)	**724**	**638**	**2,108**	**3,470**
Lodg. Sect. 1		259	638	752	1,649
Lodg. Sect. 2		465	0	1,356	1,821

These totals do not, however, fully communicate the scope of the Reception/Care burden that dispersal would impose on many outlying jurisdictions and the evacuees who would be lodged there. Consider, for example, the situation in Divison II, District B, which lies northeast of Florence and includes the communities of Penrose and Portland–an area where *total* resident population is 1,352.

Prior to dispersal, District B comprised two Lodging Sections. After dispersal, three Lodging Sections cover the same area. Lodged in this District were 405 employees and dependents associated with the Colorado Springs Fire Department, 381 evacuees associated with the Colorado Springs Parks and Recreation Department, 60 evacuees from the El Paso County (Colorado Springs) Health Department, 1,540 from the risk area offices of the Federal Aviation Agency, and 615 non-organizational evacuees. Part of these evacuees were (and remain) lodged in the Penrose School (405 evacuees from the Colorado Springs Fire Department), the offices and warehouse of the Estes Company on Highway 50 outside Penrose (381 evacuees from the Parks and Recreation Department), and the Friends Church (60 from the Health Department). The Remainder–1,540 from the FAA and 615 nonorganizational evacuees–were (and remain) lodged in seven warehouses and "silos" of the Ideal Cement Company's facilities near Portland.

To this evacuee population–already poorly accommodated–dispersal would add a total of 2,921 new organizational evacuees and nine unattached individuals. The added organizational evacuees would include 1,357 associated with the Western Forge Corporation, 560 with the Holly Sugar Corporation, 1,004 with the Joy Manufacturing Company. All of the added evacuees would share private homes, bringing the residential occupancy rate to three per room.

The Portland/Penrose area–with 1,352 residents and only one school, one church and one or two commercial facilities that are readily converted to congregate lodging–would now be home for a post-dispersal emergency population of 7,283 people, including nearly twice as many evacuees as in the pre-dispersal case.

Clearly, the arrangement of Reception/Care services for a population under these conditions would require not only an increase in the number of Districts and Lodging Sections--with those implications for R/C staffing--but also a substantial increase in the staff required to organize, monitor, and serve a more widely scattered evacuee population in the closest contact with local residents.

Just as clearly, the dispersed case would place a still higher premium on the use of organizational groups to maintain orderly relationships among evacuees and provide already-organized manpower for many Reception/Care activities. The original Fremont Plan intentionally exaggerated the percentage of evacuees who could be treated as organizational groups, and that exaggeration is continued in this modification of the plan to illustrate the effects of dispersal. But it should be apparent that "organizational relocation" serves to reduce evacuee reliance on official Reception/Care staff while providing organized manpower for potential use in emergency operations. As the degree of dispersal is increased and ill-equipped communities are asked to share greater burdens, these advantages of an organization-based evacuation become more important.

Summary

Part II of this report has sought to illustrate in concrete terms the impacts of greater population dispersal on Reception/Care planning and operations. Briefly, dispersal invites and demands complexity. It requires the mandatory use of private residences--a policy which is probably advisable in any event, but one which carries implications that may be forbidding to some policy makers. Dispersal would typically require a larger Reception/Care organization to manage the population, utilize and substitute for local infrastructure, and regulate the interactions among widely scattered residents and evacuees sharing private residences. With dispersal, all supply and service functions would become more complex and more expensive.

Offsetting these disadvantages--in part--is the reduced vulnerability of the relocated population to direct weapons effects. To defend wider dispersal is to give considerable weight to the assumption that an enemy could--and would--retarget to strike at the evacuated

population. This proposition becomes all the more important when one considers that the provision of fallout shelter (against indirect attack effects) is one of those services which is more difficult to provide under conditions of widespread dispersal.

Finally, it is important that the dispersal option entails no substantial change in the Reception/Care guidance that has been adopted. The essential features of this guidance are its districting of the emergency population into manageable units and its specification of the functions and staff required to manage and serve each of those units. The guidance, *per se*, is equally adaptable to populations which are concentrated or dispersed, which are clustered in congregate facilities, dispersed in private homes, or divided between the two.

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RECEPTION AND CARE PLANNING FOR WIDELY DISPERSED POPULATIONS
Cecil H. Davis and William W. Chenault (Final Report)

Unclassified

Human Sciences Research, Inc., March 1980. vi + 76 pages.
Contract No. DCPA01-78-C-0193, Work Unit 4821G

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