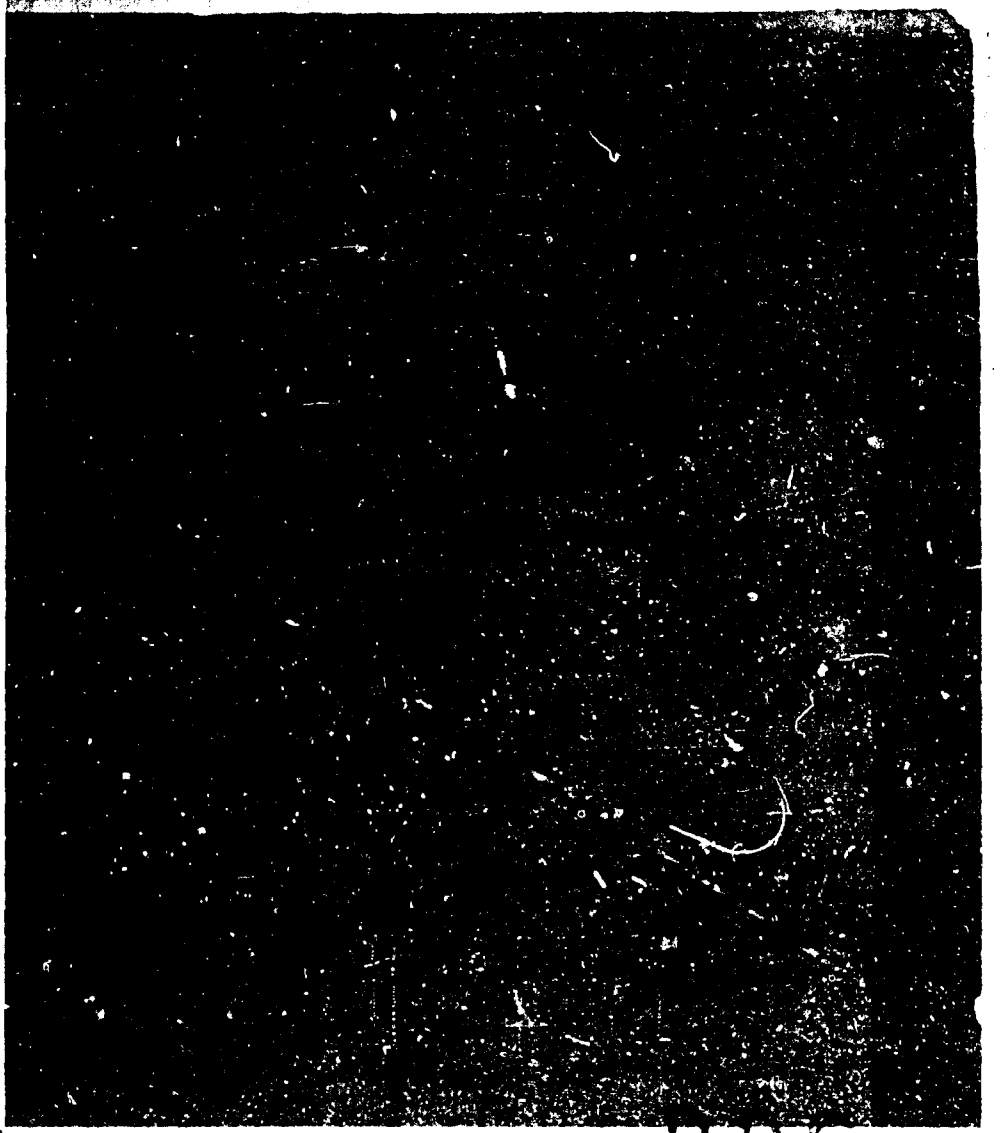
PHASE II
FINAL REPORT

August 1967



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OFFICE OF CIVIL DEFENSE
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SAN FRANCISCO, CALIFORNIA

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PHASE II
FINAL REPORT

CONCEPTUAL DESIGN OF A CIVIL DEFENSE RESCUE SYSTEM

By:

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WITH A SUPPLEMENT ON COMMUNITY MANPOWER RESOURCES

By:

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August 1967

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STANFORD
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ABSTRACT

Culminating several years of research on the problem of rescue after nuclear attack, this study reviews past work and presents a preliminary design of a general rescue system. In this system, the population would be dormant during the noncrisis period, but would be aroused at the earliest sign of a crisis, to prepare for attack and to carry out postattack rescue operations under recognized local leaders. In each urban area, this leadership would be provided by a small group or cadre drawing upon neighborhood leadership through an inactive reserve of citizen organizations. The cadre would supply the continuing readiness in peacetime under the guidance of the OCD.

PREFACE

This study is the culmination of several years of research on the problem of rescue after nuclear attack, for the Office of Civi Defense, Washington, D.C., through the U.S. Naval Radiological Defense Laboratory, San Francisco, California. To provide an integrated view over the research, the following pages discuss both the most recent effort and the previous work of Lacy Thomas, Robert K. Meister, and John L. Crain. Valuable contributions were also made by Charles D. Bigelow and Shirley R. Reid.

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I INTRODUCTION

Background

Study of Civil Defense Rescue started at SRI in late 1963. Phase Ia of this research was devoted to problem formulation in terms of the magnitude and character of the rescue problem. Phase Ib, started in early 1965, supplemented the earlier work by filling in and improving certain aspects of the problem description. Phase II began in 1966 and was essentially concerned with reformulating the rescue problem and arriving at a preliminary design of the rescue system. The reason for this evolution of ideas was that great difficulties had to be resolved.

First, the Phase I studies yielded discouraging central results. Under some postulated conditions of nuclear warfare, rescue requirements appeared to be overwhelming--in a single urban area, tens of thousands of survivors could need one or more forms of rescue. Second, because of fire or fallout development or both, most of these rescues might have to be completed within 20 or 30 minutes. Under these and other extreme constraints, it did not seem credible to postulate either the mammoth rescue organization that seemed to be needed, or the maintenance of this organization in constant preattack readiness over a prolonged time period.

However, at the conclusion of Phase I, the research team began to develop a new concept on which to base a rescue system design. This involved an organization using both a paid cadre and citizen volunteers in a joint arrangement. The design concept relied heavily on massive organizational buildup of forces in times of need.

Thus, the objectives of the Phase II research focused on certain fundamental questions concerning the availability and allocation of manpower resources.

Objectives and Scope of Phase II Research

The objectives of the Phase II research were to:

1. Delineate the required rescue tasks, using the broad definition of rescue from Phase I, and evaluate the probable forces available for accomplishment of these tasks.

2. Compare the requirements of rescue tasks and forces with the requirements of other necessary tasks and forces (such as police and fire control) in a postattack environment.

3. Examine selected organizations (including, but not limited to, police, fire, and public works) in one or more of the cities in the Five City Study to determine their probable support capability for building and maintaining a rescue system and operating it in the conditions postulated in the Five City Study.

During the Phase II work, the research team developed greater confidence in the design concept and decided that this concept should be delineated in considerable detail. This was not originally contemplated in the Phase II study, but was necessary as a framework within which to fit the problem of rescue manpower. Hence, the development of the design concept is still, in an overall sense, a manpower requirement study.

The research that was conducted included an analysis of manpower availability in urban areas, a recapitulation and final development of the rescue problem and its requirements, a description of the rescue system design, and a testing of its organizational aspects relative to a city (San Jose).

Method of Approach

The initial task was a survey of manpower availability, conducted in three steps: compare the magnitude and makeup of the staffs of city governments with rescue manpower requirements; measure the total manpower available in selected groups of citizens (e.g., VFW, Lions, Construction Workers); and study the distribution of this manpower relative to city size and geographic region.

Concurrently, a thorough recapitulation was made of both past and new research findings on the nature of the problem. These were synthesized into four fundamental assumptions and 14 design criteria.

Next, the manpower survey data were analyzed and the organizational aspects of the system were developed. This work included the development of suggested roles for various city government departments and of a mechanism for using volunteer leadership.

With the use of the design criteria, the total rescue system was then developed in terms of system elements (organization, missions, equipment, training, etc.).

The final step was to test the organizational aspects of the system against data on the city of San Jose. The city's geography, population, employees, and other resources were studied relative to the rescue system design. This comparative analysis provided a practical check on the feasibility of the rescue system organization.

II SUMMARY

Review of Outputs of the Total Program

Since this report represents the culmination of several years of research applied to a central problem area--civil defense rescue--the major outputs of this program of rescue problem analysis are given below.

Classification and Estimation of Survivors Relative to Rescue

An initial major output of the program was a procedure for separating survivors into categories meaningful to rescue analysis. These categories are: Killed Immediately, Trapped, Seriously (Nonambulatory) Injured, Ambulatory Injured, and Uninjured. The standard mortality curves used in OCD damage assessment analysis were reconstructed to provide estimates of the numbers of survivors in each of these categories relative to various post-attack environments.

Problem Formulation

With these new classifying and estimating techniques, attack analyses were performed to determine how many survivors would be expected in each postattack environment, how much work would be required to accomplish their rescue, how much time was available for rescue work, and how the answers to all these questions varied with different attacks.

This work led to a new conception of the magnitude and the nature of the problem. The problem was seen for the first time as having two unrelated parts. First, there would be an immediate rescue problem--the movement, care, and protection of masses of injured, uninjured, and lightly trapped survivors under immediate threat of fire and fallout. Later, there would be a reentry rescue problem--the returning to the damaged areas, after the danger from fires diminished, to search out and release any survivors who had been trapped in the debris. This picture led thinking away from the medium and heavy rescue work and identified, as a higher priority concern, the immediate rescue problem that involved a much larger number of people. From this new orientation, a new set of priorities was developed, and a different view emerged of the kind of civil defense response needed.

Computerized Analysis Techniques

To solidify and verify this problem formulation, the classification and measurement techniques were programmed for computer. This allowed, within

the work scope of a related contract,* simulation of eight attacks on four cities. This attack framework provided, in turn, as an input to the Rescue Problem Analysis Program, a statistical analysis of the variation in the rescue problem parameters over a broad range of attack conditions.

Thermal Analysis

During the development of the new computer damage assessment programs, an analysis of the thermal threat was performed by Robert K. Meister. His analysis provided a workable method of estimating the changing fire threat over time as a constraint on postattack operations. This work has been used extensively by others who have done studies for the OCD Research and Plans and Operations Directorates.

Manpower Analysis

An extensive survey was conducted by Lacy G. Thomas of potential manpower resources available within city governments and within local citizens groups. This survey, published as a supplement to this report, shows clearly that the numbers of city employees are too small to man an effective rescue system, and certainly cannot effectively man a total CD postattack system. These extensive survey data have been a major influence on directions taken within the Emergency Operating System Development Project. Chapter V deals with manpower in detail.

System Design

The final outcome of the research program was a set of design criteria and a design concept. These are presented as Chapters III and IV of this report. The criteria are a synoptic summary of all of the past research findings concerning the nature of the problem. A summary table of the criteria is presented on the following page. The design concept is a set of system elements organized into a system satisfying the design criteria.

Phase II Research Findings

Design Concept

One design concept that realistically satisfies all of the design criteria (see summary table) is a system based on crisis-activation rather than attack-activation. The concept is described within the report as a "sleeping giant" concept and has been termed the General Rescue System.

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* See R. K. Meister, "Damage Assessment Analysis," Stanford Research Institute, OCD-PS-65-62, December 1965.

Summary Table

DESIGN CRITERIA

No.	Criteria	Short Title
1	System must not require prolonged readiness of large citizen forces because of the obvious potential for deterioration of interest and effort	No prolonged readiness
2	Management and leadership manpower requirements are greater than the number of available municipal employees	Too few city employees
3	Rescue should be defined as broadest possible multipurpose task	Broad rescue definition
4	Rescue has no natural parent organization, and system design must circumvent this	Parent organization problem
5	System must cope with two entirely different problems--immediate rescue and reentry rescue	Duality of the rescue problem
6	System must respond for immediate rescue under very extreme time constraints	Extreme time constraints
7	The manpower requirements for rescue represent such a large percentage of the total society that they should be considered as unlimited	Unlimited manpower requirements
8	The system must be founded on an organizational theory that recognizes the regional government problem	Regional government problem
9	Only minimum training is necessary	Minimum training requirements
10	Equipment needs are minimal for immediate rescue, and reentry rescue requires no equipment not available in urban areas	Minimum equipment needs
11	The rescue system must not be dependent on availability of public shelter	Relationship to NFSS
12	System should cope with escape from low level fallout	Rescue from fallout
13	In times of massive disaster, people are passive and susceptible to leadership if it is clear to them that there is a plan and that competent leadership exists	Survivors will follow leaders
14	Because of the range of postattack conditions, command/control of any rescue system must be highly flexible.	Flexible tactics

In the General Rescue System, only a relative handful of people--some key employees of city governments throughout the country--would keep alert and ready with rescue plans for nuclear attack. This small group, called the "paid cadre," or active reserve, would function in peacetime (noncrisis period) under the general guidance of the Office of Civil Defense, and would always be in a good state of readiness.

The cadre would have, in addition, approximately 5 percent of the total population organized to provide citizen leadership for rescue and act as an extension to the defense capability of the city governments during a nuclear crisis or natural disaster. These persons, termed citizen leaders or inactive reservists, would be maintained at a minimum level of readiness. This would avoid the problem of deterioration of interest over a prolonged period. The remainder of the citizenry would be no more prepared for a nuclear attack than they are today.

However, extensive and detailed plans would be developed by local CD directors for the mobilization and use of all relevant resources of the community. During periods of cold war crisis, the system would be activated and quickly brought to a high level of readiness. This would be possible because of preplanning--resources would have been identified, OCD-cadre-citizen group agreements would have been negotiated, a long term cadre would have been trained, and citizen reservists would have been identified and preindoctrinated.

Under preplanning, the total community would have been divided into small operating units containing about 150 families each. The reservists would work at this level to organize the total citizenry.

With this kind of careful preparation, it is hoped that this massive organization, this sleeping giant, existing essentially on paper only, could be awakened in times of international crisis and could quickly become a total community force ready to rescue itself from the hazards of nuclear attack.

Findings Relative to Study Objectives

In brief terms, the three study objectives were to (1) evaluate the available manpower, (2) allocate this manpower between rescue and other CD operations, and (3) determine which city department might best lead a rescue system.

These objectives have become so interwoven within the research that it is best to summarize the research findings relative to all three in a single discussion. Moreover, the key topics of interest divide themselves naturally into manpower evaluations according to (1) command function (numbers and types of leaders needed) and (2) nature of the rescue work (immediate rescue versus reentry rescue).

Command Function--Immediate Rescue. From a review of the manpower availability of city employees, it was concluded that these people were insufficient in numbers to provide more than the top level leadership or command post operation during the immediate rescue phase. For this command function, the number of city employees required would be small. The command post function would be necessary to exercise overall control of the reservist leaders who would supervise the citizens at the operating unit level. It is suggested that the supervisory personnel of the fire departments, supported by their counterparts in the police department, provide this field command. This places command under recognized, trained authorities.

At the lower level of leadership (inactive reservists), the memberships of national veteran, fraternal, and service organizations seem large enough to satisfy manpower requirements for leadership of the citizen forces. However, there are serious problems concerning the geographical distribution of these reservists. They tend to live in middle and higher income urban areas and are usually not found in minority group areas. Since the General Rescue System is based on the concept of local leaders in their own residential areas, the filling of these vacancies needs further investigation, if an additional planning burden is not to be placed on the local CD director. Chapters V and VI present more detailed information regarding manpower distribution in urban areas.

Command Function--Reentry Rescue. During the reentry period, the city employees could and should provide on-the-scene leadership for the reentry operations, but would need the reservists to provide leadership for the individual operating units. The same overall command would be exercised by the fire and police departments as in the immediate rescue period, but the more direct command would have to come from other municipal departments. The reason is that fire and police personnel are insufficient in numbers for direct leadership. Fire control personnel number from 8 to 15 per 10,000 population, and police personnel number from 12 to 25, and they would also have other duties, such as fire control and movement control, to perform in the reentry period.

On review of the available manpower of city employees, it is suggested that sufficient manpower exists in the Public Works and the Parks and Recreation Departments. This grouping should also include all workers from Public Works related departments such as Building Inspection, Sewage, Sanitation, and Water Control. This grouping could represent from 20 to 40 city employees per 10,000 residents and should be sufficient to manage and lead the reentry rescue work.

What has been said of the veteran, fraternal, and service clubs for the immediate rescue period will also be true for the reentry period. Except for possibly filling gaps in reservist leadership in the lower income areas, these civic clubs would be adequate from a manpower standpoint.

Further Extension of the Broad Definition of Rescue. It has been concluded in previous research that the broadest possible definition of rescue was desirable. The changing character of the rescue problem with varying attack conditions warns against installing a large force capable of only a narrow mission; that mission may prove infeasible or of low priority. The General Rescue System extends this concept further. This system, after it has been activated, represents a mechanism for organizing the total citizenry for civil defense rescue. Since preparation for rescue is only one activity needed, there is no reason to limit this organization to that single function. It is most logical to extend the concept to a variety of preattack missions--the building of expedient shelters, fire prevention, hardening shelters, prepositioning equipment, and others.

With this concept of extension of missions beyond the rescue function, the General Rescue System concept appears highly attractive from the standpoint of cost-effectiveness and an overall civil defense system.

Future Research

The researchers recommend that future effort in the rescue research program should not be continued along the lines of the past. We feel that the problem analysis research phase has reached a natural ending. It is time for OCD to accept or reject the basic system concepts developed under this research program. If accepted, programs should be developed to test and refine, and possibly integrate and implement the system.

III DESIGN BASIS AND CONCEPT

Broad Definition of Rescue

The conventional definition of rescue is:

> . . . to (1) locate and extricate persons trapped in damaged buildings, shelters, vehicles, and other enclosures, or from radiologically contaminated areas, giving first aid during rescue and removing or arranging for removal of persons to safety, and (2) recover critical supplies, materials, and equipment from scenes of rescue activity.*

This definition summons a picture of men in hardhats working in debris with shovels, cranes, and ropes.

On the other hand, a major early conclusion of the SRI studies concerning rescue was that a very great proportion of the rescue problem had little to do with this picture. The major rescue task would concern untrapped or lightly trapped survivors, probably injured and needing to escape fire and fallout hazards. This suggests that a major aspect of rescue is a sweeping operation, herding and carrying multitudes of people out of burning rubble.

It was generally concluded that heavy rescue, such as digging into debris covered basements, would be a second priority mission conducted later, after the mass fires had dwindled. Under many conditions, heavy rescue would not be attempted. Thus, the research has been based on a very broad definition of rescue developed in Phase Ia. Later work has not changed the appropriateness of this definition:

> Civil Defense rescue is that organized activity that provides for, directs, or in any way facilitates the release and escape from a critically hazardous environment of survivors in the open, in buildings, or in shelter who cannot ensure their own survival; or that provides necessary supplies until such time as escape from the hazardous environment becomes possible.**

This broad definition of rescue, when coupled with the relative payoff of various lifesaving missions, has led us to design a rescue system

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* "Rescue Skills and Techniques," FG-E-11.1, Office of Civil Defense, Washington, D.C., December 1963.

** J.L. Crain and Charles D. Bigelow, Civil Defense Rescue Requirements Following a Nuclear Attack, OCD-PS-64-55, NRDL, Working Paper, Stanford Research Institute, SRI Project No. IMU-4727, February 1965.

comprising a set of rescue operations very different from the conventional ones.

Principal References

Four major references are used as the framework for system development. Key concepts and terminology are drawn from these references and used extensively. Because of this, these sources are referred to periodically throughout this report as references R1 through R4, as listed below:

Reference Number	Report
R1	A Provisional Concept of Emergency Operations Under Nuclear Attack, Walmer E. Strope, OCD, November 10, 1966.
R2	Area Wide Shelter Systems, Richard I. Condit, SRI, Contract OCD-OS-63-149.
R3a	Civil Defense Rescue Requirements following a Nuclear Attack, Contract OCD-PS-64-55, John L. Crain and Charles D. Bigelow, SRI, February 1965.
R3b	Supplemental Analysis - Civil Defense Rescue, Contract OCD-PS-64-65, John L. Crain, et al., SRI, August 1965.
R3c	Working Paper on Civil Defense Rescue--Analytical Report, Contract OCD-PS-65-62, John L. Crain, Robert K. Meister, Lacy G. Thomas, SRI, August 1965.
R3d	Damage Assessment Analysis, Contract OCD-PS-65-62, Robert K. Meister, SRI, December 1965.
R4	Intergovernmental Civil Defense Organization and Programs, Department of Urban Studies, National League of Cities, April 1965.

Strope Paper--R1

We consider this paper to be a major breakthrough in realistic conception of operations planning. The CD system framework developed in the Strope paper is a necessary backdrop to the rescue system designed herein.

Several concepts are borrowed from this paper. One is the concept of division of a metropolis into OAs (Operating Areas). This, for the first time, establishes a politically feasible framework for developing required planning across municipal boundaries. As set down by Strope, an operating area should be defined as a reasonably sized, socially coherent sector of the community that is generally capable of self-direction. Examples are a complete city, a sector of a city, a military reservation, and a large industrial complex. The OA is the basic unit for civil defense planning.

A second extraction is the terminology used to distinguish geographical sectors relative to postattack damage. These are listed in Table 1 and are self-explanatory.

Table 1

TERMINOLOGY USED FOR VARIOUS POSTATTACK ENVIRONMENTS

Situation Name	Blast Damage	Mass Fire	Fallout Radiation
1. FALLOUT RED	Not significant	None	Dangerous--dose rate >50 r/hr (exposure in the open means injury or death within a short time)
2. FALLOUT YELLOW	Not significant	None	Significant--dose rate from 0.5 r/hr to 50 r/hr
3. IMPACT RED	Many structures on fire and/or streets impassable from debris	Severe, uncontrollable	Not significant--dose rate <0.5 r/hr
4. IMPACT YELLOW	Scattered fires and/or streets passable with minor clearance	Scattered, controllable	Not significant--dose rate <0.5 r/hr
5. COMBO RED	Situation 1 plus 3 / Situation 2 plus 3 / Situation 1 plus 4	Any of these combinations	
6. COMBO YELLOW	Situation 2 plus 4		
7. FREE	Not significant	None	Not significant--dose rate <0.5 r/hr

Note: Damage categories for a given area may change over time to reflect fallout decay and changes in the fire situation.

Source: SRI recapitulation of materials in reference R1.

Condit Study--R2

The principal contribution of this study is its realistic treatment of resources. It shows that there is a variety of CD responses that can be made to a nuclear attack, particularly where there is at least a short period of time for the community to prepare itself. The study also shows the variety of alternatives to designated public fallout shelters that are not ideal but definitely provide some protection. This broad approach toward resources and countermeasures is adopted in this study of rescue.

SRI Reports on Rescue Research--R3(a, b, c, d)

The third major area of referenced research is the background of work done by SRI on the rescue question. This comprises the four major studies referenced above plus continued involvement with the problem in other CD studies. The fourth study, R3d, contains damage assessments concerning eight hypothetical attacks on four cities, and uses the detailed computerized assessment procedures developed within the rescue research studies.

N.L.C. Study--R4

This study is an equally significant reference because it provides a comprehensive understanding of the relationship between CD planning and the problem of multiple governments within a metropolitan region. A detailed appreciation of the "regional government" problem is mandatory if the system design concept developed herein is to be applied in a politically feasible manner.

Design Basis--Assumptions and Criteria

The basis for the system design developed in this report can be separated into design assumptions and design criteria. The former pertain to fundamental unsolved problems that underlie almost all of civil defense operations planning. The rescue system designed in this study is contingent on certain assumed answers to these problems. The latter pertains to fundamental problems of civil defense rescue and firm criteria developed in research.

Design Assumptions

Design assumptions were made concerning one preattack condition and three postattack conditions. The preattack condition assumed was that the crisis would be extended enough to allow for escalation planning. The three postattack conditions assumed concerned endpoints or places of destination for rescue efforts, the fallout problem, and the question of risks to rescue personnel.

Escalation Planning

The system designed is totally dependent on a preattack escalation pattern--the nuclear war is preceded by a discernible rise in international tension. The General Rescue System requires several days and preferably two weeks for mobilization. The fact that wars are preceded by discernible crisis conditions can probably be developed but has not been attempted here. Thus, it is included as an assumption.

The Endpoint Problem

The objective of a rescue system is to rescue attack survivors from hazardous environments and to facilitate their movement to relatively safe areas. If the rescued person is injured, then there will be the additional purpose of moving him to where his injuries can be treated.

In previous civil defense rescue, the "endpoint" of operations, the areas to which survivors from blast/fire areas should move, has not been well defined. It is often implied that public shelters must be the repositories for such refugees. However, this does not seem realistic since public shelters would usually be filled to capacity prior to attack. Hence, survivors from blast/fire areas would find no space available for them, and also would not find facilities for needed medical treatment at shelters.

It is assumed in this analysis that endpoints for movements would exist and would be worthy of being reached. These would be, on occasions, peripheral public shelters located outside the IMPACT RED areas, or more likely, in FREE zones. It is further assumed that the total CD operational system is capable of providing overall strategy of movement, directing movements and supplying sufficient support at the endpoints to make movements worthwhile.

The Fallout Problem

No practical method has ever been devised for conducting operations in unsheltered fallout areas. It is possible to postulate massive attacks that create FALLOUT RED conditions over entire urban areas. This blanket fallout condition could develop within hours of the first attack. Unless sufficient fallout shelter existed to quickly accommodate a reasonable number of the survivors from IMPACT AREAS, any operational concept of an organized rescue force would be infeasible.

It is easy to hypothesize such extreme conditions; a number of the standard simulated attacks show these blanket conditions. However, it is assumed in this analysis that if an attack on the continental United States occurred, the probability of such extreme conditions occurring is sufficiently less than 1.0 to justify rescue planning. Thus, it is

assumed that many cities would have less than blanket fallout conditions, and there would be time to reach peripheral safe endpoints.

Risks of Further Attack

It is argued in reference R4 that a great deal of uncertainty might exist as to the likelihood of further attacks. Consequently, since there is great uncertainty in conducting operations such as rescue in a successful manner, it can be argued that those not in danger should not be risked in attempting to save others. The result might be a fruitless loss of surviving able-bodied men and women.

It is not within the scope of this analysis to develop the necessary risk analysis relative to these uncertainties. However, it is assumed that such risk analysis will be conducted and methods of control will be used in the field to tactically account for such risks.

Design Criteria

A first attempt was made at establishing system criteria in reference R3b. These criteria have been broadened and modified and are discussed below. The criteria are summarized in Table 2.

No Prolonged Readiness

A central problem in rescue planning is that during an emergency, a very large force would be needed. However, until the emergency occurred, there would be nothing for the force to do except train. Assuming that the force would be largely comprised of volunteers, this condition would tend to cause deterioration of the force as people lost interest.

Reference R3a describes the deterioration of a force standing and waiting for a task that may never come; as countermeasure against such deterioration, R3a urges identification of the force with peacetime disaster. Unfortunately, further research has indicated that peacetime or natural disasters are inadequate to maintain even a small part of the emergency rescue force in most communities. Natural disasters of enough magnitude to involve more than the city's public safety departments are generally infrequent. Between 1953 and 1964, a majority of the states (28) experienced less than two major disasters each (total 49) which qualified for federal assistance through Public Law 875.*

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* Taken from the summary of declared major disasters, 1953-1964, presented in the Associated General Contractors of America booklet, "PLAN BULLDOZER, A Program for Disaster Relief in Your Community."

Table 2

DESIGN CRITERIA

No.	Criteria	Short Title
1	System must not require prolonged readiness of large citizen forces because of the obvious potential for deterioration of interest and effort	No prolonged readiness
2	Management and leadership manpower requirements are greater than the number of available municipal employees	Too few city employees
3	Rescue should be defined as broadest possible multipurpose task	Broad rescue definition
4	Rescue has no natural parent organization, and system design must circumvent this	Parent organization problem
5	System must cope with two entirely different problems--immediate rescue and reentry rescue	Duality of the rescue problem
6	System must respond for immediate rescue under very extreme time constraints	Extreme time constraints
7	The manpower requirements for rescue represent such a large percentage of the total society that they should be considered as unlimited	Unlimited manpower requirements
8	The system must be founded on an organizational theory that recognizes the regional government problem	Regional government problem
9	Only minimum training is necessary	Minimum training requirements
10	Equipment needs are minimal for immediate rescue, and reentry rescue requires no equipment not available in urban areas	Minimum equipment needs
11	The rescue system must not be dependent on availability of public shelter	Relationship to NFSS
12	System should cope with escape from low level fallout	Rescue from fallout
13	In times of massive disaster, people are passive and susceptible to leadership if it is clear to them that there is a plan and that competent leadership exists	Survivors will follow leaders
14	Because of the range of postattack conditions, command control of any rescue system must be highly flexible.	Flexible tactics

A basic criterion of system design is then concluded to be that all permanently standing rescue forces must be paid personnel--regular employees of governments; system operation must not depend on maintaining readiness of unpaid volunteer personnel over a prolonged period of time.

Too Few City Employees

The supplement* indicates that there are from 80 to 250 city employees per 10,000 residents. The previous rescue studies, reference R3(a, b, c, d) have illustrated that in IMPACT RED and YELLOW areas, the numbers of persons needing immediate assistance can be greater than those available to give assistance. In a recent cave-in of a large building in New York City, hundreds of rescue workers worked for five hours, digging through rubble to untrap four men buried in debris.†

It may be possible for the city employees to manage or supervise postattack operations, but it is unbelievable that they might perform all the rescue operations required. Chapter V discusses this problem.

Broad Rescue Definition

The argument for a multi-purpose rescue force is made in references R3b and R3c. These arguments have convinced OCD (Research) to use the broad definition of rescue in further rescue research and have convinced OCD (Plans and Operations) to use a similarly broad definition in final phases of the EOSD project.

The principal argument for giving a rescue organization a broad mission is as follows. The classical idea of rescue concerned men with equipment digging survivors out of debris. All of the reference R3 reports indicate that such work might be judged impossible for various reasons--for example, because extensive fallout prevents work in the open, or because such rescue might be pre-empted in favor of tasks having a higher payoff per manhour invested. Thus, if the large work force required by the rescue task is to be constituted, it should be given a variety of missions, with the leader authorized to choose a mission according to feasibility. If certain missions are precluded by peculiar conditions of the attack, the force can shift its efforts to other fruitful tasks.

Parent Organization Problem

A recognized rescue problem is that there is no obvious municipal department to assume responsibility for rescue operations. Although the

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* Published separately: "Community Manpower Resources," a working paper by Lacy G. Thomas, SRI, June 1966.

† New York Times, Page 1, January 27, 1967.

fire department is the most logical candidate, giving it the operational leadership of the rescue function would surely mean that all firemen* would be taken off their traditional job of fire control. Until cogent justification is provided for abandoning this traditional and vital job, the authors maintain that it is not sensible to earmark the fire department for rescue.

For these reasons, an important criterion is that any rescue system must be designed to cope with this dilemma. Leadership or at least management of the rescue function must be allocated to some municipal department or departments having the numbers and primary interest to see the mission accomplished.

Duality of the Rescue Problem

The reference R3 reports, particularly reference R3b, describe the likely time sequence of environmental conditions after weapon detonation. A clear distinction can be made between the first few hours after attack and a later period that begins when fires are under control or have diminished. The first period is dominated by the need to have all survivors, injured or not, cleared of the IMPACT RED area and moved to safety and treatment. For this operation, either fire or fallout can limit available time to an hour or less, and therefore only the lightest form of rescue from debris would be attempted.

Heavier forms of rescue could be attempted later when the heavily impacted areas might be reentered without extreme danger to rescue personnel. At this time, a thorough search through the rubble must be started, if for no purpose other than to find and remove the dead. Some survivors might be detected in the debris and would be dug out.

The central thought is that these two operations, the "immediate" rescue and the "reentry" rescue, are different and need not be approached as a single problem. Chapter V on Manpower Sources presents further ideas on this subject.

Extreme Time Constraints

The time available for surface operations in the heavily impacted areas is limited to a few minutes in areas close to ground zero and increases as one moves away from the impacted area. Figure 1, taken from Reference R3b, shows the nature of these time constraints. The fire tends to burn from ground zero outward. There may be discontinuities to this process, unburned islands may be left or new centers of conflagrations may start in areas well removed from the main fire center.

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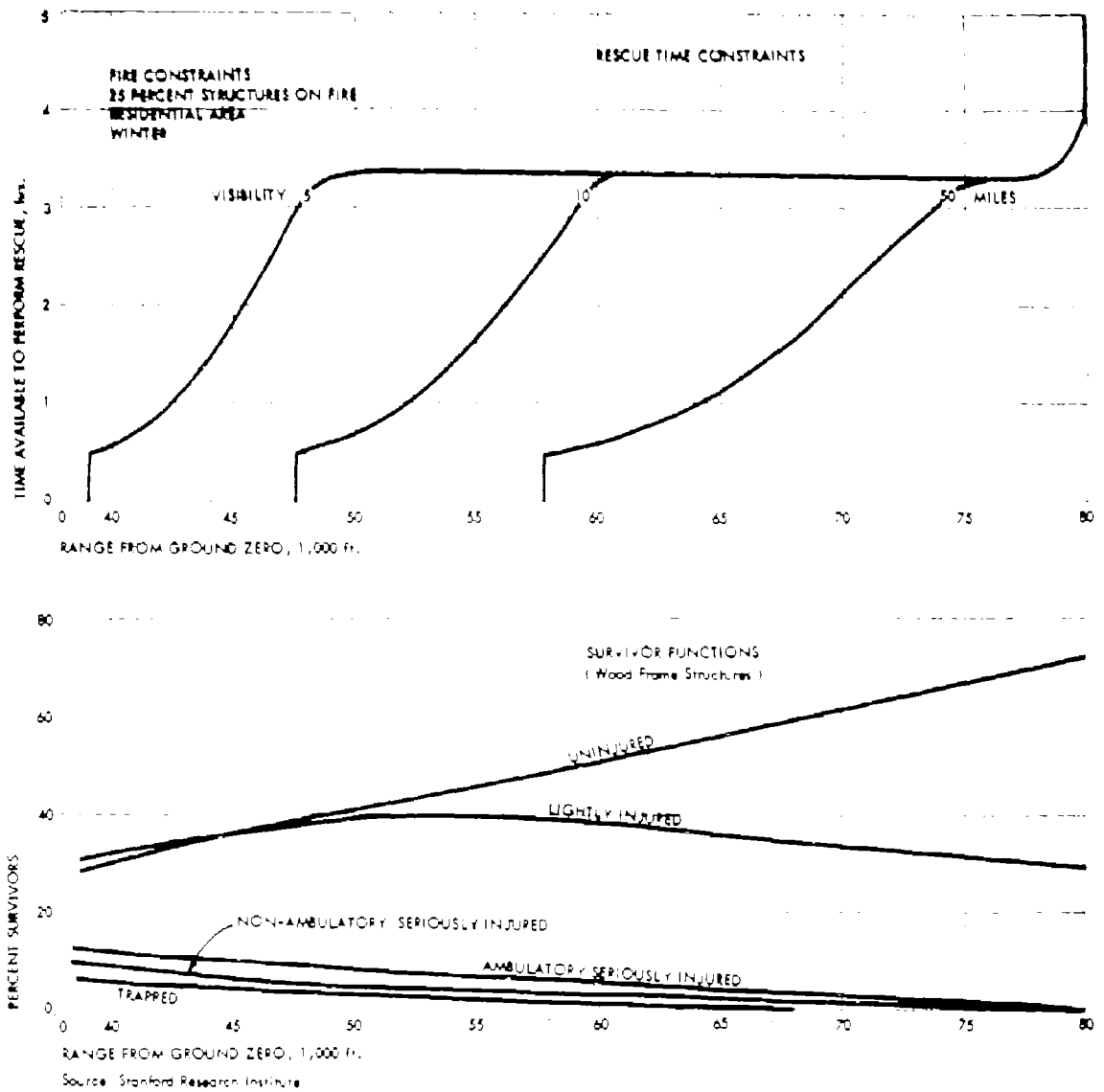
* There are approximately 8 to 15 paid firemen per 10,000 population.

Figure 1

RESCUE TIME CONSTRAINTS vs SURVIVOR LOCATION
10 MT Air Burst- Hiroshima Scaled Burst Height



Source Stanford Research Institute

However, it appears that immediate rescue must be an action that is being continuously pushed outward. An area will have to be cleared of survivors and then left behind. Where injured are being carried, the carriers might barely be able to move faster then the spreading fire. The carriers cannot return into the fire area to pick up a second victim. There can be no "doubling back" into this area for any purpose, laudable or otherwise. Medical carriage will be a single, long, one-way walk over rubble and through developing fires.

Unlimited Manpower Requirements

Reference R3c reports on a preliminary analysis suggesting that a nationwide rescue force, for rescue-from-debris only, should total at least 1 million persons. However, for the total rescue function, this would not be nearly enough. As will be shown below, the most logical system is one that uses all able-bodied survivors, that absorbs and puts to work the total society of the attacked area.

Figure 2 shows the expanded mortality function used in current rescue research. This figure estimates the number of persons in personnel categories: Killed Immediately (KI), Seriously Injured (SI), Trapped (T), Ambulatory Injured (AI), and Uninjured (U). Little confidence is placed in the exact values of the percentages for each category; however, this turns out to be unimportant. The shape of the total function is well established, and the allocation of survivors to the various categories is quite accurate at the extremes (close to ground zero and in the FREE area) and is roughly correct in the center (in the 5 to 10 psi range). Essentially all available data and theory have been used to develop this function, and further attempts to improve accuracy do not seem warranted.

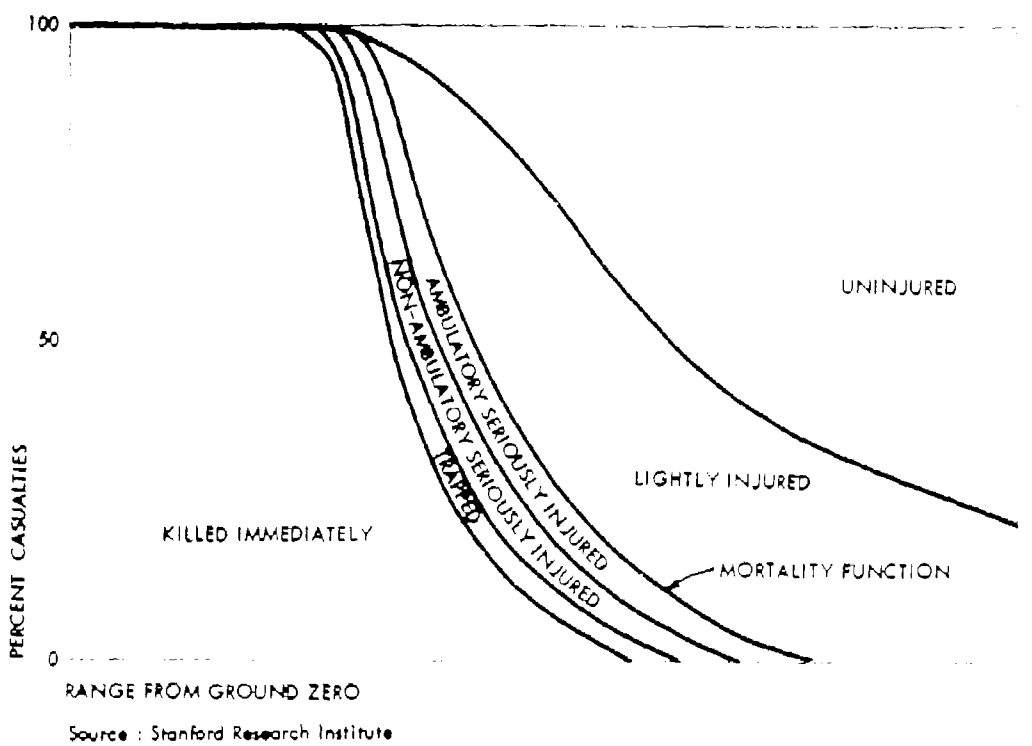
At the lightly impacted portion of Figure 2 (corresponding to psi levels less than 1.5), the uninjured greatly outnumber the seriously injured and the trapped. Because immediate rescue must be a procedure that works away from ground zero on a one-pass basis, rescue personnel must be found from the people immediately at hand. The size of the rescue force can be calculated in terms of the number of persons requiring rescue and the number of rescuers needed per rescue at the distance from burst or the psi level in question. The resulting rescue force will be some significant portion, but not all, of the uninjured population.

At higher psi levels (or closer to ground zero), where those needing rescue begin to outnumber those available for rescue, the rescue operations require the help of everyone who can be spared from other tasks.

Thus, the question of how large should a rescue force be becomes meaningless outside the context of the actual postattack situation. The important question is how best to foresee the actual context and to mobilize the total society for lifesaving activity in the event of a nuclear war.

Figure 2

PERCENT CASUALTIES vs RANGE FROM GROUND ZERO (TYPICAL)



Source : Stanford Research Institute

Regional Government Problem

Probably every aspect of urban planning (and use planning, transportation planning, refuse collection and disposing, redevelopment, etc.) is confronted by one common and critical deterrent--the regional government problem. Most large urban areas are composed of hundreds of independent governments. These can include state governments, county governments, city governments, school districts, and special districts and authorities. It is not surprising that civil defense planning should encounter the same problem area. For example, the analysis of San Jose is encumbered because of one of its major suburbs, Santa Clara, has not agreed to certain areas of participation and thus is missing in the data base.

A key criterion for effective rescue system design is that the regional government problem should be considered in organizational planning. The design must be such that existing autonomous powers will be recognized while providing for effective cooperation and effective direction over the total impacted area. References R1 and R4 provide an excellent starting point for properly dealing with the regional government problem.

Minimum Training Requirements

Past research has indicated some encouraging aspects to the rescue problem. Much of the rescue work would require little or no training. Particularly, the preattack work and the postattack "immediate rescue" would require little formal training. Preattack work would require rather simple manual labor such as prepositioning equipment. The immediate rescue task is essentially light rescue (done without tools) plus first aid and medical carriage. The most stringent requirement in immediate rescue would be training in first aid. For reentry rescue, some specialized training would be required for those who would act as leaders of the heavy rescue work.

A most important kind of minimum training is indoctrination. This would have to be repetitive and effective, as a backup to ensure the validity of Criterion No. 13 (Survivors Will Follow Leaders) given below. The leaders will have to know what they are doing, and do it without hesitation. The entire system must have been sufficiently indoctrinated that such a large group of people representing a variety of skills and attitudes would work together efficiently.

Minimum Equipment Needs

Past planning for rescue has emphasized specific sets of equipment carried on special vehicles. Such vehicles are ideally suited for the reentry rescue work. They would be of no use for the immediate rescue task since they cannot move over debris, nor can debris be cleared quickly enough for immediate rescue needs.

Ideally suited as these vehicles are, they have always been too few in number to be significant. For example, Reference R4 indicates that in representative attacks on various cities, 70,000 persons could be trapped in debris in a given urban area.* Most communities have no rescue vehicles and some have two or three. For immediate rescue, the equipment needs for a rescue system are minimal (gloves are probably the most important item). For reentry rescue, equipment needs are extensive but all equipment needed, including vehicles, exists within city government and commercial stocks. Thus, any rescue system should emphasize organizing and positioning available equipment rather than procuring new equipment.

Relationship to NFSS

Many of the American cities do not have sufficient NFSS shelter spaces. Practically all have an undesirable clustering of shelters in the central business district. It is clear that an effective rescue system cannot depend on a satisfactory installation of NFSS shelters. The rescue system must function with resources as they exist today.

Rescue from Fallout

Reference R3a illustrated that escape is possible from low level fallout (reference intensity <1,200r/hr) where no adequate shelter exists. For example, a man within a shelter of PF 4 in a fallout area with reference intensity of 600 r/hr runs considerable risk of fatal radiation sickness. However, he would have time to drive over a hundred miles if roadways were clear. (The roadways would probably be reasonable clear, since low level fallout is generally associated with light or no damage.) This action could take him into a fallout free area. Consequently, a rescue system should have the capability of rescue from low level fallout.

Survivors Will Follow Leaders

The finding of a considerable amount of research† shows that under conditions of mass disaster, people do not tend to panic and riot. Rather, they tend to be passive and susceptible to leadership. They do tend to be irrational and inefficient, particularly if they are not prepared for the conditions of disaster. Also, if all avenues of escape appear to be blocked, mass panic can be expected.

The two principal ingredients necessary for positive community response under disaster conditions appear to be (1) highly visible leadership adhering

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* See computer outputs of 10 MT attack on Atlanta City Center, Reference R4, page A-47

† See pages 47 and 48 of reference R3a.

to (2) some prearranged, reasonable plans. Hence, an obvious criterion for a rescue system design is that leadership should be immediately at the scene of disaster, that the authority of the leadership should be clear, and that the leadership is following well conceived plans appropriate for the conditions at hand.

Flexible Tactics

All past rescue research, particularly the study of the eight simulated attacks of reference R3d, indicates that highest priority rescue tasks could vary greatly. For example, it is easy to postulate the condition of massive thermal and blast disaster, with all energy being expended on clearing the injured and uninjured from damaged areas and with fire spread conditions being so severe that no rescue from debris is ever attempted. Another possibility is an attack causing high blast damage, no fallout, and minimal fire threat. This could require massive convergence of all citizens to the stricken area to comb and dig through the wreckage for survivors. A fallout-only condition, FALLOUT RED OR YELLOW, would require a totally different response.

Thus, the rescue leadership must have the capability to understand the nature of the disaster environment, to determine the best response among a range of prepared responses, and to shift to this reponse efficiently.

IV PRELIMINARY SYSTEM DESIGN

Design Concept--"Sleeping Giant" System

The following General Rescue System concept was developed on the basis of the assumptions and criteria given in Chapter III. The concept permits the system to exist at a very low level of readiness during peacetime or noncrisis periods. But during a period of national crisis, when either a nuclear threat or natural disaster was possible, the system would energize, prepare, and organize the efforts of a sizable percentage of the U.S. citizenry. To further communicate the central idea of the design, it has been termed the "sleeping giant" concept. That is, the system apparently sleeps during noncrisis, but swiftly awakens and takes action in crisis.

These various stages of preparedness are pictured in Figure 3, for each level of effort, originating with the OCD in Washington, D.C. and filtering down to the general population in each city area. To emphasize the duality of the rescue problem, boxes in Figure 3 show separate levels and functions for immediate rescue and reentry rescue.

Figure 4 pictures the roles of the local levels and the general population in more detail. Each metropolitan area would be divided into operating areas (OAs), and each OA, into neighborhoods. These, in turn, would be divided into operating units (OUs). This pyramid structure, tied together with adequate communication, is mandatory to satisfy Criterion No. 14 (Flexible Tactics).

The manner in which a metropolitan area is subdivided can vary according to local political conditions. If regionwide CD agreements and cooperation exist, then OAs can be developed along boundaries that are meaningful to CD, and particularly to CSP planning. But the principal requirement is that political power must exist in each OA to do the planning necessary there. This will usually require that OAs be determined by municipal boundaries. Most CD directors are municipal employees and are not allowed to expend their energies developing plans for other communities. It will be a requirement of the various municipalities involved and representatives of OCD to find ways to bring all geographical sectors of the metropolitan area into the regional plan. This is needed to satisfy Criterion No. 8 (Regional Government Problem).

The size relationships among OU, [illegible], and OA would be such that a tenfold increase in population occurs at each change in command level. The OU would be sized so that leaders could personally know all families involved. The initial targets for populations are shown in Table 3.

Figure 3

GENERAL RESCUE SYSTEM -- COMMAND LEVELS IN VARIOUS STAGES OF CRISIS

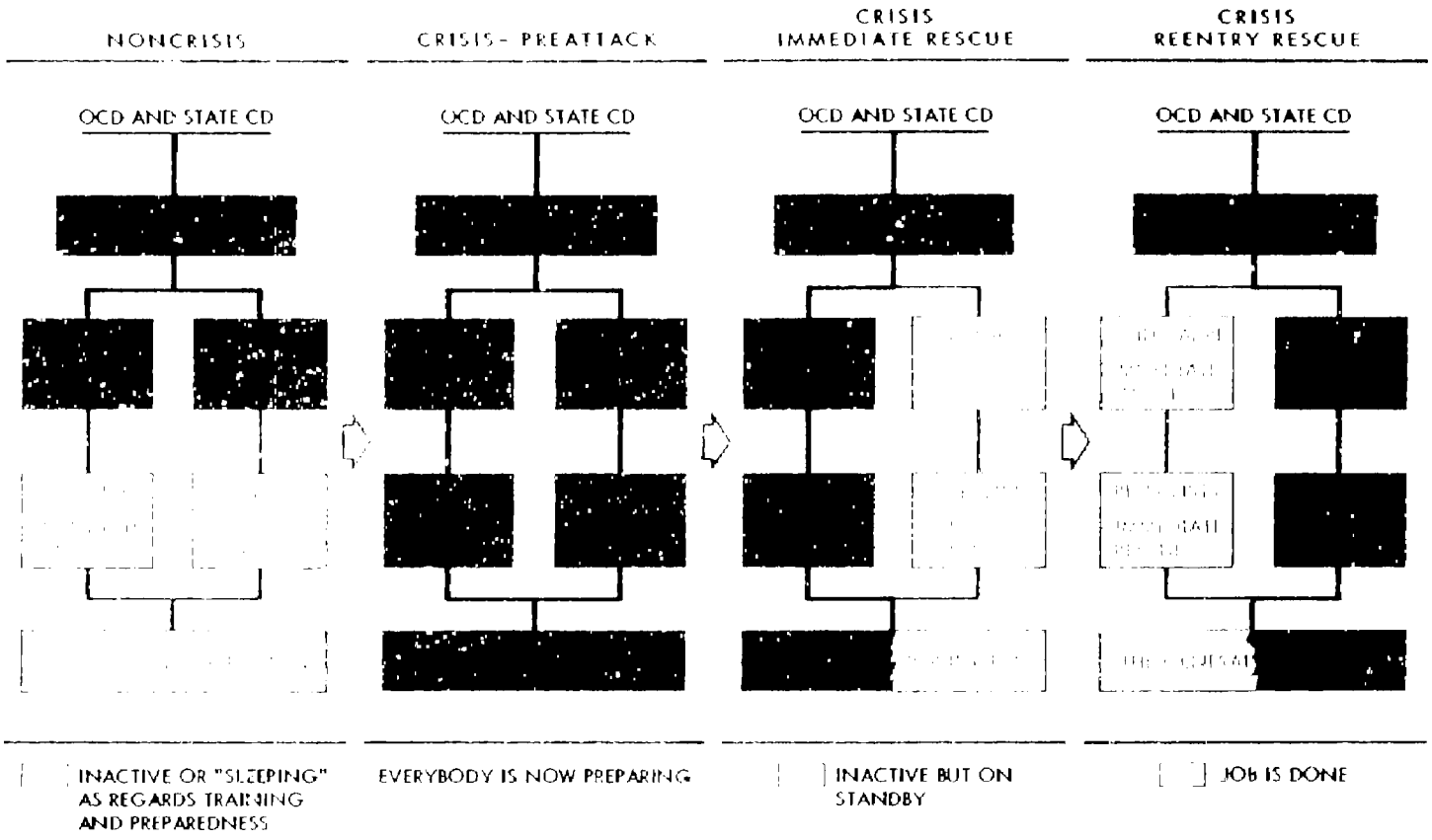

Figure 4

GEOGRAPHICAL ORGANIZATION OF GENERAL RESCUE SYSTEM AT THE LOCAL LEVEL

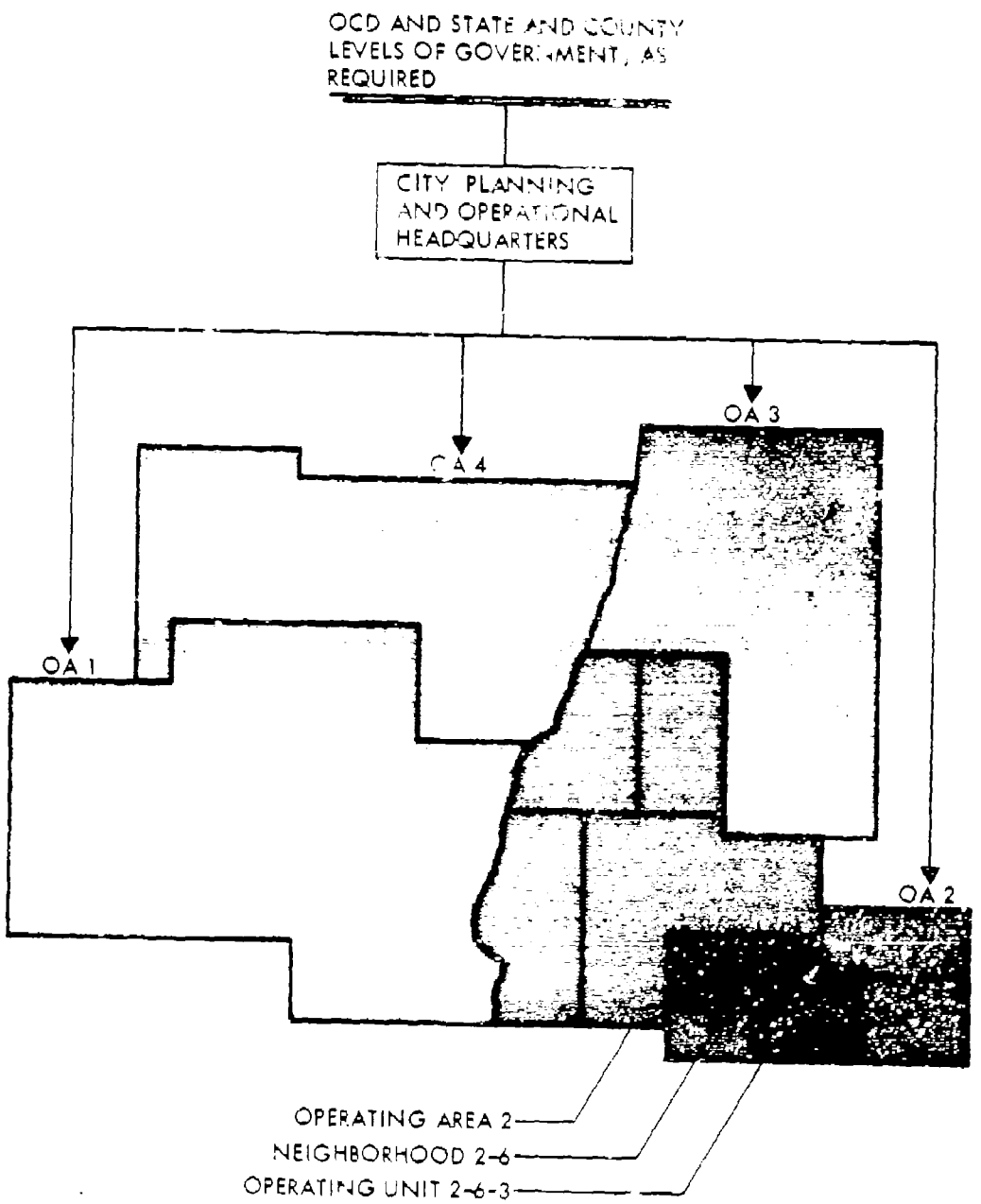

Table 3

SIZES OF GEOGRAPHICAL SUBDIVISIONS

Zone	Number of Families	Number of Persons
Operating unit	150	500
Neighborhood	1,300	5,000
Operating area	15,000	50,000

Within an OA, the development of OUs may vary. However, an attractive arrangement is to use the voting precinct as the definition of the OU. Most precincts are sized so that a single person can know all of the families, resources, and terrain in detail. An additional reason for using the precinct is that lists of the registered voters are usually available. Precinct workers have this information and should be able to aid the OU leader in meeting the families in his area of responsibility.

Given this rescue system in terms of command level and geographical distribution , the next step is to delineate the successive stages of action, as the system moves from the noncrisis period to the crisis period, culminating with postattack operations.

Operations--Noncrisis Period

In the noncrisis period, operations would be limited to planning and preparation, by the skeleton staff or cadre under the direction of the various offices of civil defense. During this period, the driving forces behind the generally "invisible" system would be the OCD at the federal level, and the CD offices at the state and local levels. OCD would provide the leadership to carry out three basic functions: making agreements, developing and disseminating plans, and undertaking a program of continuing study to update and improve the General Rescue System. Table 4 outlines these basic functions.

Making Agreements

The first function would require OCD to execute agreements with veteran, fraternal, and service organizations at the national headquarters level. These agreements would establish the general roles for these organizations. At the local level, the CD director would confirm the working agreements with the local chapters. These local agreements should provide the CD directors with names, addresses, and phone numbers of the organizations' members. The organizations, in turn, would disseminate OCD information at

Table 4

PLANNING FUNCTIONS IN THE NONCRISIS PERIOD

OCD Functions	Cadre Functions	Reservist Functions
1. Negotiate agreements with national citizen organizations.	1. Negotiate local agreements with citizen organizations.	1. Receive periodic indoctrination.
2. Prepare and disseminate indoctrination materials.	2. Define OAs and subdivisions thereof.	
3. Monitor and assist local CD directors in planning.	3. Develop organization plan of municipal employees.	
4. Provide continuing study and federal guidance.	4. Identify (without commitment) leadership personnel for each OU.	
	5. Develop overall operational strategy, with options.	
	6. Develop general instructions for OU leadership.	
	7. Provide training in reentry rescue techniques for designated city employees.	
	8. Develop detailed equipment requirements in units planned to be mobilized.	
	9. Identify sources of privately held equipment, and plan for equipment procurement and assembly upon evidence of crisis.	

chapter meetings and through their established communication lines. The information would describe the role to be played, in times of crisis, by the members. This would keep the members at a low level of readiness. No individual responsibilities would be assigned; the members would only be made aware of what types of assignments might be made. Such a procedure would generally satisfy Criterion No. 1 (No Prolonged Readiness). Additionally, the use of national organizations satisfies the need to augment the staffs of municipal employees--a need cited in Criterion No. 2 (Too Few City Employees).

Developing and Disseminating Plans

This second function would be carried out as follows. First, the OCD would develop general planning information for dissemination through the national citizen organizations and through state and local governments, and for national consumption over television, radio, and newspapers. This information would include films, reports, news releases, brochures, etc. Second, detailed plans for action in a crisis would be worked out, and the largest burden would rest on the local CD office. The detailed plans must be developed so clearly that within a few hours, personnel can be assigned to operating units, equipment dispersed to preassigned locations, the entire community briefed, and specific plans and action items dispersed to each operating unit. The local CD office would therefore work up such plans as: an organizational plan with assignments of local citizen organization members; an equipment/material assembly and allocation plan; a communication plan; a general strategies plan; and an operational plan. The plans would be coordinated with the specific governmental department involved. Information about some of these plans is presented later in this chapter.

In connection with these plans, the local CD office would have to develop and negotiate agreements with private industrial and commercial enterprises to obtain vehicles and equipment when needed. These would include rolling stock such as bulldozers and trucks, plus hand tools, power generators, and so on. All of this material would be needed for the reentry period. These agreements would be general contracts, showing the intent to cooperate.

All of these plans, when implemented, would be highly detailed, logical, and visible, to satisfy various criteria--Criterion No. 6 (Extreme Time Constraints); Criter on No. 13 (Survivors Will Follow Leaders); and Criterion No. 10 (Minimum Equipment Needs).

Improving the System

The third function, improving the General Rescue System, would require continuing study, research, monitoring, and testing. Provision would have to be made for a feedback from local to higher levels, as defects or gaps were discovered in the noncrisis period. Minimum training would also be

needed. Part of the improvement at the local level would depend on the interest and continued preparedness of the cadre, who would be organized to a higher degree of alertness than the citizen organizations, since the cadre would be managers of the system under crisis. However, Criterion No. 1 (No Prolonged Readiness) also applies to the cadre, and this is an added burden on the CD director. Training programs patterned on CSP training sessions would be of help in assuring interest and preparedness.

Operations--Crisis Period, Preattack

Preattack Mobilization

During a crisis period, at a time designated by the federal government, the skeleton staff of the rescue system would expand quickly. The cadre who had standby responsibilities in civil defense would now take up these responsibilities on a part-time basis. They would go to the local chapters of citizen organizations and implement the agreements previously established. Detailed equipment agreements would be signed to bring private vehicles, equipment, and tools under public control and ready for public use. The cadre would assign local chapter members to each operating unit, probably on the basis of a unit leader, an alternate unit leader, and deputy leaders. The deputies would act as squad leaders, supervising groups of citizens in performing specific tasks. The deputies would also act as extensions of the unit leader in briefing and organizing the citizenry. See Table 5 and Figure 3.

Information and commands would, at this time, flow from the municipal EOC through OAs, neighborhoods, and down to OUs; the link through the national citizen organization headquarters would be broken. The rescue system would become a local pyramid structure with a single head releasing a regionally coherent flow of operational instructions. This would provide the command capability required by Criterion No. 14 (Flexible Tactics).

This citywide plan would be supplemented by preplanned television, radio, and newspaper information to give further indoctrination to the general population.

The manning of neighborhood command posts represents an additional manpower requirement imposed by the General Rescue System. See Chapter V.

Table 5

PLANNING AND MOBILIZATION IN
THE EARLY CRISIS PERIOD

OCD	Municipal Government	Reservists
(Not defined within this study)	1. Initiate detailed planning by municipal departments.	1. Alert citizenry of OU as to general plans.
	2. Designate leadership for each OU.	2. Extend organization and facilitate indoctrination and training.
	3. Develop detailed agreements for obtaining private stocks of equipment.	3. Identify resources.
	4. Follow up on planning to OU level.	
	5. Appoint auxiliary personnel to Engineering and Public Works.	

Communications and Headquarters Facilities

Many major cities do not have an EOC installed in a hardened shelter. However, at the OA and neighborhood levels, the General Rescue System requires a reliable headquarters facility that can receive and interpret environmental information and develop tactical instructions over a citywide area. Criterion No. 14 (Flexible Tactics) requires this. Furthermore, there must be a headquarters facility at the OU, and there must be a reliable communication link between this facility and the higher command levels.

There are several approaches to having a sheltered OU headquarters--the most obvious choice is to have the headquarters in a public shelter. However, in an OU without adequate shelter, there would be several choices. A conventional house or building could be used with a plan to evacuate the headquarters or transfer it into a sheltered position in another OU. Another choice is to build a home shelter of some expedient variety.

There should be telephone and radio communication reaching every OU headquarters. The telephone link will exist since there are telephones in nearly every building. The simple approach to a radio network that is

often proposed is to park a vehicle containing a two-way radio at the OU headquarters. Municipally owned automobiles or taxi cabs might be used. The problem is to have a radio system operating on frequencies that can be transmitted and received at higher echelon EOCs. This is a problem best solved in terms of the specific resources that exist in a given city.

Operating Units

As the crisis deepened and attack became imminent, planning would subside, and a broad program of action would begin. Equipment would be disseminated, fire prevention activities and expedient shelter building would be started, and so on. This is consistent with Criterion No. 3 (Broad Rescue Definition). Table 6 outlines the principal functions that must be performed at the municipal government level and operating unit level in this stage. At this point in the crisis escalation process, the rescue organization would change to give increasing importance to the local level and to action. The OU organization would become the major work force in the community, receiving instructions from the EOC command post.

Table 6

FINAL PREPARATIONS BEFORE ATTACK

Municipal Governments	Operating Units
1. Disseminate latest instructions to OUs.	1. Brief and organize all personnel involved.
2. Obtain equipment, and preposition it.	2. Extend shelter facilities (final shelter stocking, building expedient shelters, etc.).
3. Install and test all systems (communications, radiological monitoring).	3. Carry out fire prevention measures (cleanup activities, white washing windows, etc.).
4. Supervise any governmental building programs such as expedient shelter construction.	4. Protect resources.

As shown in Table 6, four general work areas are probably most important during the buildup just before attack. However, within these and other

work areas, many other missions could be adopted according to local needs. For example, transporting hospitalized patients to temporary quarters in shelters might be called for. Possibly completing a shelter stocking program would be most important. The central idea is that the total population would be assembled to do the work needed to be done.

Operations--Crisis Period, Postattack

Immediate Rescue Missions

As soon as possible after the attack, the neighborhood command posts would issue orders to the operating units for specific immediate rescue missions. Table 7 shows that missions undertaken at the OU level vary with the amount and type of weapon effect. Fallout is considered an overriding effect that can preclude missions or change mission priorities.

Table 7

MISSIONS IN THE IMMEDIATE RESCUE PERIOD AFTER ATTACK

OA and Neighborhood Command Post	Operating Units
1. Provide intelligence and instructions to OUs.	FALLOUT RED 1. Insure best shelter for OU citizenry. 2. Direct escapes from fallout where circumstances allow. FALLOUT YELLOW, FREE 1. Provide support to other OUs as directed. IMPACT RED, YELLOW 1. Direct spontaneous flight through best avenues of escape. 2. Perform light rescue. 3. Provide first aid. 4. Provide medical carriage. COMBO RED, YELLOW 1. Direct spontaneous flight.

Fallout Conditions. The table shows that under fallout conditions, missions are oriented toward protection from fallout. For an OU that has adequate public shelter, the unit leader's objective is to see that the CSP is followed and that all stragglers are accounted for. Where this simple solution does not exist because of an inadequate number or distribution of shelters, the OU will have provided expedient shelters or will have planned to evacuate to fallout free areas.

Under such circumstances, the unit leader would remain at OU headquarters (assuming shelter existed or was built for the headquarters) and instruct the escapees by telephone or messenger or both. From the precinct sizes previously developed, there would be approximately 150 householders to notify. This procedure should work well relative to Criterion No. 12 (Rescue from Fallout).

Impact Areas. In these areas, particularly in IMPACT FBD areas, the highest priority task would be to clear all survivors from the area and away from any fire hazard. It is this task that would need the greatest planning and would require the cooperation of the entire precinct. The citizens must evacuate the neighborhood, taking all of their children, their injured, and their aged with them. This must be done without hesitation in compliance with Criterion No. 6 (Extreme Time Constraints), and must be done in a single operation; there would be no returning until the reentry period started. According to the well documented Criterion No. 13 (Survivors will Follow Leaders), the citizenry could be expected to conduct such as operation if they knew the general plan, and if their leaders were visible and giving on-the-spot directions.

Equipment and Material for Immediate Rescue. Previous analysis (R3) has suggested that personnel involved in immediate rescue should have certain essential items of equipment. A "backpack" of this equipment was suggested. However, we have reduced this plan to the simplest possible approach to allow the rapid escalation of preparedness that the General Rescue System requires.

The minimum equipment requirements of the unit leader and his deputies would seem to be (1) an arm band; (2) a belt (from which tools can hang); (3) operations manual; (4) gloves; (5) flashlight; and (6) small crow bar. These should be available for the immediate rescue phase. The first three items could be government furnished; the last three could be commandeered by the OU leaders. Prearranged agreements between the local civil defense leadership and local hardware merchants would be needed so that these equipments could be commandeered from commercial stocks when needed. The prearrangements should include assurances of repayment of monetary losses to merchants.

The rationale for the arm band is that Criterion No. 13 (Survivors will Follow Leaders) requires a strong visual show of leadership carrying out reasonable plans. The gloves and the crow bar are the primary tools for light rescue, and the flashlight is mandatory since a nuclear attack would most likely occur at night (when the USA is asleep and vulnerable and Eastern Europe-Asia is awake and least vulnerable). The belt is a further show of authority and can carry the flashlight and crow bar.

Reentry Rescue Missions

At some time after attack, immediate rescue would be completed and the postattack environment would permit the system to shift to reentry rescue activities. The working leadership for reentry work would be provided by the designated reentry operations command, as shown in Table 8. Discussion of the specific municipal group to man the command post is given in Chapter V.

Table 8

MISSIONS IN THE REENTRY RESCUE PERIOD AFTER ATTACK

Designated Reentry Operations Command	Operating Units
1. Alter preplanned strategy for reentry operations, as dictated by the actual postattack environment, and determine priorities.	1. Provide manpower support to reentry rescue operations.
2. Assemble appointed employees and auxiliaries and brief them.	
3. Call for and deploy manpower from operating units.	
4. Deploy motorized units into impact areas for debris clearance and heavy rescue.	

The reentry rescue organization would have its own operating units as well as its own command. These characteristics are consistent with Criterion No. 5 (Duality of the Rescue Problem). Reentry rescue functions for the command level and the operating units are outlined in Table 8.

As indicated in Table 6, the motorized equipment for the reentry operations would have been prepositioned at several sites, hopefully out of the impact areas. The designated reentry operations department would assemble personnel at these sites by communicating manpower requirements to OU leaders. Information obtained by the immediate rescue forces would aid in giving a proper estimate of the situation.

It seems logical to develop a caravan of motorized units that would move into the impact area. This should include (1) the debris removing equipment, (2) trucks loaded with heavy rescue equipment, and (3) trucks equipped as ambulances.

Lead teams would operate on foot, making systematic forays away from the caravan and identifying rescue sites. These teams would systematically mark all building sites that were searched. Rescue teams would follow, carrying basic equipment needed and sending messengers back for other needed items. These rescue teams could be in sizes ranging from 5 to 20 persons. They would be led by trained city employees or reservists. Persons rescued would be carried back to the caravan and taken out by ambulance. The whole process would take days of work for the rescues and would take weeks of work to retrieve the dead and to rescue nonhuman resources.

Although the General Rescue System is based on minimum equipment for immediate rescue, it uses extensive equipment for reentry rescue. As indicated by Criterion No. 10, the idea of retaining special rescue vehicles and equipment over prolonged periods is not a part of the General Rescue System concept. It is believed that the full complement of rescue equipment defined in existing manuals* can be assembled on conventional, open-bed trucks during the crisis buildup.

The reentry operations, as defined by the missions described above, encompass more than rescue operations. A caravan of motorized equipment would be needed and would include the following vehicles, probably entering the impact area in the order presented.

Debris Clearance Vehicles. These would include one or more bulldozers plus an open-bed truck of men, power generation equipment, power cutting tools, and hand tools. The function would be to cut a path into the debris areas as fast as possible.

Rescue Vehicles. The rescue trucks would be prepackaged to include all equipment expected to be needed. They would also carry the rescue workers who would have only gloves and possibly crow bars. Some of these vehicles would undoubtedly be fire trucks that would be suitod for both rescue and fire fighting.

Power Vehicles. It is likely that one truck might be devoted to electrical power carrying a power generator, power tools, lighting equipment, and a maximum amount of extension cord.

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* See Rescue Manuals FG-E-11.1, IG-14.1, IG-14.2, and IG-14.3.

Medical Vehicles. The trailing vehicles would be ambulances, either real or makeshift, plus other support vehicles carrying medical supplies and stretchers. Depending on the type of injury, survivors would be given initial treatment at the rescue site or at the medical vehicles. The ambulances would supply a shuttle service to the rear area. Special vehicles and crews might also be included to carry out nonsurvivors.

Training Plan

The indoctrination given citizen members during noncrisis periods would be oriented to general education on nuclear attack environment and on the general operational plan of the system. It would seem that this would be as much information as could be retained over a prolonged period without actual use of the information. The majority of these indoctrination sessions would be based on films and written handouts supplied by OCD. These might be supplemented by discussions led by representatives of the local CD director.

During the early crisis buildup, the principal source of information would be the operational manual supplied to each cadreman. This would fill in the details of the general indoctrination previously given.

Training for cadremen and reservists would be accomplished through existing educational programs given by the city and the Red Cross. Of particular importance would be the Red Cross courses on medical self help and police fire department courses concerning rescue and other aspects of community disaster.

Another channel of education would be through predeveloped telecasts, radio broadcasts, news releases, and written handouts. These would be used to indoctrinate the general population on the rudiments of nuclear effects and on their role in the General Rescue System.

V MANPOWER SOURCES FOR THE GENERAL RESCUE SYSTEM

Selection of Sources

The foregoing chapters have discussed the General Rescue System mainly in terms of functions below the OCD level:

1. The cadre
2. The inactive reservists
3. The general population

It has been assumed that the general population will function satisfactorily as rescue workers, as long as the leadership is there and is effective. Thus, the manpower availability study was concerned largely with (1) and (2). At the beginning of Phase II, the most likely candidates were: for the cadre function--the city government; and for the inactive reservists--the veteran, fraternal, and service organizations. The objectives of the manpower study were: to compare the magnitude and makeup of the staffs of selected city governments with rescue manpower requirements; and to measure the total manpower available in selected veteran, fraternal, and service organizations, and to study the distribution of this manpower relative to city size and geographic region.

Conclusions Regarding Manpower Sources

The basic data and findings are reported in the supplement to this report. Pertinent conclusions of the supplement are:

1. The organizations in the selected urban areas appear to have the potential manpower for an emergency rescue force. Twenty percent of the city's population is considered the gross potential resource for the rescue force. Duplicate counting of some and unavailability of others would decrease this total to a net of about 10 percent or perhaps less. The municipal employees could probably provide an escalation base equal to 0.5 to 1 percent of the population. Various community groups could provide approximately half of the force--less in the larger cities and more in the smaller cities. Students and other crisis volunteers would furnish the remainder of the force in inverse proportion to the reserve component.

2. The citizen organizations selected as manpower sources for the inactive reserve are significantly stronger, proportionately, in cities from 50,000 to 200,000 people than in cities above this population range. Some of these cities could, apparently, build a rescue force without depending on volunteers chosen at the time of crisis.

3. The larger cities would need more or different organizations in addition to those enumerated herein to supply manpower for the inactive reserve.

4. The municipal employees in each city are the logical choice for the peacetime skeleton staff or cadre. This cadre would direct the life-saving activities during the immediate rescue period following the attack. In the reentry rescue period, the more highly skilled of this group would be needed for heavy rescue leadership.

Total Manpower in City Governments

The supplement to this report shows that there are approximately 120 to 180 employees per 10,000 population, according to city size (in the range of cities having 50,000 to 1 million or more people). The total number of employees decreases significantly with city size. Remembering that we need to deal with the entire metropolitan area and that many small city governments are involved, we must consider the aggregate employees per 10,000 population over the entire urban region.

This is done in Table 9, which summarizes the numbers of city employees, by department, within 17 Standard Metropolitan Statistical Areas (SMSAs) that vary in size from 700,000 to 10.7 million population.

Manpower for Immediate Rescue Cadre

A determination of the numbers of city government personnel necessary to man the cadre of the rescue system is complicated by the duality of the rescue problem. For immediate rescue, it appears that the drain on city employees would be minimal--a small number of city employees would be required to man the neighborhood command centers. Since there would be only one neighborhood per 5,000 residents, the manning of these stations would require only a handful of persons per 10,000 citizens. For purposes of analysis, let us assume three persons per neighborhood or six persons per 10,000 citizens.

This requirement could be handled by any of a number of city departments. Since the neighborhood command post would be a key decision level in field command, these stations could be handled by the fire department and police department supervisory personnel.

Table 9

NUMBER OF GOVERNMENT EMPLOYEES IN METROPOLITAN AREAS

	New York 10.7 Million	9 M	8 M	7 M	Los Angeles/ Long Beach 6.7 Million	Chicago 6.2 Million	5 M	Philadelphia 4.3 Million	Detroit 3.7 Million	San Francisco/ Oakland 2.7 Million	Washington, D.C. 2.0 Million
Full-time equivalent employment per 10,000 population	336				307	256		210	264	300	294
Education	110				140	110		104	130	133	139
Teachers	87				93	79		74	91	95	94
Other	23				47	31		30	39	38	45
Other than education	226				166	146		106	134	167	155
Highways	12				11	15		11	9	9	13
Hospitals	39				19	13		8	23	28	18
Health	6				3	3		3	3	5	6
Police protection	32				20	27		23	21	18	23
Fire protection	13				12	10		7	9	16	9
Sewage	3				2	6		3	3	3	9
Sanitation other than sewage	15				4	2		9	11	2	13
Parks and recreation	12				9	11		5	7	10	5
Financial administration	6				6	5		6	5	7	6
General control	9				10	8		9	7	8	7
Water supply	4				8	6		4	6	9	6
Other local utilities	33				21	21		--	7	16	--
All other functions	42				40	20		18	24	35	40

Table 9 (concluded)

	San Diego 1.0 Million	Denver 0.9 Million	San Bernardino/ Riverside/ Ontario 0.8 Million	Phoenix 0.7 Million (663,510)	San Jose 0.6 Million (642,315)	Sacramento 0.5 Million	Toledo 0.4 Million	New Haven 0.3 Million	Pensacola, Fla. 0.2 Million	Decatur, Ill. 0.1 Million
Full-time equivalent employment per 10,000 population	271	272	300	307	311	299	231	189	256	213
Education	145	162	164	176	183	161	117	103	163	143
Teachers	97	116	108	121	129	111	82	81	111	101
Other	48	46	56	55	54	50	35	23	52	42
Other than education	126	109	136	131	128	138	111	86	93	70
Highways	8	12	16	12	9	6	7	11	12	8
Hospitals	18	10	20	11	21	22	12	--	20	5
Health	3	3	3	3	6	1	5	3	1	6
Police protection	17	15	18	17	16	13	16	20	12	10
Fire protection	9	9	9	8	9	12	11	16	6	8
Sewage	3	2	2	2	2	1	6	2	2	2
Sanitation other than sewage	3	4	5	11	1	1	7	2	4	1
Parks and recreation	7	8	5	6	6	7	6	5	5	1
Financial administration	7	7	9	8	7	6	5	1	5	5
General control	10	12	11	7	10	7	8	3	8	7
Water supply	6	10	7	7	2	6	7	--	4	5
Other local utilities	--	--	2	20	2	19	--	--	1	--
All other functions	35	19	30	18	32	29	21	19	9	14

	Range
Hwys., sewage, sanitation, parks and recreation	20 to 40 employees
Fire	8 to 15 employees
Police	12 to 25 employees
Health and hospitals	15 to 30 employees

The Fire Department is the logical lead department because of experience in managing large disaster situations. The fire perimeters will govern the areas where reentry is possible. Thus, fire fighting effort will be directed at these perimeters and should require the total capability of the Fire Department. The determinations of which areas should be entered, where debris clearance should be directed, where decontamination is needed, and where human life may remain--these are logical decisions to be made by the Fire Department working under direction of those with responsibility at the citywide EOC level.

Manpower for Reentry Rescue Cadre

At some time after attack, immediate rescue would be completed, and the General Rescue System would shift to reentry rescue activities. The working leadership for reentry work would be provided by the designated reentry operations command--municipal employees with some particular department designated the lead agency. Candidates for this assignment are the Public Works Department, Engineering Department, the Parks and Recreation Department, the Police Department, or the Fire Department. The most logical candidate would appear to be the Public Works Department supported by the Parks and Recreation personnel working under the overall command of the Fire Department.

The reasoning here is that although the Fire Department has sufficient personnel to command the immediate rescue operations, it does not have the forces to provide direct leadership of reentry operations, but can provide only overall command. There are only about 8 to 15 firemen per 10,000 population (Table 9). A force can be assembled from the Public Works Parks and Recreation Departments that numbers 20 to 40 per 10,000 population--say, an average of 30 per 10,000. Furthermore, these people have the vehicles, equipment, and many of the skills needed for the heavy reentry work. They have natural ties to the heavy construction contracting industry and its labor force.

This argument is built on the premise that reentry operations, like the immediate rescue operations, should encompass a number of tasks--debris clearance, rescue, fire fighting, decontamination, medical treatment, carriage of injured survivors, and removal of the dead. These activities require trained leadership. Criterion No. 1 (No Prolonged Readiness) requires that this leadership be in the form of paid employees of the responsible government. By process of elimination and on considering the large manpower requirements for reentry leadership, the Public Works Park and Recreation group was identified as the best response to Criterion No. 4 (Parent Organization Problem). As already shown, an average of 30 employees per 10,000 population seems reasonable. Table 10 provides an estimate of the percentage of total employees that are male and female by departments. According to this table, about 90 percent of the employees in the Public Works Parks and Recreation group are male. Ninety percent of the previously derived 30 employees per 10,000 is 27. Thus, we have derived and have used in this analysis an estimate of 27 male employees per 10,000 population in the Public Works Parks and Recreation group.

Table 10

MALE TO FEMALE RATIOS OF CITY GOVERNMENT STAFFS

Function	Ratio
Education	50/50
Other than education	
Highways	90/10
Hospitals	15/85
Health	40/60
Police	85/15
Fire	98/2
Sewage	98/2
Other sanitation	98/2
Park and recreation	70/30
Financial administration	60/40
General control	60/40
Water supply	85/15
Other utilities	85/15
All other functions	
Libraries	20/80
Building inspection	90/10
Probation department	50/50
Welfare	30/70
Airports	70/30

Source: Stanford Research Institute, based on opinions of local government officials believed to be accurate within ±15%.

The major point of this analysis is that the total numbers of city employees do not appear to be constraining on the system. The working estimate of 27 employees per 10,000 population seems to be sufficient to lead the reentry forces required.

Manpower for Inactive Reserve

The number of inactive reservists can be summed in a number of ways with the use of the tables of the supplementary report. In the system

description, we have emphasized developing reservists from veteran, fraternal, and service groups since these people provide much of today's citizen leadership. According to page A-18 of the supplementary report, these people number from 332 (larger cities) to 1,120 (small cities) per 10,000 population. As stated in the conclusions previously given, these numbers include double counting

The development of Criterion No. 7 (Unlimited Manpower Requirements) has shown that it is not helpful to try to determine how many people are required to carry out the rescue function. However, given the General Rescue System concept, it is meaningful to ask how many people are required to provide management and leadership for it.

The number of inactive reservists can easily be determined if we know how many reservists are needed to manage an Operating Unit (OU). One would think that five qualified men might be a minimum base on which to build an OU organization. Ten or fifteen should definitely be enough. If we use the higher estimate of 15 reservists per OU and assume an OU to contain 500 persons, 300 reservists per 10,000 population would be required. The supplementary report shows that this number is readily available from the selected citizen organization, even in the largest cities.

However, it is pointed out in both the supplementary report and the evaluation using San Jose (Chapter VI) that these potential reservists are not evenly distributed within the society. Members of veteran, fraternal, and service organizations tend to live in middle or higher income areas and do not come from minority groups. Thus, there will be many pockets of urban terrain that are not represented by the membership of the organizations studied. This means an added planning burden on the local CD director. He must identify local organizations that are related to these pockets and make the necessary arrangements to introduce these organizations into the system.

Total Manpower for Reentry Rescue Operations

The most difficult requirement to determine is the number of reservists and volunteers needed for the reentry operations. Since the amount of work involved in the total reentry function (debris clearance, rescue, decontamination, and medical carriage) is almost impossible to predict but is very large, it might be more meaningful to turn the question around. Instead of asking how many people are required, let us ask how large a work force could be put to effective work under the direction of "the designated reentry operations command." If this command consists of the Public Works/Parks and Recreation group, the number of male city employees required would be approximately 27, as developed above. It is hoped that a 10 to 1 ratio of city employees and reservists would be possible. If a 10 to 1 ratio also exists between reservists and volunteers, we would have a 100 to 1 overall ratio.

These ratios are evaluated in a specific case. Reference R3d analyzes the magnitude of the rescue problem under eight specific attacks. The reentry problem would be greatest in the simulated 10 MT surface burst attack

on the city center of Atlanta. In this attack, over 30,000 persons would be trapped in debris. Out of a total population of 1.8 million, approximately 1.1 million (60 percent) would have survived without serious injury. If we apply our general rules for manpower availability (rather than specific figures for Atlanta), we will derive the statistics given in Table 11.

Table 11 shows that if the above ratios prevail, a sizable force will be developed--nearly 300,000 persons. It is unlikely that such a massive force could be developed and deployed for reentry work only, since there are other CD operations that would be needed. However, the numbers of paid cadre and inactive reservists hypothesized to lead the General Rescue System force would not appear to be limiting.

Table 11

TOTAL FORCE AVAILABILITY FOR REENTRY OPERATIONS--AN EXAMPLE

	Preattack Manpower		Postattack Manpower	
	per 10,000	Total	per 10,000	Total
Public Works Parks and Recreation males	27	4,850	27	2,900
Reservists	270	48,500	270	29,000
Volunteers	2,700	485,000	2,700	290,000

Assumptions:
1. Based on a 10 MT simulated attack on Atlanta city center. See reference R3d.
2. 27 men per 10,000 in Public Works Parks and Recreation.
3. 10 to 1 escalation factor between manpower levels.
4. 40% degradation of forces at all levels.

VI SAN JOSE EVALUATION

Introduction

The previous chapters have developed the criteria and the general design of a CD rescue system. The major uncertainties of this system seem more related to the organization of people than to questions of environmental conditions or availability of resources. To further test the organizational aspects of the system, a study was made of its applicability to San Jose, California. This was accomplished in three ways: by mapping an example geographic subdivision of the San Jose metropolitan areas, by developing an example allocation of San Jose city employees to a General Rescue System force, and by measuring the size and distribution of the memberships of local chapters of national citizen organizations.

San Jose has been selected as a base city for this evaluation because of its position within the Five City Study, where it is being given first priority attention in all CD studies that use a selected city for evaluation. This same attention is valid for the purpose of rescue research. First, because of the many past CD studies of San Jose, much data concerning the city were available through OCD and SRI channels, and other data were easily obtained. Second, the city is large enough to be representative of large cities without being unmanageably large for analysis. Third, in terms of CD operations planning, San Jose contains most of the problem areas and difficulties that plague many large American cities--too few shelters, an unsatisfactory concentration of shelters downtown, no practical planning of the rescue function, and the probability of sustaining a variety of weapon effects in nuclear attack. Reference R4 also indicates that although the number of shelters is insufficient in San Jose, the city does have access to a variety of resources, and thus a variety of countermeasures against nuclear attack is possible.

Geographical Division of the Study Area

The specific area studied was an arbitrary approximation of the San Jose Urbanized Area. In general terms, an Urbanized Area is any central city with more than 50,000 people plus all contiguous suburbs with population densities of 1,000 persons per square mile. Less dense areas are included under certain conditions.

Since there are no easily available maps of the Urbanized Area, we have developed an approximation that might be called "metropolitan San Jose." This includes all census tracts in the San Jose SMSA excluding certain rural census tracts. It is an area containing thirteen cities (San Jose, Los Gatos, Monte Sereno, Campbell, Santa Clara, Sunnyvale, Mountain View, Los

Altos, Cupertino, Palo Alto, Saratoga, Los Altos Hills, and Milpitas), plus all unincorporated land lying within.

Under certain circumstances, we have also used the unit SMSA in comparisons with other cities.

Figure 5 presents the geometry of the municipal boundaries involved and illustrates clearly the concern expressed in Criterion No. 8 for the regional government problem. The political boundaries are complex and irregular reflections of a long history of individual annexations.

The total population of this area, according to the special 1965 Santa Clara County census, is 852,996. The total land area is approximately 200,000 acres.

Division Into Operating Areas

There are two basic approaches to developing operating areas (OAs) within a metropolitan area: political subdivision, and nonpolitical. The first would use political boundaries to ensure the existence of a single local government with authority to plan and control the civil defense activity over a total OA. This approach would result in a map of OAs that would reflect the meandering municipal boundaries shown in Figure 5. The OA or OAs representing the unincorporated areas would be sprinkled throughout the county and would include many islands within the cities. This pattern would pose many difficult problems of organization and control.

The nonpolitical approach would set OA boundaries independent of political boundaries. This would establish a more logical pattern of areas relative to available shelter, fire breaks, evacuation routes, etc. However, the approach would require some form of areawide authority to plan across political boundaries.

The method of setting OA boundaries in this study is a compromise between the two methods--we have generally followed the political boundaries but have removed some irregularities to obtain reasonable land shapes. This is shown in Figure 6. This method has proved satisfactory for analysis although it may be infeasible in practice because of jurisdictional problems among local governments.

Using this method, we have developed 14 OAs with population ranging from 30,000 to 90,000 and with land area ranging from 4,000 to 30,000 acres. Table 12 shows the particular characteristics of each OA. A column in the table gives information on the census tracts associated with the OAs. (In this study, certain rural census tracts have been excluded. P-117, Q-118, R-119, S-120, T-121, U-122, V-123, W-124, X-125, and Y-127.)

Figure 5

METROPOLITAN BOUNDARIES WITHIN THE SAN JOSE URBANIZED AREA

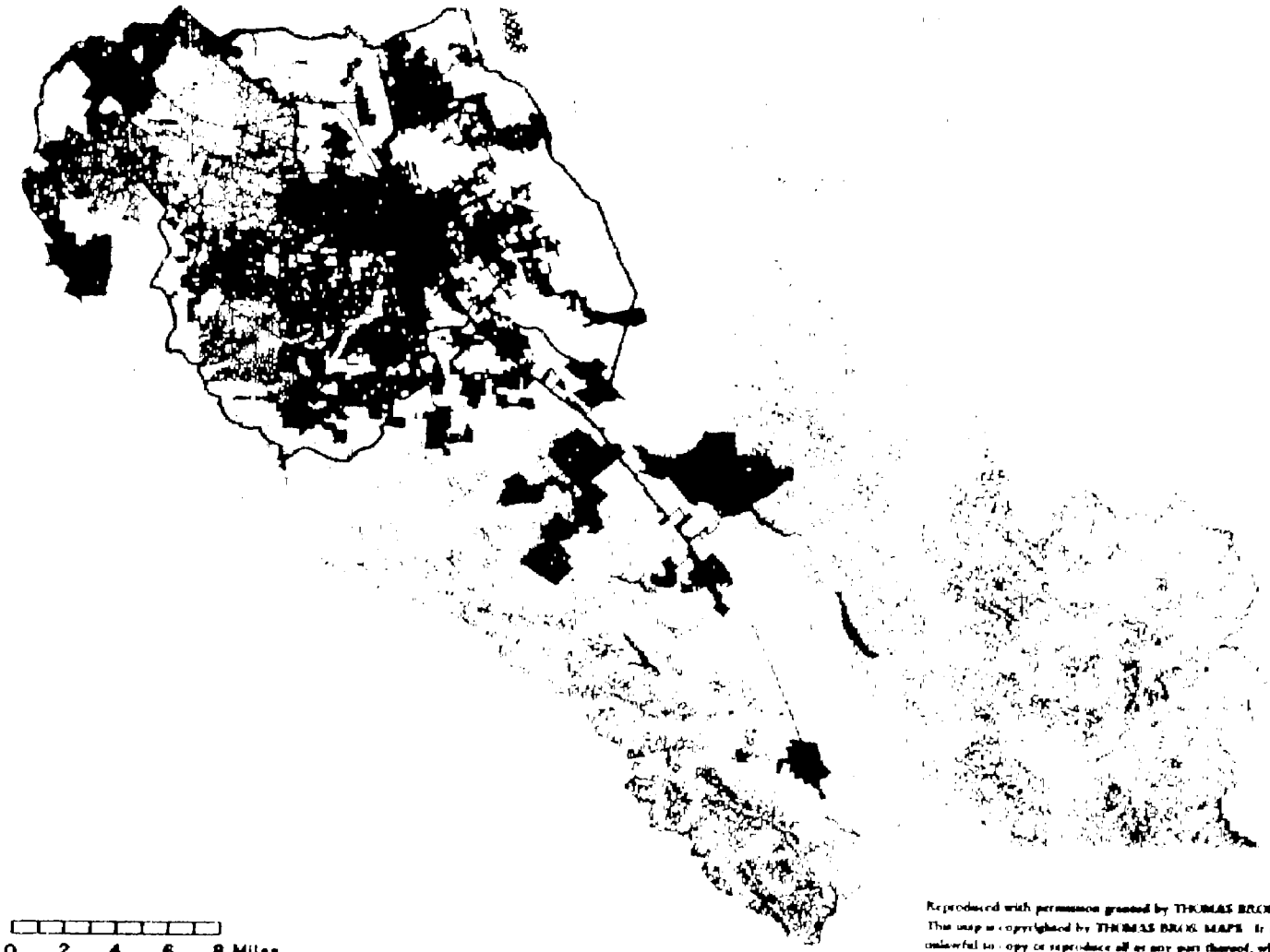

Figure 6

EXAMPLE OPERATING AREAS WITHIN THE SAN JOSE URBANIZED AREA

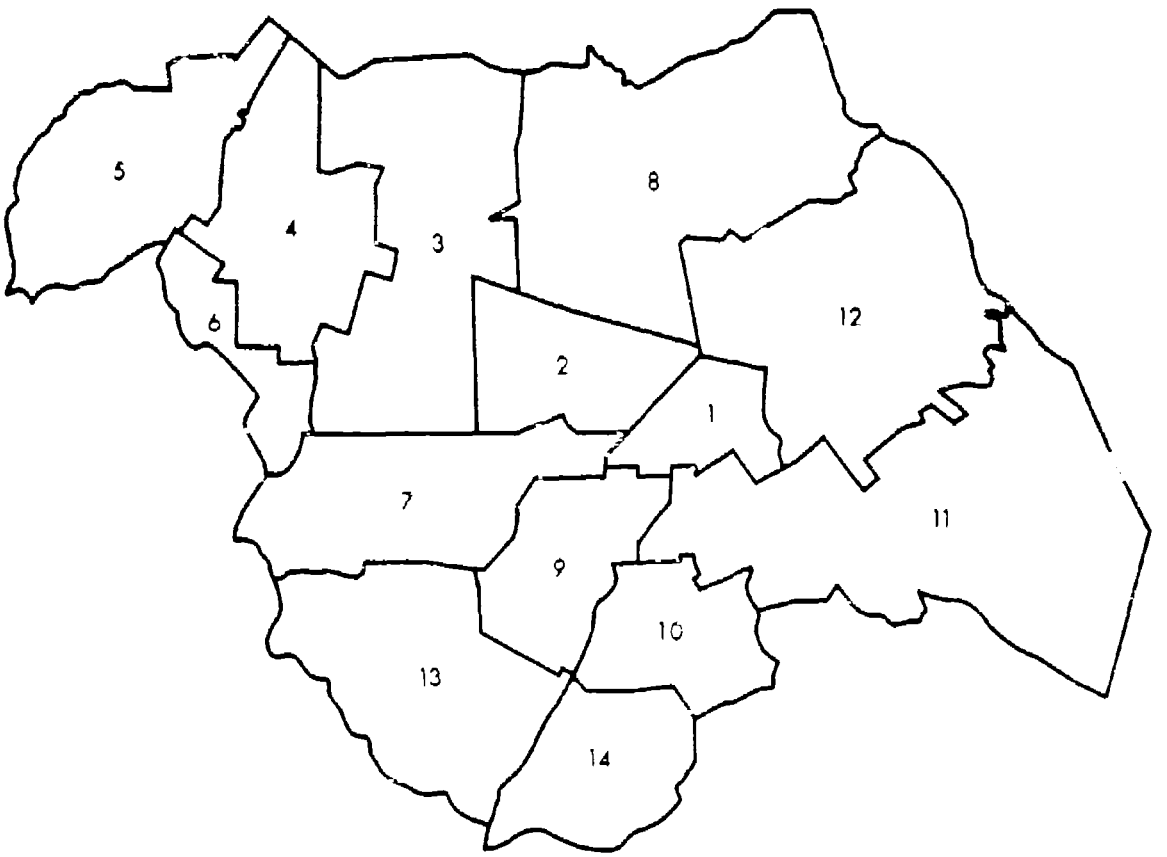

Table 12

OPERATING AREA CHARACTERISTICS
1966

OA No.	Census Tract No.	Population	Total Area (acres)
1	14	52,886	4,746
2	7	53,702	8,199
3	10.4	85,130	19,280
4	10.2	59,098	11,623
5	11.1	69,181	14,144
6	6	29,239	4,537
7	10	94,746	13,504
8	4.3	33,696	27,331
9	7	80,936	8,176
10	5	73,288	7,472
11	10	70,754	31,672
12	12	84,621	22,086
13	6	34,758	15,822
14	3	30,961	8,855
Totals		852,996	197,397
Averages		60,928	14,100

Source: Santa Clara County 1965 Special Census.

Analysis of a Specific OA

A specific OA has been selected for analysis of size and demographic characteristics of neighborhoods and precincts. This OA is number 12 and is known as East San Jose. It encompasses the areas of Alum Rock, Evergreen, Berryessa, and two San Jose census tracts, A-14 and A-15. It is located east of Bayshore Highway and south of Highway 17 in the northeast corner of the San Jose SMSA. The central portion of the area has been a residential area for 25 years or more but the surrounding areas have exploded from rural orchard land to densely populated communities within the last ten years.

The far eastern quarter of OA 12 is sparsely settled range land and park lands. Along the foothills adjacent to this quarter is a strip several miles wide, developed with expensive homes for a high income population. Another strip several miles wide parallels this and includes a middle income population.

Within the area bounded by McKee Road, Capitol Avenue, Bayshore Highway, and Tully Road, roughly one-sixth of the total area, is a low income population with a high proportion of Negro and Mexican-American families (see Figure 7). The north half of this area is a near-slum with real poverty and race problems and the southern half is a huge tract of inexpensive homes developed within the last eight years for low income families. Most of these families are transient or recently arrived in San Jose, and the result is a highly unstable population group.

The western third of OA 12 along Bayshore Highway and Route 17 is largely commercial and industrial.

The area was selected for analysis because of its wide range of land use, terrain, and societal characteristics.

Division Into Neighborhoods and Operating Units

As previously stated, the General Rescue System subdivides large operating areas into neighborhoods and then into operating units. In Santa Clara County, the operating units are best represented by the political precincts. Each subdivision from OA to precinct is supposed to be accompanied by a tenfold decrease in population: OAs might contain 50,000 people, neighborhoods 5,000, and precincts 500.

In our study of the available data for an operating area, it was apparent that a census tract was a unit well suited to represent a neighborhood. Census tracts usually contain a few thousand people and are bounded by major highways and changes in land use. The use of census tracts allows population estimates down to the neighborhood level.

Figure 7 shows the neighborhoods developed and Table 13 shows their size and demographic characteristics. As this table shows, OA 12 has been divided into 14 neighborhoods that have an average population of about 6,000 persons and an average size of 400 residential acres.* The average neighborhood contains about 12 precincts which, in turn, have an average population of approximately 500 people and an average size of 30 acres. These values appear to be quite reasonable with respect to command and control.

Figure 8 shows the neighborhoods of OA 12 divided into operating units or precincts.

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* Residential acreage is herein defined as total acreage minus agricultural, manufacturing, and industrial acreage.

Figure 7

DIVISION OF EAST SAN JOSE OA 12 INTO NEIGHBORHOODS

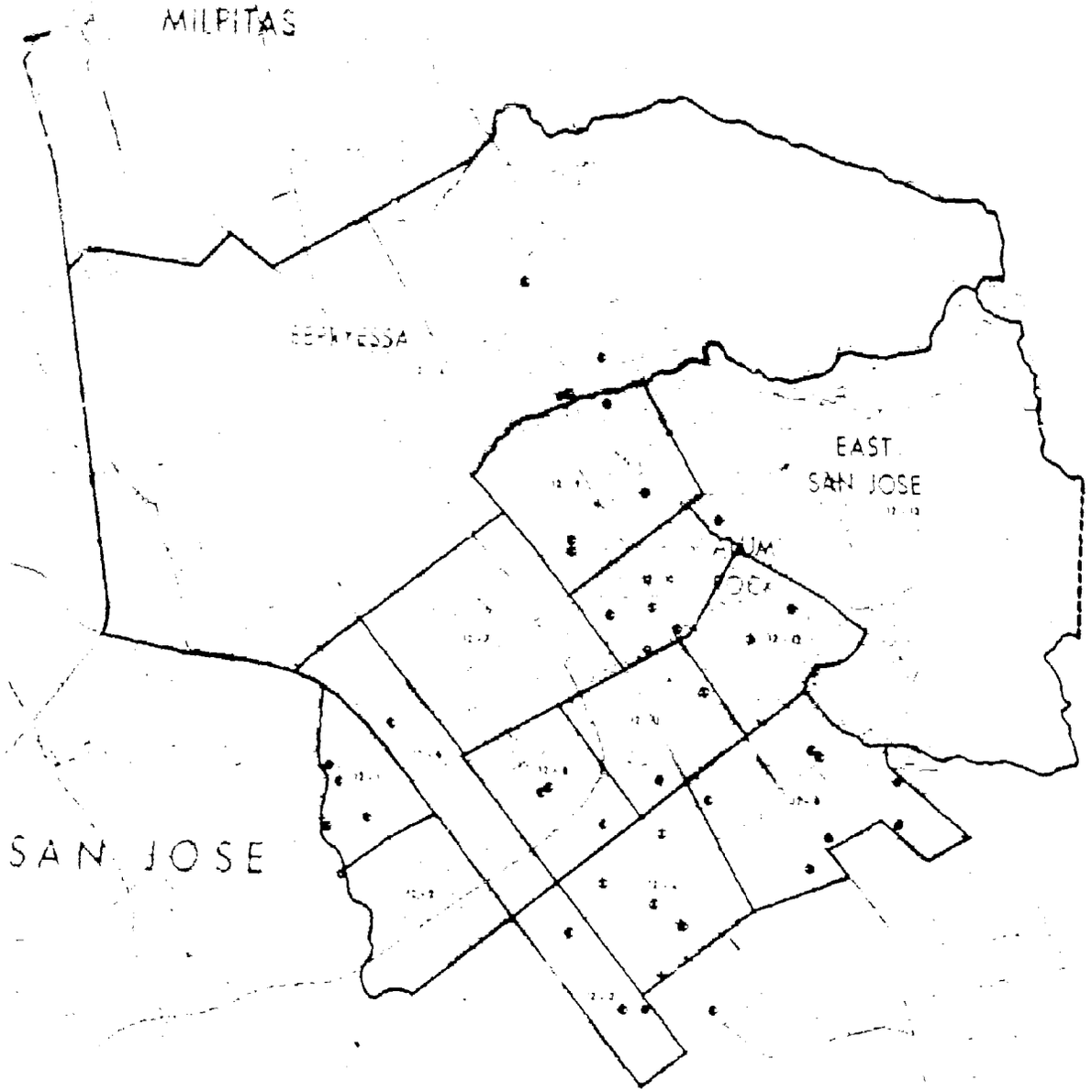


Table 13

CHARACTERISTICS OF OA 12

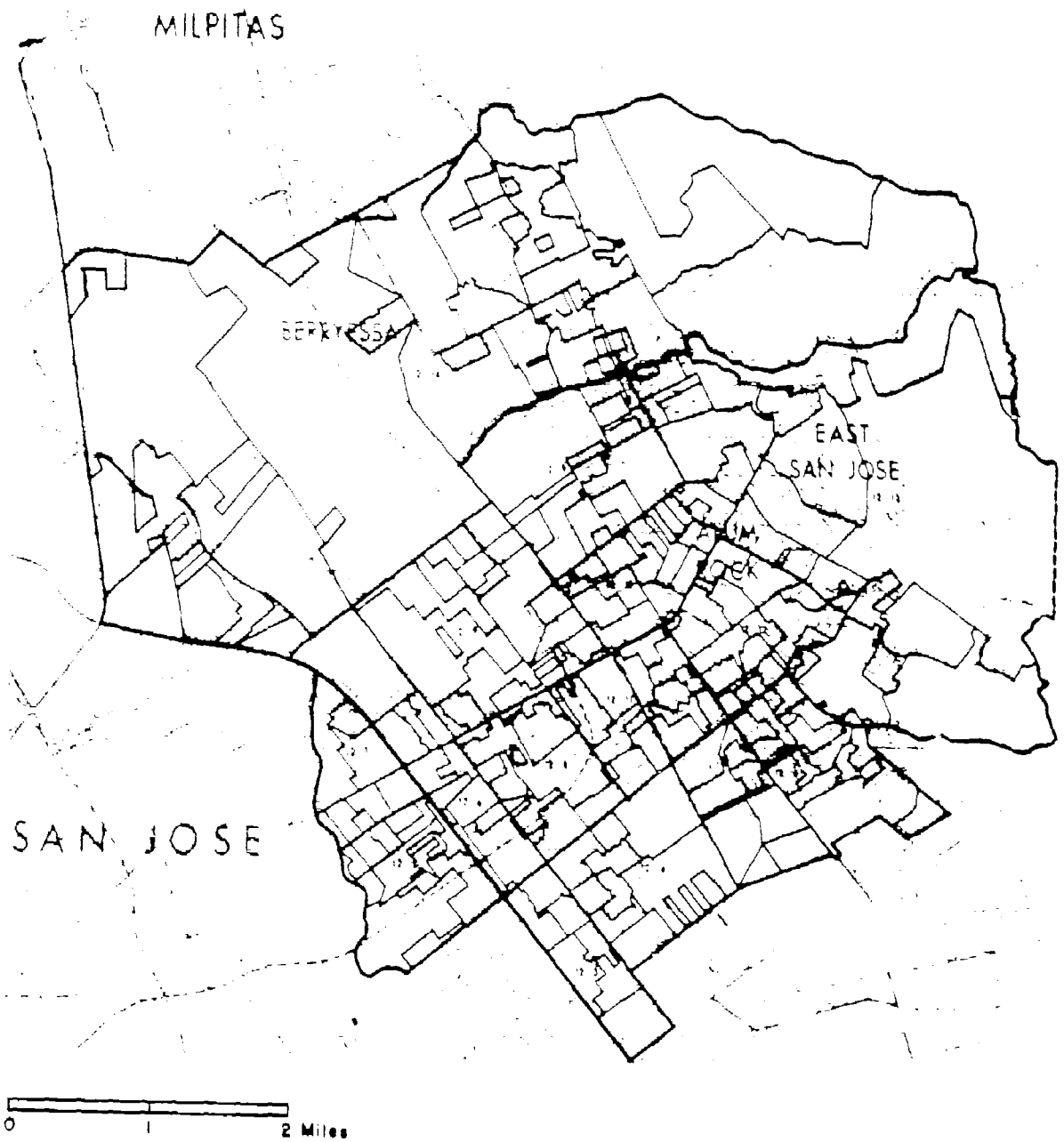
Neighborhood No.	Census Tract Or County Planning Area No.	Population	Residential Area*	Number of Precincts	Persons per Precinct	Residential Acres per Precinct
12-1	14	3,187	251	7	455	35.9
12-2	15	4,612	298	10	461	29.8
12-3	34	6,315	258	7	902	37.0
12-4	35A	5,800†	274	12	483	22.9
12-5	35B	11,676†	489	18	649	27.2
12-6	36	4,603	311	15	307	20.8
12-7	37A	4,708†	259	9	523	28.8
12-8	37B	5,869†	298	9	654	33.2
12-9	38	5,789	308	12	482	25.7
12-10	39	5,645	396	12	470	33.1
12-11	40	6,520	384	12	543	32.0
12-12	41	6,609	428	14	472	30.6
12-13	42	5,888	822	20	294	41.1
12-14	43	7,380	736	14	527	52.6
Totals		84,621	5,312	171		
Averages		6,044	394	12	516	32

* Total area minus acreage devoted to agriculture, manufacturing, and industrial uses.

† Voting precincts do not always conform to census tract boundaries. Thus, the number of precincts per neighborhood is approximate.

Figure 8

DIVISION OF EAST SAN JOSE OA 12 INTO NEIGHBORHOODS AND OPERATING UNITS



Allocation of City Employees

Employees of the City of San Jose

The City of San Jose, during the 1966 fiscal year, averaged approximately 2,313 municipal employees and a total population of approximately 384,000 citizens. This is a ratio of approximately 61 employees per 10,000 citizens. Employees in education are not included as city employees since they work for the school districts, which are separate governments authorized by the state legislature.

Table 14 lists the numbers of employees by department or function. These numbers are consistent with the availability tables of the supplement to this report and provide added detail. The Public Works Parks and Recreation group number 687 employees--a sizable force. Some of these are female and could be subtracted. However, there are some additional Public Works related personnel subsumed under the Capital Outlay fund working on projects concerning study and development of new city facilities. Thus, the 687 figure may be accepted as a minimum estimate of the male working force available for the reentry operation.

Ratio of Central City to Areawide Municipal Employees

Since San Jose is the central city within a major urban area, there is an immediate question of the total number of city employees of the 13 cities in the San Jose complex.

According to census data, approximately 32 percent of the citizens of the SMSA live in San Jose while about 18 percent of all city employees are employees of the San Jose government. The relationship between these two ratios is consistent with nationwide statistics. Table 15 lists certain ratios of interest for the 17 selected cities used in previous tables within this report. These ratios give the relationship between central city and SMSA for population, total city employees in common municipal functions (excluding education), and the employees of Public Works Parks and Recreation departments. The statistics on total municipal employees within metropolitan areas are listed in the census data in terms of the SMSA rather than the urban[illegible] poses no problems in analysis as long as the data are used in the proper context. The last column of Table 15 lists the population ratio between central city and urbanized area. This ratio will be used later to return the focus of analysis on the urbanized area rather than the SMSA.

Table 15 indicates that the ratios involving total city employees are consistently less than the ratios involving population. This suggests that although the ratio of employees to population increases with city size (as the supplement report shows), there are some economies in bringing most of an urban population under a central government.

Table 14

CITY EMPLOYEES--SAN JOSE

Function	Average Number of Employees
General fund departments	
City Manager	20
City Auditor	6
Finance	53
City Attorney	17
City Clerk	16
City Planning	30
Personnel	24
Police	426
Communications	47
Fire	383
Building	48
Civil Defense	9
Public Works	407
Parks and Recreation	280
Health	148
Auditorium	11
Library	113
Property	3
Municipal Garage	11
Subtotal	2,052
Other departments	
Airport Operations	40
WPC Plant Operation	87
Capital Outlay Projects	110
Off-Street Parking	26
Subtotal	263
Total	2,315

Source: Santa Clara County Government files.

Table 15

POPULATION AND CITY EMPLOYEE RATIOS - CENTRAL CITY TO SMSA

Central City	Population Ratio Central City/ SMSA	Employee* Ratio Central City/ SMSA	Employee† Ratio Central City/ SMSA	Population Ratio Central City/ Urbanized Area
New York	72.7	41.4	72.7	55.1
Los Angeles-Long Beach	36.8	21.5	56.6	38.2
Chicago	57.1	38.3	46.6	59.6
Philadelphia	46.1	52.1	63.3	55.1
Detroit	44.4	36.5	53.7	47.2
Washington, D.C.	38.2	41.9	52.7	42.3
San Francisco-Oakland	26.6	19.2	29.7	31.0
San Diego	55.5	32.7	57.2	68.5
Denver	53.1	51.2	76.1	61.5
San Bernardino-Riverside-Ontario	11.4	8.1	15.1	24.3
Phoenix	66.1	40.8	68.8	79.5
San Jose	31.8	17.9	24.5	33.9
Sacramento	38.0	26.2	51.1	42.3
Toledo	69.6	49.3	73.7	72.6
New Haven	48.7	59.8	76.3	54.5
Pensacola	28.1	34.9	60.8	44.5
Decatur	66.1	41.2	44.7	86.7

* Employees in common municipal functions excluding education.
† Employees in Public works/Parks and Recreation and related areas--highways, sewage, sanitation, parks and recreation, water.

For Public Works Parks and Recreation employees, these economies do not seem to be present. The number of these "blue collar" employees seem to vary with population regardless of the relative size of the central government.

Thus, a general rule for expanding the number of public works-related employees from central city to SMSA is to divide by the population ratio. Since our analysis is based on the urbanized area unit, we would divide by the population ratio of central city to urbanized area (last column of Table 15). This ratio for San Jose is 33.9 percent. Dividing the 687 San Jose "public works related" employees by 0.339 gives a quotient of slightly more than 2,000 metropolitan area employees that might be used in reentry operations.

County Government Employees

The city of San Jose is the county seat of Santa Clara County. Thus, in addition to the city staff of municipal employees, there is a county staff of comparable size. This staff was not assumed to be a usable resource in this analysis since the objective of the Phase II research was to analyze the capability of city governments for civil defense rescue.

However, this delimitation could be shortsighted since most major cities are county seats. Of the 212 largest U.S. cities, which are the most likely targets in an attack on the nation's population, approximately 87 percent are county seats. Future organizational studies of CD systems should review the possibilities of joint use of both city and county staffs.

Inactive Reservists and Potential Reservists

The membership of the veterans, fraternal, and service groups have been designated in this analysis as the best source of inactive reservists. Members of these groups living in San Jose numbered 12,619 in 1964.* A more realistic estimate might be 10,000 to adjust for the double counting inherent in the statistics. This number is expanded to possibly 20,000 persons when known CD volunteers, construction workers and Boy Scout Explorers are added.

The number of potential reservists over the entire San Jose urbanized area is, of course, much greater. A conservative estimate of this

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* See Page A-11 of Supplementary Report.

total could be obtained by dividing the central city total of 20,000 by the ratio of central city to urbanized area population (0.339 in Table 15). This would give about 60,000 potential reservists--a highly conservative figure since the number of citizen organization members per 10,000 population is much larger in the small suburban communities than in the central cities. Therefore, a procedure of merely expanding the central city organization membership in proportion to population gives a considerable understatement of the total membership over the urbanized area.

However, this conservative procedure is acceptable since the number of metropolitan-wide citizen organization members thus calculated seems more than sufficient relative to the manpower requirements for citizen leadership. A less acceptable statistic, already mentioned, is the distribution of residential locations of citizen organization members studied--a distribution that does not agree with the population distribution. A brief study of this phenomenon was made using OA 12, East San Jose, as a basis of analysis. Figure 9 shows the results of this study. A significant number of OUs have no reservists residing there while others have more than needed.

This problem seems solvable in San Jose by looking to organizations of tradesmen, labor groups, minority groups, religious groups, and so on. Some of these organizations have the national framework that is desirable. The reader should recall that this national framework was to be used as a communication line and a mechanism to develop coherence and stability in the reservist program. For groups without a national organization, this coordination, indoctrination, and maintenance function would fall as an extra burden on the local CD officials.

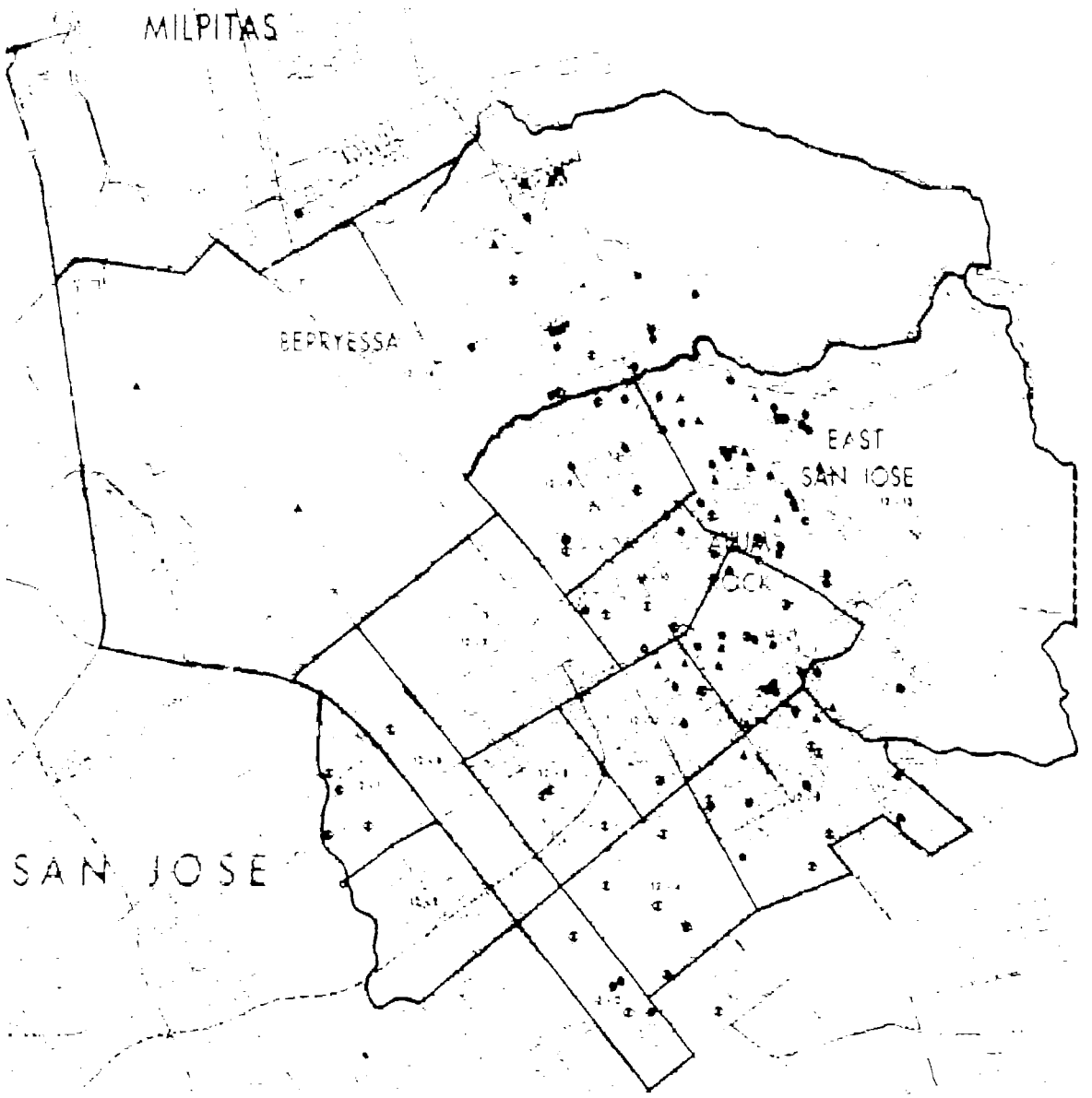
Summary

This brief study of the organizational aspects of the General Rescue System generally supports the conceptual design developed in the preceding sections. The manpower availability within the San Jose metropolitan area suggests a sufficiency of both municipal employees and potential reservists.

However, two major points were highlighted within the San Jose study. First, the existence and potential of county government employees within the central cities have not been sufficiently appreciated nor analyzed. Second, the problem of the shortage or absence of citizen organization members in certain geographical areas becomes increasingly clear with continued analysis. Within San Jose, the operating areas of lower income families and minority groups may be difficult to represent through the membership of national citizen groups, unless a thorough search is made of the worlds in which lower income and minority groups live. Such a search would have to be more sociological than statistical, and is in fact being made by research groups, not for CD purposes, but for purposes of betterment--war on poverty, crime prevention, education.

Figure 9

DISTRIBUTION OF MEMBERS OF CITIZEN ORGANIZATIONS



TOTAL IN OPERATING AREA 12 = 88 PERSONS

August 1967

COMMUNITY MANPOWER RESOURCES

A Supplement to Conceptual Design
of a Civil Defense Rescue System

By Lacy G. Thomas

FOREWORD

This working paper reports on an enumeration of potential manpower resources which could be used for Emergency Rescue Forces in 40 selected cities. It is the initial substudy in Phase II of Rescue Problem Analysis, which is being performed by Stanford Research Institute for the Support Systems Research Division, Office of Civil Defense.

Many individuals in the various organizations selected for enumeration have freely volunteered their time to provide the data base for this analysis. We are grateful for their willing assistance.

Lacy G. Thomas was responsible for this substudy. He was assisted by Shirley R. Reid who collected and tabulated the data. John L. Crain is the Project Manager.

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COMMUNITY MANPOWER RESOURCES

Introduction

This investigation looks at probable community sources for the people who would join together in time of national peril to provide an organized rescue force. The locale is major cities (more than 50,000 inhabitants). The rescue force envisioned would be capable of performing the variety of life-saving tasks likely to be needed in the aftermath of a nuclear attack. This study is part of a continuing analysis (Phase II of Rescue Problems) which, in addition to evaluating manpower resources, estimates total work requirement, specifies needed rescue force, provides a conceptual design of a rescue system, and assesses the capability of this design under simulated attacks.

This study builds upon a considerable foundation of rescue research and analysis which has broadly defined the nuclear attack environment and the tasks associated with rescue. From this foundation it appears that the task of rescue will be either minor or of overwhelming proportions depending upon the proximity of the attack. Obviously, rescue system design must wrestle with the overwhelming rescue problem.

The indicated need for rescue personnel in an area subjected to blast damage and fire could be an appreciable part of the area's residents. Most likely, rescuers would be doing relatively simple life-saving tasks. They would require little training and have only a minor, if any, identification with rescue in peacetime. But at the sound of danger, the rescue force must begin to rise almost from nothing and reach giant-like proportions before the time of need. These are the probable realities of an emergency rescue force. More will be said of them in the background discussion.

Considerably more is known about the requirements for rescue than about the community manpower resources which might be used for rescue. Consequently, it seemed reasonable to examine existing, potential community manpower sources early in the study. The general system criteria from previous efforts provide a guide to what kind of manpower and how much will be required. Also, it seemed desirable to establish a resource data bank so that rescue system design iterations could be accomplished easily later in the study and not be constrained by additional time-consuming data collection.

Objective

This investigation examines community organizations which are commonly found in cities of over 50,000 residents, with two objectives: (1) to see if those organizations are feasible sources for emergency rescue force manpower, and (2) to determine, roughly, how many persons they might provide in time of need.

Scope

Primarily, this paper reports the collection, correlation, and presentation of manpower resource data and interpretation of the findings. Data came from pertinent census publications, initial progress reports for local CD jurisdictions, and selected organizations. All U.S. cities (326 cities, selected urban towns and townships) with 50,000 or more inhabitants within the corporate limits are reviewed. This division was selected because such cities are the more likely targets. Also, census data for city employment conveniently starts with cities of this size.* A selection of 40 cities is made on the basis of size and location for data correlation and evaluation. At this time, data reduction for the remaining 286 major cities does not appear to be justified.

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* See Census Bureau GE No. 1, City Employment in 1965, February 1966.

This examination of manpower resources is related primarily to the requirement for rescue services which would exist immediately following an attack and extending for a short time (3 or 4 hours) until the sweep of fire and/or the threat of distant fallout arrival drives the rescuers out of the area. The problem of Re-entry Rescue, more directly related to the existing OCD concept of Light and Heavy Duty Rescue, which would occur after the fires and the fallout levels had subsided, would be of far less magnitude. A force capable of coping with Immediate Rescue should have no difficulty in meeting Re-entry Rescue requirements.

Method of Investigation

The initial step in this investigation developed criteria for selecting community organizations that are potential sources of rescue manpower. Using these criteria, representative organizations were selected. Data were collected for the major U.S. cities utilizing the method best suited to each particular organization. Correlation and initial evaluation of the resource data followed for 40 candidate cities which were selected as being representative of city size and OCD region. Results of the evaluation are shown in graphs (Figures 2 through 5), and conclusions are reported under the heading Findings. Final evaluation of the community manpower resources must necessarily wait until the rescue system requirements have been more clearly defined in the course of this study.

Background

The initial analysis (Phase I) for this series of rescue studies began in 1964 when SRI defined for OCD the character and magnitude of the rescue problem in terms of general life-saving tasks. That analysis also established general guidelines for rescue organizations that would be capable

of coping with these tasks. The results were published in a working paper[1] which provides a common point of view for those working in this area and highlights the more profitable areas for further research. A significant conclusion of this effort was that it is infeasible for a city to maintain, during peacetime, a standing rescue force capable of handling the nuclear attack rescue problems. It recognized that, at best, a city could maintain a small, hard-core rescue force and count on strengthening it from the surviving populace to attempt what might be an overwhelming task after nuclear attack.

The second rescue study, Phase Ib, clarified the task of rescue from debris by providing (1) revised estimates of the trapping function, i.e., the number of persons trapped in debris under given conditions; (2) a re-evaluation of the rescue time constraints imposed by fire and fire spread; (3) a determination of the feasibility of detection equipments for locating people buried under debris; and (4) a set of criteria to guide the evolution of the rescue system.

Phase Ib also showed the credibility of a cadre-based, crisis-escalated concept for the acquisition of a community life-saving capability.[2] It suggested that one person in every one hundred* should be assigned to rescue forces to provide a force adequate for the release of those trapped in debris, and that a broad spectrum of "people-saving" activities following attack would require a force several times greater than that for merely releasing trapped victims.

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1. J. L. Crain and Charles D. Bigelow, Civil Defense Rescue Requirements Following a Nuclear Attack, OCD-PS-64-55, NRDL, Working paper, Stanford Research Institute, SRI Project No. IMU-4727, February 1965.

2. L. G. Thomas, et al., Phase Ib Analytical Report, Supplemental Analysis, Civil Defense Rescue, NRDL, Stanford Research Institute, SRI Project 4727, August 1965.

* A total force of approximately 1,000,000 rescue workers for people living within SMSA's (96,000,000 persons).

Concurrent with Phase Ib research, the conceptual criteria for a national system of rescue (from debris) was required by OCD Plans and Operations for the Emergency Operating System Development (EOSD), Phase I. From this analysis it became clear that the central problem in organizing an emergency force, in peacetime, would be the lack of identification with any ongoing community or municipal function. Rescue forces could be acquired in each community during peacetime, but they would be difficult to sustain over a long period of time without experiencing the inherent decay that comes from inactivity. Phase I of EOSD also provided an extensive assessment by computer of the probable time constraints imposed by blast and fire effects.

Rescue System Design Assumptions

An understanding of design criteria for the rescue system is basic to an appreciation of the need for this examination of community organizations. The system design criteria are briefly described as follows:

Rescue Force Requirements

Because of the short time in which a rescue force can operate, the planning, expansion base, and most--if not all--of the force must be provided prior to the attack, so that the surviving rescuers can move quickly into action after the attack. The overriding constraint on saving lives following attack will most likely be time. Extensive fires will accompany local attacks and soon destroy survivors who cannot evacuate the rescue area. A surface burst will produce prompt downwind fallout. (Fallout from distant upwind surface bursts would arrive much later depending upon wind speed.)

The concept of rescue emerging from this analysis postulates a large force of relatively untrained people helping the survivors in accordance with an overall rescue plan and under ECC direction.* This assistance could be in many forms, such as directing those fleeing the fires in the area to places of refuge, carrying the nonambulatory injured, releasing those trapped in debris, helping fight fires, removing obstacles that impede vehicles, providing expedient shelter, repairing existing shelters, or recovering medical supplies.

The nature of the rescue force concept seems to dictate general public participation by those with average adult physical capabilities. Although adult men would likely predominate, young men could render valuable service and women are suited to many of the tasks.

Rescue Force Size

How many adults would volunteer for the emergency rescue force during a crisis buildup? If all able-bodied adults were motivated strongly enough to volunteer the rescue force would approach one-half

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* I.G. Enores, et.al., Working Paper Phase 1 Civil Defense Rescue--Analytical Report, OCSD Stanford Research Institute SRI Project No. 5020-104, August 1965. See Chapter IV.

of a city's population. At the other extreme are the city's fi: , police, and public works employe' s (generally around 0.7% of the total population) who would not have to volunteer to become involved in rescue, simply because they could provide an organized response to city leadership.

People would certainly become increasingly receptive to the idea of volunteering to participate on a rescue force as the crisis builds--if they know of the danger. With proper motivation, audio-visual instructions, and training during this period, the bulk of the force could be activated and trained to do rescue. Hopefully, somewhere between 10 and 20% of the adults (5 to 10% of the population) would come forward to serve during the emergency. A rescue force of 10% of a city's residents requires roughly one adult in every 5. Likely ratios might be every third man and every tenth woman.

Maintaining Readiness

The central difficulty in organizing and maintaining a capability for postnuclear attack rescue is the lack of any related activity during peacetime. The principal problem is to find a way to maintain a rescue capability over a long period of time without the inherent decay that comes from inactivity.

Past analysis* describes the deterioration of a force which stands and waits for a task which may never come; as a countermeasure it urges identification of the force with peacetime disaster. Unfortunately, for maintaining readiness, peacetime or natural disasters are inadequate to maintain even a small part of the emergency rescue force in most communities. Natural disasters of enough magnitude to involve more than the city's public safety departments are generally infrequent. Between 1953 and 1964 a majority of the states (28) experienced less than 2 major disasters (total 49) which qualified for Federal assistance through Public Law 875.** It appears unlikely that an emergency rescue system could be kept viable in peacetime unless the members are paid.

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*See Page 43, Phase 1b Analytical Report, Supplemental Analysis--Civil Defense Rescue, op.cit.

**Taken from the summary of declared major disasters, 1953-1964, presented in the Associated General Contractors of America booklet describing PLAN BULLDOZER, A Program for Disaster Relief in Your Community.

System Acquisition by Crisis Escalation

It would seem reasonable to secure rescuers in response to the buildup of international tensions. As the threat to the nation increased, citizens could be readily motivated to seek instruction and prepare for an active rescue role. The public pursestrings would loosen in an attempt to overcome the lack of time. Crisis acquisition appears feasible as long as the escalation to the emergency force can be accomplished in a controlled manner from a small peacetime cadre of trained personnel.

Rescue Force Components

Paid Cadre. Crisis escalation is a reasonable approach to system acquisition only if the resulting rescue force can function in a reliable manner. The force must respond to direction and be capable of performing the life-saving activities desired of it. The surest way to obtain this is to base the force upon a cadre of trained personnel and escalate no faster than this cadre can indoctrinate/train new members. Escalation requirements and the lack of sufficient peacetime motivation in rescue activities suggest the creation of a cadre whose members can be directed and paid to acquire the necessary rescue skills and to learn about the city's plans for rescue.

Inactive Reserve. The expansion of the paid cadre to the emergency force--going rapidly from less than 1% of the total population to around 10%, with the majority of persons with no previous background in rescue--would likely introduce a serious element of risk into an already chaotic situation. It is more probable that escalation would become a mass influx of crisis volunteers rather than controlled buildup. Ideally, escalation to an emergency force should proceed no faster than the capacity for assimilation. Volunteers from the general public are necessary, but they should come last after the introduction of pre-indoctrinated and, hopefully, trained personnel.

It is feasible to indoctrinate members of certain organizations with the rudiments of rescue in peacetime. (For the past 10 years, the American Legion, with little encouragement, has had participation by approximately 200 posts in a Light Duty Rescue Program.) A large reserve (3 to 6 times the paid cadre) with relatively little training would be

of significant assistance if they could be activated early in the crisis to assist with escalation. The overall effectiveness of the emergency force would probably be more closely related to the size and capability of this peacetime reserve component than any other factor. They would be the non-coms--the sergeants and the corporals--of the emergency force and lead the rescue teams.

What community sources exist for providing an Inactive Reserve? Probably the best trained and most readily available would be the volunteer auxiliaries or stand-bys for the public protection departments (CD Volunteers). These would substantially enlarge the cadre without degrading capability to an appreciable extent. Construction workers, as a group, have many of the skills deemed important to rescue. They could be added early in the escalation. The bulk of the unpaid cadre could come from organizations that had encouraged their members in Civil Defense activities and assisted them with rescue indoctrination and training prior to the crisis. Such organizations are found among the public service, fraternal, and religious organizations which abound in our society.

Crisis Volunteers. The third and last component group for the emergency period rescue force would be the volunteers who are motivated to action by the crisis confronting the nation. They need only to be willing, able to follow instructions, and of average physical stamina and emotional stability. An individual's sex or age should not be a barrier to service. These volunteers would be the large diluent, probably contributing more than half of the total force.

Of course, it would be better if the Crisis Volunteers could be inducted and trained prior to need, but the emergency force should be able to absorb these people at any time up to and including actual operations. If the population were in public shelter, many of these volunteers would likely be added then. With the people in home and neighborhood expedient shelters, many volunteers would probably be added in the course of rescue activities ("Hey Bernie! How about giving us a hand here?"). It is important to remember that without leadership and control, the Crisis Volunteers cannot, in themselves, constitute a rescue force.

Manpower Resource Organizations

The constraints imposed upon rescue by the attack environment suggest that a rescue force based upon neighborhood sources has the clearest chance for success. Consequently, it is desired that source organizations for the manpower required by each component be representative of population distribution. This will be hard to achieve in practice and cannot be attempted except at the community level. In this investigation it was necessary to disregard this aspect of local physical distribution and select national organizations with large total memberships knowing that neighborhood distribution of the membership was probably far from ideal.

Resource Organization Selection Criteria

There are several fundamental differences in the criteria for selection of the resource organizations within each rescue force component. They are described briefly as follows.

Paid Cadre. The source organization for the Paid Cadre must provide for insurance coverage for training and operations and permit on-the-job training. It should be the traditional and legal source of rescue assistance in natural disaster. It must have a predictable peacetime response to the local Civil Defense organization.

Inactive Reserve. Many different organizations would be needed to provide manpower for an Inactive Reserve. There are significant advantages to utilizing those organizations whose membership is widely distributed throughout the nation. Existing communication channels can be used for indoctrination and for maintaining interest. These organizations frequently have facilities which could be used for training and for equipment storage. The esprit de corps of these groups would also help maintain peacetime interest in rescue.

Crisis Volunteers. The requirement for organizations to provide Crisis Volunteers is far less a factor than for the other components. Crisis Volunteers would ordinarily come into the rescue force only when the nation was

clearly in danger. Organizations whose members are distributed by neighborhood and who are not already sources to the Paid Cadre and Inactive Reserve are desired. Probably most of this component will "come in off the street."

Selection of Resource Organizations

Paid Cadre. The most likely candidates for the paid cadre role appear to be the city's employees.

The fact that municipal personnel are inherently key participants in many other CD roles does not nullify their value to rescue, since direct life-saving tasks would generally precede and preempt their other postattack tasks. At the completion of the relatively short period for rescue, cadre workers from the city's departments could return to their functional roles and proceed with recovery activities.

Selection of municipal employees for the paid cadre would facilitate federal cost sharing of training expense. Insurance coverage of the cadre would be simplified. Training could be scheduled on-the-job, if required. The extensive knowledge of the city's physical characteristics and facilities, which many city employees have, would be of distinct benefit to rescue planning and operations. Since city employees have traditionally served in disaster situations, it is believed that they would provide a more predictable response than any other group.

A paid cadre involving about 0.5% to 0.7% of the city's population, could probably be mustered from the city's departments. This estimate is approximately one-half of the total city employees.

Inactive Reserve. Resource organizations for this component could show wide variation by city size and region. For this enumeration, only organizations of reasonable nationwide scope and size were considered in order to minimize the effort and time required to collect representative data. The abundance of other organizations not included herein is acknowledged, such as local or regional organizations, religious bodies, craft unions, community school groups (PTA), and business and industrial concerns. The following groups of organizations indicate the extensive sources available for the Inactive Reserve.

1. Civil Defense Volunteers. OCD guidance recommends that each local government provide four volunteers for each regular policeman and each regular fireman and also two rescue personnel per 1,000 population.* Although most cities are far short of those goals, CD Volunteers provide a tangible rescue manpower resource in many cities.

2. Construction Industry. Construction workers are considered to have the skills more nearly parallel to those required by rescue than any other occupational group. Construction workers are found in roughly the same trades and numbers in each city. They can be approached collectively through the local Union secretaries, or possibly through individual contractors. The Associated General Contractors of America (AGC) is actively involved in a nationwide disaster relief program called "Plan Bulldozer" which, though oriented to heavy equipment, could also be applicable to rescue.**

3. War Veterans Organizations. Five major veterans organizations were selected for enumeration. They are:

The American Legion
The Veterans of Foreign Wars (VFW)
The Jewish War Veterans of the USA
Catholic War Veterans, Inc.
American War Veterans WW II and Korea (AmVets)

These organizations have a combined membership of over four million, with over 90% belonging to the Legion or the VFW. Dual membership is common in these organizations but the extent is not known. It is reasoned that the men who have served in past wars would be highly motivated to participate in rescue. This is confirmed by the Legion's peacetime interest in rescue. Since 1956, the American Legion by agreement with OCD has fostered Light Duty Rescue Teams in its local posts. Many Legionnaires have been trained and some are well equipped for natural disaster rescue.

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*Federal Civil Defense Guide, Part B, Chapter 3, Appendix 2, May 1966, page 16.

**D.A. Giampaoli, P.E., Disaster Relief through PLAN BULLDOZER, Constructor Magazine, Volume XLVII, No. 3, March 1965, page 17.

4. Service Clubs. Many of the service clubs which exist in all cities would encourage and indoctrinate their members for rescue service ahead of the time of need, thus providing an easily assimilated addition to the cadre. Members in these clubs are individually committed to individual and community service. Many are prominent citizens and could provide the example and leadership in promoting rescue force training and participation. The five service clubs selected for enumeration are:

Rotary
Lions
Optimist
Kiwanis
Junior Chamber of Commerce

Altogether they total about 1,700,000 (1964) nationally.

5. Fraternal Associations. The fraternal associations have facilities that would be useful for training, and great loyalty and enthusiasm for projects sponsored by their lodges. Similar to service club members, fraternal association members would be influential in attracting public support. The eight fraternal associations selected for enumeration are:

Modern Woodmen of America
Knights of Pythias
Masons
Knights of Columbus
Order of Elks
Order of Eagles
Maccabees
Order of Moose

Altogether they total about 6,300,000 (1964) nationally.

6. Youth Organizations. The older youths (14 though 17 years old) of the Boy Scout movement, the Explorers, would provide an excellent adjunct to a rescue force. Some of the more successful Civil Defense Rescue Units have been formed from the older Explorers (16 and 17 years old). The national program of instruction for this group includes rescue techniques for natural disaster. In 1964, a total of 317,600 young men

were enrolled in Explorer Posts. Other youth groups such as YMCA and Boys Clubs, Inc. also have potential here, but were not investigated.

Crisis Volunteers. Each neighborhood or certainly each census tract should be able to "field" a rescue force based upon a trained cadre plus reserves and using many neighborhood Crisis Volunteers. The older students in the high schools would provide a tangible resource to neighborhood rescue groups since they are distributed according to neighborhood and can be readily trained at school during the crisis. Many college students live at home and could serve in neighborhood groups.

Data Collection

Of the resources for the three components, the resource for the reserve is the most difficult to quantify in each city, and it will likely show the widest variation. Since many functions of the city government are common and reasonably constant, the cadre force size should show a corresponding uniformity. Crisis volunteer sources are the remaining adults and young adults. The quantity would vary widely.

The statistical basis for the analysis described in this paper is the data from 40 major cities which were selected to give a uniform distribution by size and OCD regions. The cities are listed on Table 1. The OCD Regions are shown on Figure 1. Table 2 shows the 1960 major city population distribution by city size and OCD Region. Size classification follow Census Bureau examples.*

Rescue data for the various organizations was obtained from published Federal government sources and by corresponding with national and state headquarters. No attempt was made to survey individual cities. The specific data sources are listed in Appendix A.

*See Figure E/11, page 16, Census of Governments, 1962, Vol. III, Compendium of Public Employment, Bureau of the Census.

Table 1

40 CITIES SELECTED FOR INITIAL ANALYSIS

City and State	1960 Population (000)	OCD Region
Albuquerque, New Mexico	201	5
Allentown, Pennsylvania	108	2
Atlanta, Georgia	487	3
Baltimore, Maryland	939	2
Boston, Massachusetts	697	1
Charleston, South Carolina	66	3
Chicago, Illinois	3,550	4
Denver, Colorado	494	6
Des Moines, Iowa	209	6
Detroit, Michigan	1,670	4
Fort Smith, Arkansas	53	5
Fort Wayne, Indiana	162	4
Great Falls, Montana	55	8
Houston, Texas	938	5
Independence, Missouri	62	6
Lincoln, Nebraska	126	6
Los Angeles, California	2,479	7
Miami, Florida	292	3
Milwaukee, Wisconsin	741	4
New Britain, Connecticut	82	1
New Orleans, Louisana	628	1
New York City, New York	7,782	1
Newark, New Jersey	405	1
Oakland, California	368	7
Oklahoma City, Oklahoma	324	5
Palo Alto, California	52	7
Philadelphia, Pennsylvania	2,003	2
Pontiac, Michigan	82	4
Portland, Oregon	373	8
Providence, Rhode Island	207	1
Richmond, Virginia	220	2
St. Louis, Missouri	750	6
St. Petersburg, Florida	181	3
Salt Lake City, Utah	189	7
San Diego, California	573	7
San Jose, California	204	7
Spokane, Washington	182	8
Tacoma, Washington	148	8
Toledo, Ohio	318	2
Tulsa, Oklahoma	262	5

Distribution of Cities by Size

50,000 to 99,999	= 7
100,000 to 199,999	= 7
200,000 to 299,999	= 7
300,000 to 499,999	= 7
500,000 to 999,999	= 7
1,000,000 or more	= 5

Distribution of Cities by OCD Region

Region	Number of Cities	Region	Number of Cities
1	5	5	6
2	5	6	5
3	4	7	6
4	5	8	4

Figure 1

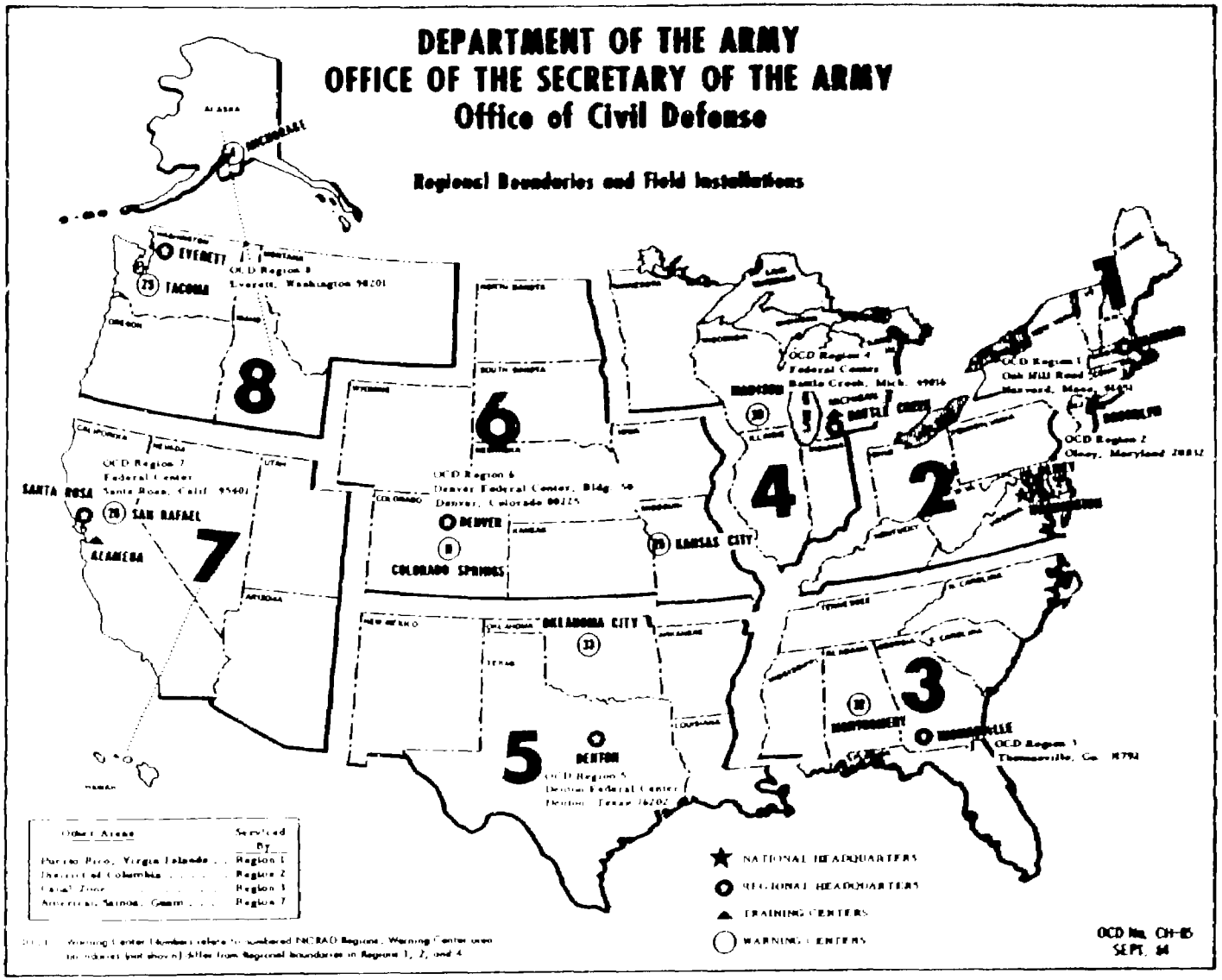

DEPARTMENT OF THE ARMY
OFFICE OF THE SECRETARY OF THE ARMY
Office of Civil Defense
Regional Boundaries and Field Installations
EVERETT
TACOMA
SAN RAFAEL
ALAMEDA
DENVER
COLORADO SPRINGS
KANSAS CITY
OKLAHOMA CITY
DENTON
8
6
7
4
2
1
3
5
NATIONAL HEADQUARTERS
REGIONAL HEADQUARTERS
TRAINING CENTERS
WARNING CENTERS
OCD No. CH-85
SEPT. 84

Table 2

MAJOR CITY* POPULATION

Classified According to Size and OCD Region

City Population Size (000)	Number of Cities	1960 Population (000)	Percent of Total Cities
1000 and over	5	17,484	27.1
500 - 1,000	16	11,111	17.2
300 - 500	23	9,183	14.2
200 - 300	19	4,495	7.0
100 - 200	68	9,086	14.1
50 - 100	191	13,150	20.4
Totals	322	64,509	100.0

Cities by OCD Region (000)	Number of Cities	1960 Population (000)	Percent of Total Cities
Region I	68	15,673	24.3
Region II	55	11,243	17.4
Region III	37	5,426	8.4
Region IV	52	11,268	17.5
Region V	33	6,580	10.2
Region VI	22	3,824	5.9
Region VII	48	9,076	14.1
Region VIII	7	1,419	2.2
Totals	322	64,509	100.0

* There were 310 cities with more than 50,000 inhabitants living within city limits in 1960. Twelve selected urban towns and townships having 50,000 inhabitants or more are also included.

Source: Bureau of Census, GE-No.1, City Employment in 1965, Table 3.

Discussion of Results

Summations of the data collected during this investigation are made on Table 3. Graphs which relate the three components of the Emergency Rescue Force and show the contribution of the groups selected for enumeration within each component are given in Figures 2 through 5. The summary and associated graphs classify the data first by city size, to reveal any trends associated with city size, and second by OCD Region, to show the general extent of the selected component groups throughout the nation.

Six, or 15%, of the cities examined have resources for a rescue force equal to 20% of the population without the need for "general public" volunteers. Charleston, South Carolina; Great Falls, Montana; and Lincoln, Nebraska could, in theory, dispense with Crisis Volunteers since their rescue forces could be obtained complete from the resource organizations shown for the cadre and the reserve. San Jose, and Palo Alto, California; and Tacoma Washington need only a portion of the student groups from the volunteer component. The remaining 36 cities need Crisis Volunteers to supplement the resources for the cadre and the reserve to provide a total rescue force potential equaling 20% of the 1960 population.

Considerable multiple counting is inherent in reaching the totals shown on Table 3. Many persons belong to two or more of the organizations polled and were counted by each organization. An obvious duplication exists between the BSA Explorers and the high school students. The size of the rescue force provided by each city would be strongly influenced by local action. If only the organizations examined in this review were used for resource, the net force would be significantly less--perhaps as much as 50%--because of multiple counting of some and unavailability of others. It is assumed that local evaluation of anticipated mobilization strength would add additional resource organizations, if required.

Table 3

MANPOWER RESOURCES FOR COMMUNITY EMERGENCY FORCES
MEAN VALUES FOR 40 SELECTED CITIES

NUMBER PER 10,000 POPULATION

Emergency Rescue Force Component	Cities Grouped by 1960 Population: 1,000 or More	500 to 1,000	300 to 500	200 to 300	100 to 200	50 to 100	Cities Grouped by OCD Region: 1	2	3	4	5	6	7	8
Paid Cadre														
Fire	14.1	17.3	17.5	18.0	16.7	17.3	23.2	17.2	18.7	14.6	15.4	15.9	14.7	17.0
Police	31.8	28.0	22.4	20.2	16.3	17.2	32.5	28.9	22.7	24.7	16.4	19.3	19.3	16.5
Public works	32.1	27.6	31.1	34.9	28.8	27.0	28.8	31.5	48.5	27.1	33.5	24.0	22.1	30.2
Other common functions	25.5	24.3	21.8	19.4	19.5	21.0	27.3	28.0	25.3	17.9	14.0	23.1	22.8	19.1
All others	61.0	49.6	28.3	25.2	32.4	30.3	71.1	30.7	30.9	51.0	18.9	36.4	21.7	25.1
Total Paid Cadre*	164.5	146.8	119.1	118.7	113.7	112.8	182.9	141.3	140.1	135.3	98.2	118.9	100.9	107.9
Maximum	272.9	221.0	183.5	174.4	188.8	195.9	272.9	205.7	196.8	195.9	127.2	167.2	141.3	157.3
Minimum	108.2	72.5	60.8	70.8	79.9	80.9	93.0	79.9	119.1	98.2	68.8	88.4	72.3	80.9
Inactive Reserve														
CD volunteers	9.9	38.1	17.5	22.5	11.1	13.3	34.0	13.0	7.4	9.4	21.8	52.2	17.2	13.2
Construction workers	150.6	194.2	201.4	241.8	235.1	192.0	163.8	169.8	241.5	145.0	242.8	221.7	217.2	230.4
Veterans organizations	113.9	143.4	151.9	189.6	209.1	175.4	126.7	189.4	172.7	185.2	153.5	235.7	95.1	233.2
Service clubs	15.8	28.2	35.4	46.8	42.9	47.0	23.7	51.8	73.1	35.7	58.7	73.4	63.3	46.0
Fraternal associations	202.5	183.5	366.1	401.7	520.0	456.6	299.5	307.4	570.4	446.2	340.4	306.8	410.0	930.6
BSA explorers inactive	14.0	28.2	33.6	38.0	88.4	49.2	5.9	30.4	52.5	30.7	39.2	31.0	95.5	46.2
Total Standby Reserve	516.5	617.0	823.9	961.3	1,238.2	1,374.4	641.6	781.8	1,117.8	852.2	856.4	1,021.0	898.3	1,549.7
Maximum	607.2	852.0	1,340.1	1,305.9	1,901.6	1,920.0	848.2	1,133.6	1,875.0	1,394.4	1,337.5	1,980.0	1,404.7	1,920.0
Minimum	445.1	419.3	604.2	699.6	846.6	844.3	419.3	497.8	846.6	691.3	581.0	700.6	645.1	1,340.1
Crisis Volunteers														
High school students (males - 11th & 12th grades)	151.9	139.4	149.2	146.9	131.3	111.1	147.0	141.6	143.7	146.2	156.1	111.7	100.9	126.2
College male students	245.7	412.7	206.7	452.8	204.3	189.6	505.4	268.1	324.8	170.1	214.0	285.8	422.7	124.9
General public	903.3	658.2	675.2	286.7	310.0	149.5	419.3	610.9	310.6	730.3	673.0	603.2	416.4	89.7
Total Crisis Volunteers	1,300.9	1,210.3	1,031.1	886.4	645.6	450.2	1,071.7	1,020.6	778.7	1,016.6	1,045.1	980.5	999.8	339.8
Maximum	1,412.2	1,349.3	1,256.1	1,361.4	956.3	1,036.2	1,278.4	1,308.7	1,901.9	1,400.4	1,347.3	1,149.4	1,412.2	564.8
Minimum	1,242.6	1,045.0	547.4	578.1	0.0	0.0	918.7	578.1	0.0	630.6	575.4	0.0	475.5	0.0
Summary														
Paid Cadre	164.5	146.8	119.1	118.7	113.7	112.8	1,182.9	141.3	140.1	135.3	98.2	118.9	100.8	107.9
Inactive Reserve	515.5	617.0	823.9	961.3	1,238.2	1,374.4	641.6	781.8	1,117.8	852.2	856.4	1,021.0	898.3	1,549.7
Crisis Volunteers	1,300.9	1,210.3	1,031.1	886.4	645.6	450.2	1,071.7	1,020.6	778.7	1,016.6	1,045.1	980.5	998.8	339.8
Gross Resource	1,980.9	2,074.1	1,974.1	1,966.4	1,997.5	1,937.4	1,886.2	1,941.7	1,999.8	1,994.1	1,999.7	2,000.4	1,998.9	1,987.4

* Municipal employees in education are omitted because city operated schools are uncommon.

Source: This table summarizes appendix tables A-4, A-5, A-6, A-7, A-8, and A-9.

The cities selected for enumeration showed wide variation in the manpower resource potential for each component. This is indicated in the maximum and minimum limits for the force component totals in each classification.

Figure 2 shows that the smaller cities in this sampling would have less of a cadre and more of a reserve to call upon than the larger cities. City employees decrease steadily, in ratio to population, from the large to the small city by almost one-third, while the reserve increases, proportionally, by almost three times. As a consequence, Crisis Volunteers would be more numerous in the rescue force of the larger city.

The data base is insufficient to justify any conclusions on a regional basis other than that the resource organizations are widely distributed throughout the nation and that crisis volunteers could be expected to provide about half of the emergency rescue force in the major cities.

From Figure 3 it is apparent that cities of over 500,000 residents provide more employees for the "variable functions" (transportation systems, places of correction, health clinics, hospitals, public assistance, etc.) than do cities of fewer residents. Fire control organizations appear to be the most constant of the city organizations with average values which vary from 0.14% to 0.19% of the city's population.

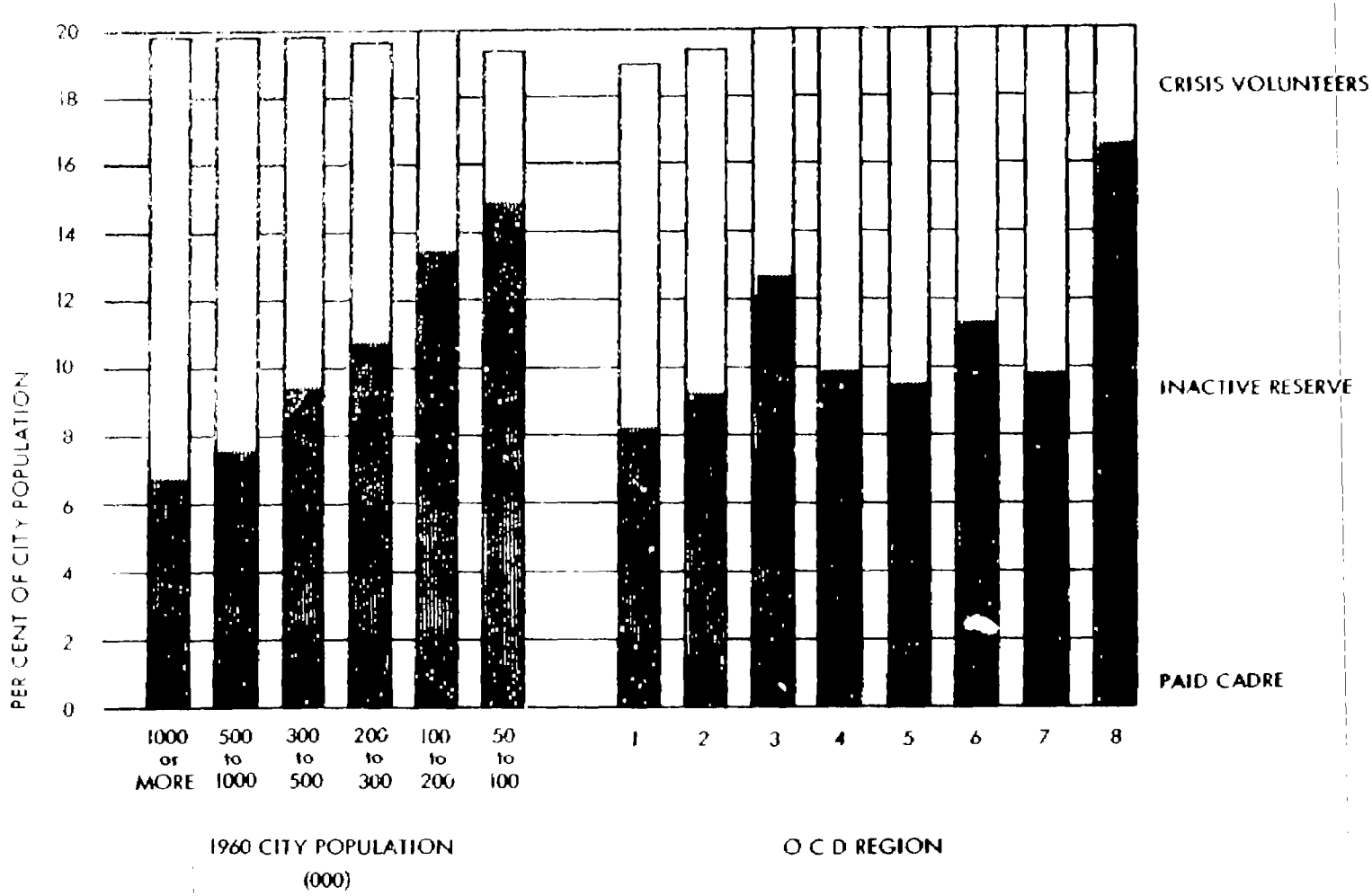
The large proportional increase in the Inactive Reserve with decreasing city size results primarily from the fraternal associations. As shown on Figure 4, CD volunteers are considerably less than the OCD desired ratio of approximately 1.6% for each city. Construction workers are fairly constant at around 2%. The fraternal associations have a ratio of members to total population four times larger (8% vs 2%) in the cities of less than 100,000 than in the cities over 1,000,000. Service clubs, veterans organizations and BSA Explorers also follow the fraternal association trends. The data for Explorers is misleading for cities in the 100,000 to 200,000 size and for Region 7 because of the unusually high affiliation of young men with Exploring in one of the cities--Salt Lake City.

FIGURE 2

GROSS RESOURCE FOR EMERGENCY RESCUE FORCES

PAID CADRE, INACTIVE RESERVE, AND CRISIS VOLUNTEERS

MEAN VALUES FOR 40 SELECTED CITIES



NOTE: Crisis volunteers were added to give each city a gross resource of 20%

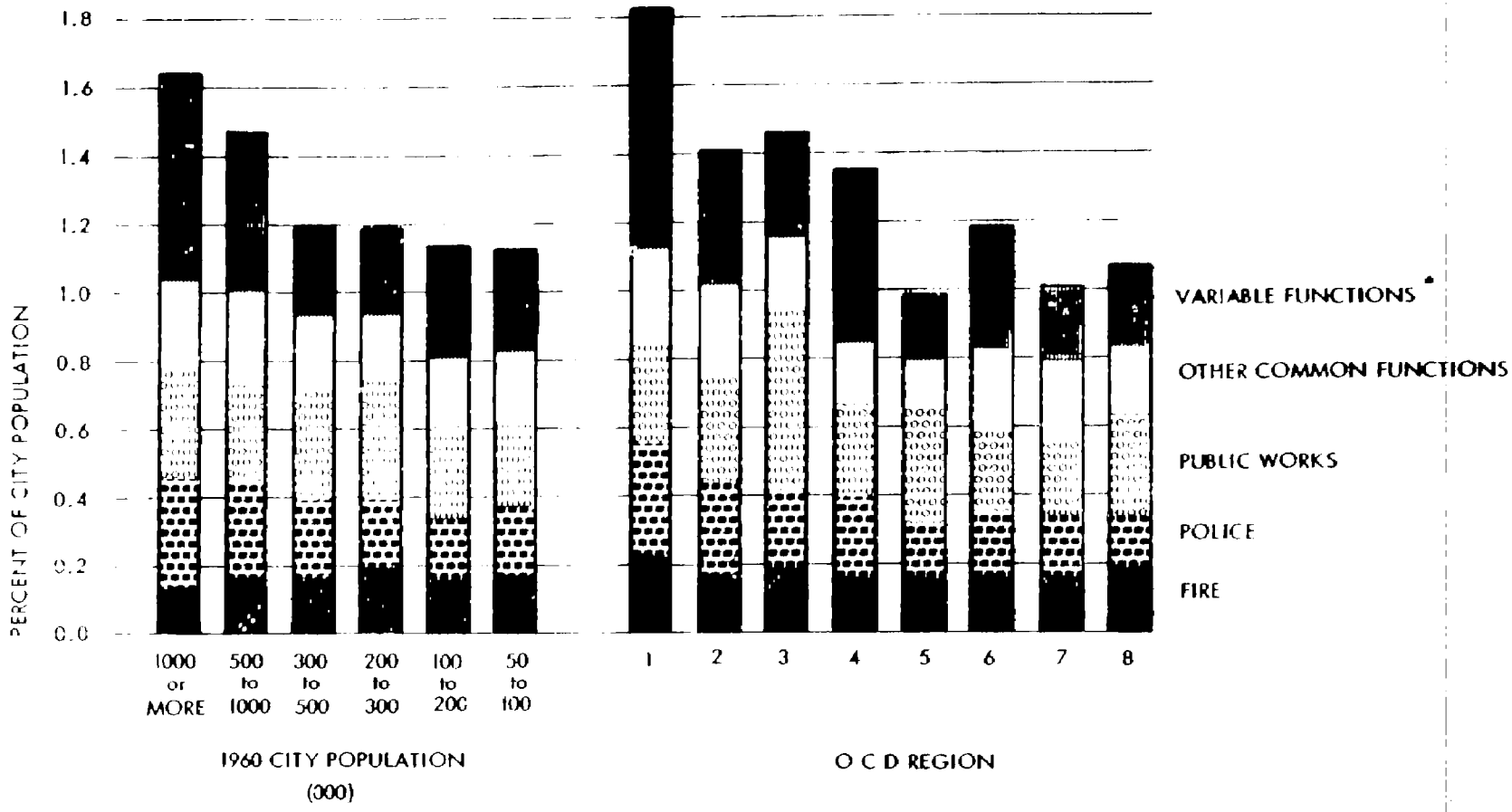
SOURCE: TABLE 3

FIGURE 3

RESOURCES FOR EMERGENCY RESCUE FORCES

PAID CADRE (MUNICIPAL GOVERNMENT EMPLOYEES)

MEAN VALUES FOR 40 SELECTED CITIES



*NOTE: Education is excluded.

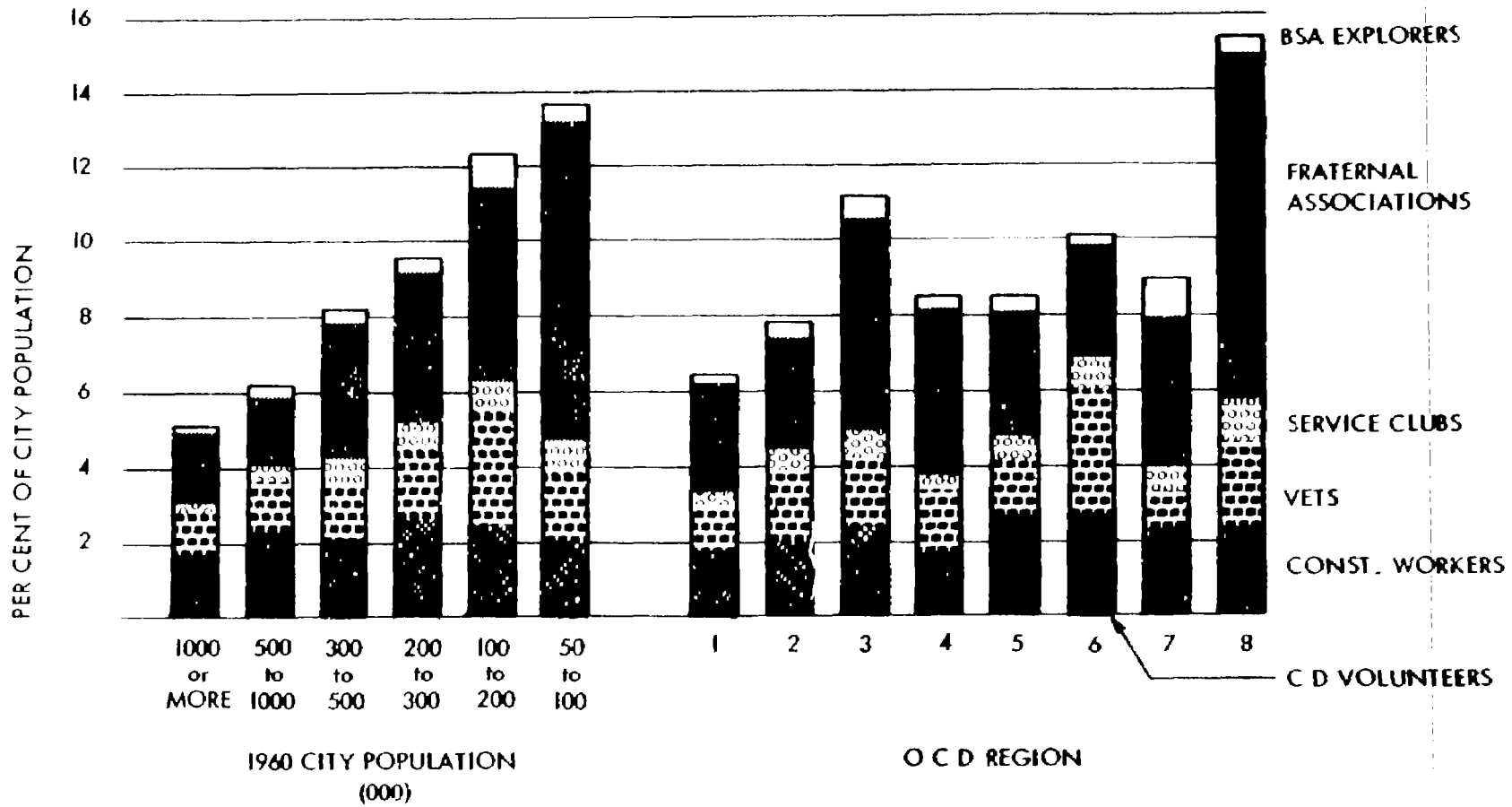
SOURCE: TABLE 3

FIGURE 4

RESOURCES FOR EMERGENCY RESCUE FORCES

INACTIVE RESERVE

MEAN VALUES FOR 40 SELECTED CITIES

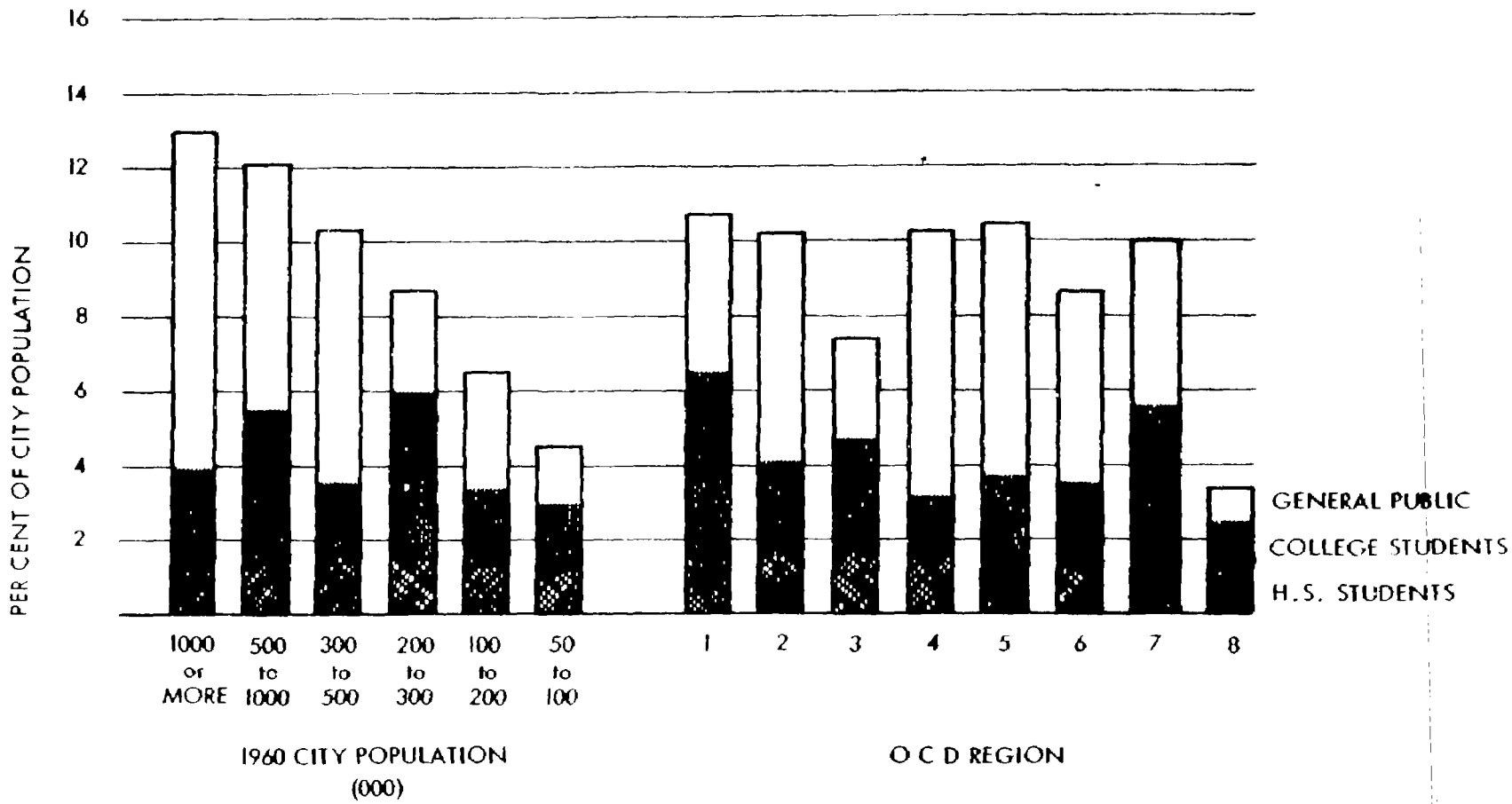


SOURCE: TABLE 3

FIGURE 5

RESOURCES FOR EMERGENCY RESCUE FORCES
CRISIS VOLUNTEERS

MEAN VALUES FOR 40 SELECTED CITIES



SOURCE: TABLE 3

The considerable variation in the ratio of college students shown on Figure 5 is a reflection of the small sample rather than the potential resource. The available high school students (11th and 12th grades) are reasonably constant throughout the land. The total high school resource shown in the two smaller city classifications and in Regions 3, 6, and 8 is less because of the reduced requirement for Crisis Volunteers in six cities (Charleston, Great Falls, San Jose, Palo Alto, Tacoma, and Lincoln) within these categories.

Findings

Significant findings from this investigation of organizations in selected cities are as follows:

1. The organizations examined in this review appear to have the potential manpower for an emergency rescue force. Twenty percent of the city's population is postulated as the gross potential resource for the rescue force. Duplicate counting of some and unavailability of others would decrease this total to a net considerably below this number--to 10% or perhaps less. The municipal employees could probably provide an escalation base equal to 0.5% to 1% of the population. Various community groups could provide approximately half of the force--less in the larger cities and more in the smaller cities. Students and other crisis volunteers would furnish the remainder of the force in inverse proportion to the reserve component.

2. The service/fraternal organizations selected as manpower sources for the Inactive Reserve are significantly stronger, proportionately, in cities from 50,000 to 200,000 people. Some of these cities could, apparently, build a rescue force without depending on Crisis Volunteers.

3. The larger cities would need more or different organizations in addition to those enumerated herein to supply manpower for the Inactive Reserve.

4. The municipal employees in each city are the logical choice for the peacetime component of the Emergency Rescue Force--the Paid Cadre. This cadre would direct the functional activities of life-saving during the critical period following the attack. At a later period, the more highly skilled of this group would engage in rescue from debris, if required.

Further Investigation

A more reasonable organizational basis for the Inactive Reserve component of the Emergency Rescue Force is needed in the larger cities. Within the organizations examined, there is a distinct decrease in the degree of participation in service/fraternal activities in cities with more than 500,000 residents. Most of the membership of these organizations is probably Caucasian. The patterns of social organization for the

large minority populations in the big cities need to be examined to identify reserve member-parent organizations.

Lack of uniform distribution of the rescue force throughout a community is also recognized as a more acute problem in the larger cities. People with the leisure and means to participate in service club.fraternal order activities are more likely to live in the more affluent neighborhoods, whereas the less prosperous areas might have little more than Crisis Volunteers for their rescue force.

The simulated rescue system test with Five City damage analysis data, which is planned later in this study, will provide some insight into the reserve capabilities of San Jose. Similar analysis of Detroit and New Orleans (two more of the Five Cities) would show, generally, where the potential reservists live. This data will provide the basis for a more realistic appraisal of the Inactive Reserve capabilities of the big cities.

Appendix A

EMERGENCY RESCUE FORCE COMPONENT RESOURCE DATA

This appendix consists of the Emergency Rescue Force manpower resource data which was compiled during March, April and May of 1966 for 40 cities with more than 50,000 inhabitants. The cities were selected to give a cross-section of manpower resource potential existing within cities of various sizes and from each OCD region.

Three separate data tabulations are provided for each rescue force component. Tables A-1 through A-3 list the number of persons in each city within each component group.

In Tables A-4 through A-6, the component group totals for each city are converted to number per 10,000 inhabitants and the cities are classified in six divisions: 50,000 to 99,999; 100,000 to 199,999; 200,000 to 299,999; 300,000 to 499,999; 500,000 to 999,999; and 1,000,000 or more. The arithmetic mean of each group is provided as a basis for comparing the size divisions.

Tables A-7 through A-9 rearrange the cities by OCD regions, 1 through 8, and provide mean values for each component group.

Data Collection

The data source for each component group is described as follows.

Paid Cadre (Municipal Employees)

Source: City Employment in 1965, U.S. Department of Commerce, Bureau of the Census, GE-No. 1, February 1966, pp. 5-14.

The city employees listed under the education function were omitted from the total of city employees in the summary graphs for the 40 selected cities, since there were only one or two cities in each population group that included education employees. Thus, an average for this function would be meaningless.

Inactive Reserve

CD Volunteers. Source: Individual Program Papers (OCD Form 744A) submitted to OCD during the last half of 1965.

The figures for the CD fireman volunteers, CD police volunteers, and CD rescue personnel were totalled for each city and then averaged for the city group.

Construction Workers. Source: City and County Data Book, U.S. Department of Commerce, 1962, Table 6, pp. 476-575.

Veterans Organizations

The following veterans organizations were contacted:

American Legion

American Veterans WW II and Korea (AmVets)

Veterans of Foreign Wars (VFW)

Catholic War Veterans, Inc.

Jewish War Veterans of USA

Complete figures for all cities over 50,000 were received from the AmVets and VFW. The American Legion forwarded subscription totals for the American Legion Magazine, which is sent to all Legion members, and included the number of subscribers in each city. Catholic and Jewish veteran memberships were obtained only on a regional basis. Since both of these are relatively small (each was less than 50,000 in 1965), they were omitted from the totals.

Service Clubs. Source: Encyclopedia of Associations, 4th Edition, Volume I, National Organizations of the United States, Gale Research Company, Book Tower, Detroit 26, Michigan, 1964.

The service clubs have a membership which is already involved in civic affairs as a primary function and might provide organized leadership for

developing interest in Civil Defense rescue work training groups as well as service during an emergency period. The five service clubs with the highest national membership were selected for enumeration. They are as follows:

Lions International	600,000
Rotary International	526,500
Kiwanis International	262,000
Junior Chamber of Commerce	230,000
Optimist International	75,000
National total	1,893,500

The distribution of service club members was obtained from local and national offices of the respective organizations. We agreed that individual service club membership totals in each city would not be released.

Fraternal Association. Source: Enclyclopedia of Associations, 4th Edition, Volume I, National Organizations of the United States, Gale Research Company, Book Tower, Detroit 26, Michigan, 1964.

The nine fraternal associations with the highest national membership were selected for enumeration. One major association did not respond. The organizations which provided data are as follows:

Order of Elks	1,294,000
Knights of Columbus	1,143,809
Order of Moose	1,020,429
Masonic Lodges	993,786
Order of Eagles	825,000
Modern Woodmen of America	460,000
Maccabees	263 841
Knights of Pythias	250,000
National total	6,250,865

The distribution of the fraternal association membership was obtained from the national headquarters for each association except for the Masons and the Knights of Pythias. For these two orders, it was necessary to contact the Grand Lodges in each state. The form letter used in contacting the Grand Lodges is included as Exhibit 1. Individual city totals of each fraternal association are also private data and consequently are not shown separately. Knights of Pythias membership distribution was received from 35 of the 46 eligible states. (All cities in Alaska, Idaho, North Dakota, and Wyoming had less than 50,000 inhabitants in 1960.) Masonic membership data were received from 29 Grand Lodge secretaries. Lack of information is indicated by a blank space.

BSA Explorers. Source: 55th Annual Report to Congress of Boy Scouts of America, 1964, 89th Congress, 1st Session, House Document No. 116.

The figures for membership in this organization for the larger cities may be a little low because in some cases the total listed under the name of a suburban city may actually be the total for a metropolitan area. For instance, the Oakland total in the report includes San Francisco and several other communities which make up the Bay Area Boy Scout District.

Crisis Volunteers

In this analysis, the Crisis Volunteers are considered to come from three sources: 11th and 12th grade male high school students, male college students, and others (general public). Student sources are described as follows:

High School Students. Sources: City and County Data Book (cf. above). Fall 1965 Statistics of Public Schools, Office of Health, Education, and Welfare, O.E. 20007-65, Table 5, p. 15; also Table 10, p. 22. Projections of Educational Statistics to 1974-75, 1965 Edition, U.S. Department of Education, O.E. 10030-65, Table 2, p. 5.

From the above references, it was found that the proportion of high school students in the 11th and 12th grades was 45%; that there had been a 31% increase in high school students from 1960 to 1966; and that the male students were very nearly half of all high school students. Therefore, the total numbers of male students in the 11th and 12th grades for 1966 for each city were found according to the following relationship:

$$0.45 \times 1.31 \times 0.5 = 0.295$$

$$= 0.3$$

1960 Census total x 0.3 = number of male students in 11th and 12th grades in 1966.

College Students. Sources: Opening Fall Enrollment in Higher Education, U.S. Department of Health, Education and Welfare, O.E. 54003-65, Circular No. 796, U.S. Government Printing Office, Washington, 1966. 1964-65 Education Directory, Part 3, Higher Education, U.S. Department of Health, Education and Welfare, O.E. 50000-65, U.S. Government Printing Office, Washington, 1965.

The total of college students in each city was found by listing all institutions of higher education in that city as shown in the 1965 Education Directory and then finding the total number of male students in Opening Fall Enrollment in Higher Education. It was decided not to use 1960 Census figures since they represent where the college student slept when the Census was taken, rather than where he attended college. For rescue training purposes and organization, it seemed more logical to locate them by school.

STANFORD RESEARCH INSTITUTE

MENLO PARK, CALIFORNIA

March 30, 1966

EXHIBIT 1

Stanford Research Institute is gathering information on manpower resources that would be available to large cities (50,000 inhabitants or more) during the emergency period following a major natural disaster or the unlikely occurrence of a nuclear attack. We believe that many of the men of your organization are well suited, if they should so choose, to be of service to their community during such an emergency by assisting in general life-saving activities such as first aid, releasing persons trapped in debris, or directing people away from areas of known danger. If you think that it is likely your members would participate in such activities, upon the request of the local Civil Defense Director, then I would like to know, roughly, the total male membership of your organization in each city listed below.

The information you choose to provide will be held in strictest confidence. Individual organization totals will not appear in any resulting documentation; only the totals for similar groups, i.e., service organizations, will be given for each city.

This data would be most useful if it were returned prior to April 15th. To simplify your task, I suggest that you write your totals opposite the cities shown on this letter and mail it back to me. If you have any questions, please call me collect at (415) 326-6200, extension 3397. We shall be grateful for your assistance.

Very truly yours,

L. G. Thomas

L. G. Thomas, Operations Analyst
Logistic Systems Research

Cities:

Table A-1

PAID CADRE RESOURCE

Municipal Full-Time Employees: October 1965

City and State	Fire	Police	Public Works[1]	Other Common Functions[2]	Variable Functions: Education[3]	Variable Functions: All Other[4]	Total Employees
Albuquerque, N.M.	333	374	605	337		448	2,097
Allentown, Pa.	160	175	320	187		22	864
Atlanta, Georgia	778	870	2,763	994		400	5,805
Baltimore, Maryland	2,153	4,060	3,295	3,109	10,611	6,700	29,928
Boston, Massachusetts	1,994	2,700	1,488	2,782	5,623	6,444	21,031
Charleston, South Carolina	126	159	338	159		66	848
Chicago, Illinois	4,602	11,729	10,573	4,884		6,640	38,428
Denver, Colorado	655	1,032	1,653	1,741		2,323	7,404
Des Moines, Iowa	347	287	714	314		291	1,953
Detroit, Michigan	1,870	4,868	5,372	4,099		8,879	25,088
Fort Smith, Arkansas	93	97	171	43		57	461
Fort Wayne, Indiana	262	282	402	288		375	1,609
Great Falls, Montana	70	70	140	107		59	446
Houston, Texas	1,292	1,575	3,074	1,002		2,484	9,427
Independence, Missouri	113	86	126	114		112	551
Lincoln, Nebraska	184	168	173	259		448	1,232
Los Angeles, California	3,554	6,420	9,177	6,109		12,408	35,323

Table A-1 (Continued)

City and State	Fire	Police	Public Works[1]	Other Common Functions[2]	Variable Functions: Education[3]	Variable Functions: All Other[4]	Total Employees
Miami, Florida	697	903	1,393	756		355	4,104
Milwaukee, Wisconsin	1,102	2,055	1,847	1,164		3,005	9,173
New Britain, Connecticut	156	161	226	125	780	101	1,549
New Orleans, Louisiana	954	1,191	2,630	1,689	135	2,156	8,755
New York, New York	13,779	28,977	25,636	27,031	73,632	117,037	286,092
Newark, New Jersey	1,062	1,657	1,150	962	6,426	2,593	13,850
Oakland, California	674	793	451	985		586	3,389
Oklahoma City, Oklahoma	425	405	995	433		352	2,610
Palo Alto, California	88	82	46	234		163	613
Philadelphia, Pennsylvania	2,822	6,756	5,726	7,891		6,585	29,840
Pontiac, Michigan	148	136	197	145		980	1,607
Portland, Oregon	716	857	1,150	915		547	4,185
Providence, Rhode Island	512	541	706	473		751	4,822
Richmond, Virginia	389	457	845	642	3,209	1,502	7,044
St. Louis, Missouri	1,281	2,648	1,393	2,032		5,184	12,538
St. Petersburg, Florida	289	328	704	563		1,694	3,578
Salt Lake City, Utah	242	366	582	337		111	1,638
San Diego, California	510	890	1,099	991		765	4,255
San Jose, California	360	378	545	372		310	1,965

Table A-1 (Continued)

City and State	Fire	Police	Public Works[1]	Other Common Functions[2]	Variable Functions: Education[3]	Variable Functions: All Other[4]	Total Employees
Spokane, Washington	295	256	503	201		221	1,476
Tacoma, Washington	294	240	547	315		929	2,325
Toledo, Ohio	517	650	814	120	703	755	3,793
Tulsa, Oklahoma	421	342	868	211		219	2,061

Source: U.S. Census, GE-No. 1, City Employment in 1965, Table 3.

(1) Sewerage, sanitation other than sewerage, highways, and water supply.

(2) Parks and recreation, libraries, financial administration, general control.

(3) City operated schools and colleges.

(4) Public welfare, hospitals, health, housing and urban renewal, airports, water transport and terminals, correction, electric power, gas supply, transit utilities, and "other unallocable."

Table A-2

INACTIVE RESERVE RESOURCE

City and State	CD[1] Volunteers	Construction[2] Workers	Veterans[3] Organizations	Service[4] Clubs	Fraternal[5] Associations	BSA[6] Explorers	Total
Albuquerque, N.M.	1,050	6,293	5,883	1,522	10,313	1,187	26,248
Allentown, Pa.	107	2,217	2,759	1,100	3,674	550	10,407
Atlanta, Georgia	866	11,200	4,005	2,884	21,097	2,451	42,503
Baltimore, Maryland	1,853	18,083	13,998	1,932	7,857	2,140	45,863
Boston, Massachusetts	1,430	12,390	9,106	1,324	4,050	944	29,244
Charleston, S.C.	60	1,334	805	542	8,908 (9,226)	703	12,352 (12,670)
Chicago, Illinois	1,600	57,025	53,718	6,025	50,645	5,395	174,409
Denver, Colorado	1,258	10,543	9,511	2,941	9,179	1,182	34,614
Des Moines, Iowa	175	4,327	5,915	1,400	6,127	1,016	18,960
Detroit, Michigan	5,263	20,237	20,577	2,717	48,988	3,618	101,400
Fort Smith, Arkansas	69	904	510	472	4,884	250	7,089
Fort Wayne, Indiana	89	2,911	4,675	906	6,022	728	15,331
Great Falls, Montana	30	1,565	1,780	777	6,148 (6,965)	254	10,554 (11,371)
Houston, Texas	1,313	25,604	7,626	3,615	9,680	3,957	51,795
Independence, Missouri	248	1,538	1,664	523	1,451	0*	5,424
Lincoln, Nebraska	90	3,828	9,225	1,535	8,902 (12,212)	388	23,968 (27,278)
Los Angeles, California	695	47,262	12,906	6,096	38,826	4,590	110,375

*Explorers in Independence, Missouri included in Kansas City, Missouri Council.

Table A-2 (Continued)

City and State	CD[1] Volunteers	Construction[2] Workers	Veterans[3] Organizations	Service[4] Clubs	Fraternal[5] Associations	BSA[6] Explorers	Total
Miami, Florida	27	7,081	5,323	2,440	9,832	995	25,698
Milwaukee, Wisconsin	150	11,737	15,567	1,500	30,969	1,666	61,589
New Britain, Connecticut	127	1,306	1,209	289	3,837	156	6,924
New Orleans, Louisiana	1,045	13,189	7,117	1,376	15,384	869	38,980
New York, New York	5,962	124,337	43,475	3,097	200,355	5,577	382,803
Newark, New Jersey	640	6,216	3,846	982	12,482	316	24,482
Oakland, California	340	7,364	2,904	1,525	13,966	328	28,427
Oklahoma City, Oklahoma	236	8,708	5,968	2,257	2,998	1,324	21,491
Palo Alto, California	32	907	611	584	4,774	397	7,305
Philadelphia, Pennsylvania	595	33,257	37,497	3,212	32,586	1,462	108,609
Pontiac, Michigan	30	860	1,250	565	8,078	405	11,188
Portland, Oregon	--	7,398	7,489	3,347	29,370	2,391	49,995
Providence, Rhode Island	220	3,495	4,137	748	8,401	559	17,560
Richmond, Virginia	--	5,271	2,760	1,667	13,839	700	24,237
St. Louis, Missouri	13,500	10,228	15,185	2,644	8,640	3,877	54,074
St. Petersburg, Florida	32	5,274	5,507	1,219	2,941	348	15,321
Salt Lake City, Utah	245	4,278	2,109	4,594	1,521	7,520	20,267
San Diego, California	839	12,110	6,874	2,824	13,880	1,794	1,794
San Jose, California	1,176	6,124	1,847	1,459	9,513	821	20,940
Spokane, Washington	708	4,008	3,711	1,305	14,256	655	24,643
Tacoma, Washington	123	5,808	3,026	1,202	15,294	574	23,457

Table A-2 (Continued)

City and State	CD[1] Volunteers	Construction[2] Workers	Veterans[3] Organizations	Service[4] Clubs	Fraternal[5] Associations	BSA[6] Explorers	Total
Toledo, Ohio	1,059	4,631	7,323	1,416	10,232	1,250	25,902
Tulsa, Oklahoma	721	5,808	4,026	1,509	4,391	833	17,288

(1) 1965 Progress Reports, OCD Form 744-A.

(2) County and City Data Book, U.S. Census, 1962, Table 6.

(3) American Legion, Veterans of Foreign Wars, American Veterans of WW II, and Korea.

(4) Rotary, Lions, Optimist, Kiwanis, Junior Chamber of Commerce.

(5) Modern Woodmen of America, Knights of Pythias, Masons, Knights of Columbus, Order of Elks, Order of Eagles, Order of Moose, Maccabees.

(6) 55th Annual Report to Congress, Boy Scouts of America, 1964, 89th Congress - 1st Session, House Document No. 116.

Table A-3

CRISIS VOLUNTEERS RESOURCE

City and State	High School Students[1] (11th & 12th Grades)	College[2] Students	General[3] Public	Total Crisis Volume
Albuquerque, N.M.	3,517	8,279	59	11,855
Allentwon, Pa.	1,465	1,204	7,660	10,329
Atlanta, Georgia	7,589	18,684	22,819	49,092
Baltimore, Maryland	13,219	25,235	73,555	112,009
Boston, Massachusetts	9,998	78,020	1,107	89,125
Charleston, South Carolina	(1,137)	(2,765)	--	(3,902)
Chicago, Illinois	48,977	67,124	381,062	497,163
Denver, Colorado	7,040	6,362	43,380	56,782
Des Moines, Iowa	2,973	5,364	12,550	20,887
Detroit, Michigan	27,229	27,353	152,930	207,512
Fort Smith, Arkansas	997	1,093	960	3,050
Fort Wayne, Indiana	2,447	2,727	10,286	15,460
Great Falls, Montana	(825)	(455)	--	(1,280)
Houston, Texas	12,878	20,472	93,028	126,378
Independence, Missouri	911	3,352	2,162	6,425
Lincoln, Nebraska	(1,966)	(12,218)	--	(14,184)
Los Angeles, California	38,224	90,116	221,762	350,102
Miami, Florida	3,720	17,947	6,931	28,598

Table A-3 (Continued)

City and State	High School Students[1] (11th & 12th Grades)	College[2] Students	General[3] Public	Total Crisis Volume
Milwaukee, Wisconsin	10,450	24,390	42,589	77,438
New Britain, Connecticut	1,256	3,423	3,248	7,927
New Orleans, Louisiana	8,828	13,092	55,945	77,865
New York, New York	116,355	168,601	602,549	887,505
Newark, New Jersey	5,779	8,965	27,924	42,668
Oakland, California	5,295	4,812	31,677	41,784
Oklahoma City, Oklahoma	4,827	2,161	33,711	40,699
Palo Alto, California	985	1,487 (8,601)	--	2,472 (9,536)
Philadelphia, Pennsylvania	30,946	59,199	172,006	262,151
Pontiac, Michigan	1,130	--	2,475	3,605
Portland, Oregon	6,048	10,621	3,751	20,420
Providence, Rhode Island	3,011	11,431	4,576	19,018
Richmond, Virginia	2,851	9,543	325	12,719
St. Louis, Missouri	9,067	26,403	47,918	83,388
St. Petersburg, Florida	2,159	5,436	9,706	17,301
Salt Lake City, Utah	3,299	11,995	601	15,895
San Diego, California	8,708	22,552	40,764	72,024
San Jose, California	3,059	14,836 (19,354)	--	17,895 (22,413)

Table A-3 (continued)

City and State	High School Students[1] (11th & 12th Grades)	College[2] Students	General[3] Public	Total Crisis Volume
Spokane, Washington	3,132	2,450	4,699	10,281
Tacoma, Washington	2,468	1,350 (2,763)	--	3,818 (5,231)
Toledo, Ohio	4,683	7,327	21,895	33,905
Tulsa, Oklahoma	4,150	4,507	24,394	33,051

(1) City and County Data Book, U.S. Census, 1962, Table 6.

(2) Opening Fall Enrollment in Higher Education, U.S. Office of Education, No. 54003-65, 1966.

(3) This figure was used to adjust the total emergency rescue force to 20% of the 1960 population.

( ) Available resource, but not required to reach 20% of city population.

Table A-4

RESOURCE DISTRIBUTION BY CITY SIZE
PAID CADRE
NUMBER PER 10,000 POPULATION

City and State	Fire	Police	Public Works	Other Common Functions	Variable Functions: Education	Variable Functions: All Other	Total Employees	Total Employees Less Education
1,000,000 or more								
New York City, N.Y.	17.6	37.2	33.0	34.7	94.6	150.4	367.5	272.9
Chicago, Ill.	12.9	33.0	29.8	13.8		18.7	108.2	
Los Angeles, Calif.	14.2	25.7	36.7	15.1		49.6	141.3	
Philadelphia, Penn.	14.4	33.8	28.6	39.5		32.9	149.2	
Detroit, Mich.	11.2	29.1	32.2	24.5		53.2	150.2	
Mean	14.1	31.8	32.1	25.5	--	61.0	183.3	164.5
500,000 to 999,999								
Baltimore, Md.	22.9	43.2	35.1	33.1	113.0	71.4	318.7	205.7
St. Louis, Mo.	17.1	35.3	18.6	27.1		69.1	167.2	
Milwaukee, Wis.	14.9	27.7	24.9	15.7		40.6	123.8	
Boston, Mass.	28.6	38.7	21.3	39.9	80.7	92.5	301.7	221.0
New Orleans, La.	15.2	18.9	41.9	26.9	2.1	34.3	139.3	137.2
San Diego, Calif.	8.7	15.1	18.7	16.8		13.0	72.3	
Houston, Tex.	13.8	16.8	32.8	10.7		26.5	100.6	
Mean	17.3	28.0	27.6	24.3	--	49.6	174.8	146.8
300,000 to 499,999								
Denver, Colo.	13.2	20.8	33.4	35.2		46.9	149.6	
Atlanta, Georgia	16.0	17.8	56.7	20.4		8.2	119.1	
Newark, N.J.	26.2	40.9	28.4	23.8	158.7	64.0	342.0	183.3
Portland, Oregon	19.2	23.0	30.8	24.5		14.7	112.2	
Oakland, Calif.	18.2	21.4	12.2	23.9		15.8	91.5	
Oklahoma City, Okla.	13.1	12.5	30.7	13.4		10.9	80.6	
Toledo, Ohio	16.3	20.4	25.6	11.1	22.1	23.7	119.2	97.1
Mean	17.5	22.4	31.1	21.8	--	26.3	144.9	119.1

Table A-4 (continued)

City and State	Fire	Police	Public Works	Other Common Functions	Variable Functions: Education	Variable Functions: All Other	Total Employees	Total Employees Less Education
200,000 to 299,999								
Miami, Fla.	23.7	30.7	47.4	25.7		12.1	139.6	
Tulsa, Okla.	16.1	13.1	33.1	8.1		8.4	78.8	
Richmond, Virginia	17.7	20.8	38.4	29.2	145.9	68.3	320.3	174.4
Des Moines, Iowa	16.6	13.7	34.2	15.0		13.9	93.4	
Providence, R.I.	24.7	26.1	34.1	22.9	88.8	36.3	232.9	144.1
San Jose, Calif.	17.6	18.5	26.7	18.2		15.2	96.3	
Albuquerque, N.M.	16.6	18.6	30.1	16.8		22.3	104.4	
Mean	19.0	20.2	34.9	19.4		25.2	152.2	118.7
100,000 to 199,999								
Salt Lake City, Utah	12.8	19.4	30.8	17.8		5.7	86.5	
Spokane, Wash.	16.2	14.1	27.6	11.0		12.1	81.0	
St. Petersburg, Fla.	15.9	18.0	38.7	31.0		93.2	196.8	
Fort Wayne, Ind.	16.0	17.2	24.5	17.6		22.9	98.2	
Lincoln, Neb.	14.3	13.0	13.5	20.2		34.9	95.9	
Allentown, Penn.	14.8	16.2	29.6	17.3		2.0	79.9	
Tacoma, Wash.	20.0	16.2	37.0	21.3		62.8	157.3	
Mean	15.7	16.3	28.8	19.5		33.4	113.7	
50,000 to 99,999								
New Britain, Conn.	18.9	19.5	27.3	15.1	94.4	12.2	187.4	93.0
Pontiac, Mich.	18.0	16.6	24.1	17.7		119.5	195.9	
Charleston, S.C.	19.1	24.1	51.2	24.1		10.0	128.5	
Independence, Mo.	18.1	13.8	20.2	18.2		18.1	88.4	
Great Falls, Mont.	12.7	12.7	25.4	19.4		10.7	80.9	
Fort Smith, Ark.	17.5	18.3	32.3	8.1		10.8	87.0	
Palo Alto, Calif.	16.8	15.7	8.8	44.7		31.1	117.1	
Mean	17.3	17.2	27.0	21.0		30.3	126.5	112.8

Table A-5

RESOURCE DISTRIBUTION BY CITY SIZE
INACTIVE RESERVE*

NUMBER PER 10,000 POPULATION

City and State	CD Volunteers	Construction Workers	Veterans Organizations	Service Clubs	Fraternal Associations	BSA Explorers	Total
1,000,000 or more							
New York City, N.Y.	7.7	159.8	55.8	4.0	257.4	7.2	491.9
Chicago, Ill.	4.6	160.6	151.3	17.0	142.6	15.2	491.3
Los Angeles, Calif.	2.8	190.6	52.0	24.6	156.6	18.5	445.1
Philadelphia, Penn.	2.9	166.0	187.2	16.1	162.6	7.3	542.1
Detroit, Mich.	31.[illegible]	121.2	123.2	16.3	293.3	21.7	607.2
Mean	9.9	159.6	113.9	15.6	202.5	14.0	515.5
500,000 to 999,999							
Baltimore, Md.	19.3	192.6	148.9	20.6	83.6	22.8	487.8
St. Louis, Mo.	180.0	136.4	202.4	35.3	115.2	51.7	721.0
Milwaukee, Wis.	2.0	158.6	210.4	20.3	438.2	22.5	852.0
Boston, Mass.	20.5	177.7	130.6	18.9	58.1	13.5	419.3
New Orleans, La.	16.6	210.1	113.3	21.9	244.9	13.8	620.6
San Diego, Calif.	14.6	211.3	119.9	49.2	241.8	31.3	668.1
Houston, Tex.	13.9	272.4	81.1	38.5	103.0	42.1	551.0
Mean	38.1	194.2	143.8	29.2	183.5	28.2	617.1
300,000 to 499,999							
Denver, Colo.	25.5	213.4	192.5	59.5	185.8	23.9	700.6
Atlanta, Georgia	17.8	230.0	82.2	59.2	433.2	50.3	872.7
Newark, N.J.	15.7	153.5	94.9	24.2	308.1	7.8	604.2
Portland, Oregon	--	198.3	200.7	89.7	787.3	64.1	1,340.1
Oakland, Calif.	9.2	200.1	78.9	41.4	433.8	8.9	772.3
Oklahoma City, Okla.	7.3	268.8	184.1	69.6	92.5	40.9	663.2
Toledo, Ohio	33.0	145.6	230.2	44.5	321.7	39.3	814.5
Mean	15.5	201.4	151.9	55.4	366.1	33.6	823.9

*Was Inactive Standby Reserve.

Table A-5 (Continued)

City and State	CD Volunteers	Construction Workers	Veterans Organizations	Service Clubs	Fraternal Associations	BSA Explorers	Total
200,000 to 299,999							
Miami, Fla.	.9	242.5	182.3	83.6	336.7	34.1	880.1
Tulsa, Okla.	27.5	221.7	153.7	57.6	167.6	31.8	659.9
Richmond, Virginia	--	239.6	125.4	75.8	629.0	31.8	1,101.6
Des Moines, Iowa	8.4	207.0	283.0	67.0	293.2	48.6	907.2
Providence, R.I.	10.6	168.8	199.9	36.1	405.8	27.0	848.2
San Jose, Calif.	57.6	300.2	90.5	71.5	466.3	40.2	1,026.3
Albuquerque, N.M.	52.2	313.1	292.7	75.7	513.1	59.1	1,305.9
Mean	22.5	241.8	189.6	66.8	401.7	38.9	961.3
100,000 to 199,999							
Salt Lake City, Utah	13.0	226.3	111.6	80.5	243.1	397.9	1,072.4
Spokane, Wash.	38.9	220.2	203.9	71.7	783.3	36.0	1,354.0
St. Petersburg, Fla.	1.8	291.4	304.3	67.3	162.5	19.2	846.5
Fort Wayne, Ind.	5.4	179.7	288.6	55.9	371.7	44.9	946.2
Lincoln, Neb.	7.1	303.8	732.1	121.8	706.0	30.8	1,901.6
Allentown, Penn.	9.9	205.3	255.5	101.9	340.2	50.9	963.7
Tacoma, Wash.	8.3	218.8	204.5	81.2	1,033.0	38.8	1,584.6
Mean	12.1	235.1	300.1	82.9	520.0	88.4	1,238.2
50,000 to 99,999							
New Britain, Conn.	15.5	159.3	147.4	35.2	467.9	19.0	844.3
Pontiac, Mich.	3.7	104.9	152.4	68.9	985.1	49.4	1,364.4
Charleston, S.C.	9.1	202.1	122.0	82.1	1,350.0	106.5	1,875.0
Independence, Mo.	40.0	248.1	268.4	84.4	234.0	--	874.8
Great Falls, Mont.	5.5	284.5	323.6	141.3	1,120.0	46.2	1,920.0
Fort Smith, Ark.	13.0	170.6	96.2	89.0	921.5	47.2	1,337.5
Palo Alto, Calif.	6.1	174.4	117.5	112.3	918.1	76.3	1,404.7
Mean	13.3	192.0	175.4	87.6	856.6	49.2	1,374.4

Table A-6

RESOURCE DISTRIBUTION BY CITY SIZE

CRISIS VOLUNTEERS

NUMBER PER 10,000 POPULATION

City and State	High School Students (11th & 12th)	College Students	General Public	Total
1,000,000 or More				
New York City, N.Y.	150.0	216.7	774.2	1,140.4
Chicago, Ill.	138.0	189.1	1,073.4	1,400.4
Los Angeles, Calif.	154.2	363.4	894.5	1,412.2
Philadelphia, Penn.	154.5	295.5	858.7	1,308.7
Detroit, Mich.	163.0	163.8	915.7	1,242.6
Mean	151.9	245.7	903.3	1,300.9
500,000 to 999,999				
Baltimore, Md.	140.8	268.7	783.3	1,192.8
St. Louis, Mo.	120.9	352.0	638.9	1,111.8
Milwaukee, Wis.	141.0	329.1	575.5	1,045.0
Boston, Mass.	143.4	1,119.3	15.8	1,278.6
New Orleans, La.	140.6	208.4	890.8	1,239.8
San Diego, Calif.	152.0	393.5	711.4	1,256.9
Houston, Texas	137.2	218.2	991.7	1,347.3
Mean	139.4	412.7	658.2	1,210.3
300,000 to 499,999				
Denver, Colo.	142.5	128.8	878.1	1,149.4
Atlanta, Georgia	155.8	383.6	468.5	1,008.0
Newark, N.J.	142.7	221.3	689.4	1,053.5
Portland, Oregon	162.1	284.7	100.5	547.4
Oakland, Calif.	143.9	130.7	860.7	1,135.4
Oklahoma City, Okla.	150.0	66.7	1,040.4	1,256.1
Toledo, Ohio	147.3	231.1	688.5	1,066.1
Mean	149.2	206.7	675.2	1,030.8
200,000 to 299,999				
Miami, Fla.	127.4	614.6	237.3	979.3
Tulsa, Okla.	158.4	172.7	931.0	1,261.4
Richmond, Virginia	129.6	433.7	14.7	578.1
Des Moines, Iowa	142.3	256.6	600.4	999.3
Providence, R.I.	145.4	552.2	221.0	918.7
San Jose, Calif.	149.9	728.0	--	879.9
Albuquerque, N.M.	175.0	411.9	3.0	589.8
Mean	146.9	452.8	286.7	886.4

Table A-6 (Continued)

City and State	High School Students (11th & 12th)	College Students	General Public	Total
100,000 to 199,999				
Salt Lake City, Utah	174.3	634.6	31.7	841.0
Spokane, Wash.	172.1	134.6	258.1	564.8
St. Petersburg, Fla.	119.3	300.3	536.2	955.8
Fort Wayne, Ind.	151.1	168.3	634.9	954.3
Lincoln, Neb.	--	--	--	--
Allentown, Penn.	135.6	111.5	709.2	956.3
Tacoma, Wash.	166.7	80.4	--	247.2
Mean	131.3	204.3	310.0	645.6
50,000 to 99,999				
New Britain, Conn.	153.3	417.4	396.0	966.7
Pontiac, Mich.	137.9	--	301.8	439.6
Charleston, S.C.	--	--	--	--
Independence, Mo.	146.9	540.6	348.7	1,036.2
Great Falls, Mont.	149.9	82.7	--	232.7
Fort Smith, Ark.	--	--	--	--
Palo Alto, Calif.	189.5	286.0	--	475.5
Mean	111.1	189.6	149.5	450.2

Table A-7

RESOURCE DISTRIBUTION BY OCD REGION

PAID CADRE

NUMBER PER 10,000 POPULATION

City and State	Fire	Police	Public Works	Other Common Functions	Variable Functions		Total Employees	Total Employees Less Education
					Education	All Other		
Region 1								
New York City, N.Y.	17.6	37.2	33.0	34.7	94.6	150.4	367.5	272.9
Boston, Mass.	28.6	38.7	21.3	39.9	80.7	92.5	301.7	221.0
Newark, N.J.	26.2	40.9	28.4	23.8	158.7	64.0	342.0	183.3
Providence, R.I.	24.7	26.1	34.1	22.9	98.8	36.3	232.9	144.1
New Britain, Conn.	18.9	19.5	27.3	15.1	94.4	12.2	187.4	93.0
Mean	23.2	32.5	28.8	29.3		71.1	286.3	182.9
Region 2								
Philadelpha, Penn.	14.4	33.8	28.6	39.5		32.9	149.2	149.2
Baltimore, Md.	22.9	43.2	35.1	33.1	113.0	71.4	318.7	205.7
Toledo, Ohio	16.3	20.4	25.6	11.1	22.1	23.7	119.2	97.1
Richmond, Virginia	17.7	20.8	38.4	29.2	145.9	68.3	320.3	174.4
Allentown, Penn.	14.8	16.2	29.6	17.3		2.0	79.9	79.9
Mean	17.2	26.9	31.5	26.0		39.7	197.5	141.3
Region 3								
Atlanta, Georgia	16.0	17.8	56.7	20.4		8.2	119.1	
Miami, Fla.	23.7	30.7	47.4	25.7		12.1	139.6	
St. Petersburgh, Fla.	15.9	18.0	38.7	31.0		93.2	196.8	
Charleston, S.C.	19.1	24.1	51.2	24.1		10.0	128.5	
Mean	18.7	22.7	48.5	25.3		30.9	146.0	

Table A-7 (Continued)

City and State	Fire	Police	Public Works	Other Common Functions	Variable Functions: Education	Variable Functions: All Other	Total Employees	Total Employees Less Education
Region 4								
Chicago, Ill.	12.9	33.0	29.8	13.8		18.7	108.2	
Detroit, Mich.	11.2	29.1	32.2	24.5		53.2	150.2	
Milwaukee, Wis.	14.9	27.7	24.9	15.7		40.6	123.8	
Fort Wayne, Ind.	16.0	17.2	24.5	17.6		22.9	98.2	
Pontiac, Mich.	18.0	16.6	24.1	17.7		119.5	195.9	
Mean	14.6	24.7	27.1	17.9		51.0	135.3	135.3
Region 5								
New Orleans, La.	15.2	18.9	41.9	26.9	2.1	34.3	139.3	137.2
Oklahoma City, Okla.	13.1	12.5	30.7	13.4		10.9	80.6	
Tulsa, Okla.	16.1	13.1	33.1	8.1		8.4	78.8	
Albuquerque, N.M.	16.6	18.6	30.1	16.8		22.3	104.4	
Houston, Tex.	13.8	16.8	32.8	10.7		26.5	100.6	
Fort Smith, Ark.	17.5	18.3	32.3	8.1		10.8	87.0	
Mean	15.4	16.4	33.5	14.0		18.9	98.5	98.2
Region 6								
St. Louis, Mo.	17.1	35.3	18.6	27.1		69.1	167.2	
Denver, Colo.	13.2	20.8	33.4	35.2		46.9	149.6	
Des Moines, Iowa	16.6	13.7	34.2	15.0		13.9	93.4	
Lincoln, Neb.	14.3	13.0	13.5	20.2		34.9	95.9	
Independence, Mo.	18.1	13.8	20.2	18.2		18.1	88.4	
Mean	15.9	19.3	24.0	23.1		36.6	118.9	118.9

Table A-7 (Continued)

City and State	Fire	Police	Public Works	Other Common Functions	Variable Functions: Education	Variable Functions: All Other	Total Employees	Total Employees Less Education
Region 7								
Los Angeles, Calif.	14.2	25.7	36.7	15.1		49.6	141.3	
San Diego, Calif.	8.7	15.1	18.7	16.8		13.0	72.3	
Oakland, Calif.	18.2	21.4	12.2	23.9		15.8	91.5	
San Jose, Calif.	17.6	18.5	26.7	18.2		15.2	96.3	
Salt Lake City, Utah	12.8	19.4	30.8	17.8		5.7	86.5	
Palo Alto, Calif.	16.8	15.7	8.8	44.7		31.1	117.1	
Mean	14.7	19.3	22.3	22.8		21.7	100.8	100.8
Region 8								
Tacoma, Wash.	20.0	16.2	37.0	21.3		62.8	157.3	
Portland, Oregon	19.2	23.0	30.8	24.5		14.7	112.2	
Spokane, Wash.	16.2	14.1	27.6	11.0		12.1	81.0	
Great Falls, Mont.	12.7	12.7	25.4	19.4		10.7	80.9	
Mean	17.0	16.5	30.2	19.1		25.1	107.9	107.9

Table A-8

RESOURCE DISTRIBUTION BY OCD REGION
INACTIVE RESERVE*
NUMBER PER 10,000 POPULATION

City and State	CD Volunteers	Construction Workers	Veterans Organizations	Service Clubs	Fraternal Associations	BSA Explorer	Total
Region 1							
New York City, N.Y.	7.7	159.8	55.8	4.0	257.4	7.2	491.9
Boston, Mass.	20.5	177.7	130.6	18.9	58.1	13.5	419.3
Newark, N.J.	15.7	153.5	94.9	24.2	308.1	7.8	604.2
Providence, R.I.	10.6	168.8	199.9	36.1	405.8	27.0	848.2
New Britain, Conn.	15.5	159.3	147.4	35.2	467.9	19.0	844.3
Mean	14.0	163.8	125.7	23.7	299.5	14.9	641.6
Region 2							
Philadelphia, Penn.	2.9	166.0	187.2	16.1	162.6	7.3	542.1
Baltimore, Md.	19.3	192.6	148.9	20.6	83.6	22.8	487.8
Toledo, Ohio	33.0	145.6	230.2	44.5	321.7	39.3	814.5
Richmond, Virginia	-	239.6	125.4	75.8	629.0	31.8	1101.6
Allentown, Penn.	9.9	205.3	255.5	101.9	340.2	50.9	963.7
Mean	13.0	189.8	189.4	51.8	307.4	30.4	781.9
Region 3							
Atlanta, Georgia	17.8	230.0	82.2	59.2	433.2	50.3	872.7
Miami, Fla.	.9	242.5	182.3	83.6	336.7	34.1	880.1
St. Petersburg, Fla.	1.8	291.4	304.3	67.3	162.5	19.2	846.5
Charleston, S.C.	9.1	202.1	122.0	82.1	1350.0	106.5	1875.0
Mean	7.4	241.5	172.7	73.1	570.6	52.5	1117.8

*Was Standby Reserve.

Table A-8 (Continued)

City and State	CD Volunteers	Construction Workers	Veterans Organizations	Service Clubs	Fraternal Associations	BSA Explorers	Total
Region 4							
Chicago, Ill.	4.6	160.6	151.3	17.0	142.6	15.2	491.3
Detroit, Mich.	31.5	121.2	123.2	16.3	293.3	21.7	607.2
Milwaukee, Wis.	2.0	158.6	210.4	20.3	438.2	22.5	852.0
Fort Wayne, Ind.	5.4	179.7	288.6	55.9	371.7	44.9	946.2
Pontiac, Mich.	3.7	104.9	152.4	68.9	985.1	49.4	1364.4
Mean	9.4	145.9	185.2	35.7	446.2	30.7	852.3
Region 5							
New Orleans, La.	16.6	210.1	113.3	21.9	244.9	13.8	620.6
Oklahoma City, Okla.	7.5	268.8	184.3	69.6	92.5	40.9	663.2
Tulsa, Okla.	27.5	221.7	153.7	57.6	167.6	31.8	659.9
Albuquerque, N.Mex.	52.2	313.1	292.7	75.7	513.1	59.1	1305.9
Houston, Tex.	13.9	272.4	81.1	38.5	103.0	42.1	551.0
Fort Smith, Ark.	13.0	170.6	96.2	89.0	921.5	47.2	1337.5
Mean	21.8	242.8	153.5	58.7	340.4	39.2	856.4
Region 6							
St. Louis, Mo.	180.0	136.4	202.4	35.3	115.2	51.7	721.0
Denver, Colo.	25.5	213.4	192.5	59.5	185.8	23.9	700.6
Des Moines, Iowa	8.4	207.0	283.0	67.0	293.2	48.6	907.2
Lincoln, Nebr.	7.1	303.8	732.1	121.8	706.0	30.8	1900.0
Independence, Mo.	40.0	218.1	268.4	84.4	234.0	-	874.8
Mean	52.2	221.7	335.7	73.6	306.8	31.0	1021.0

Table A-8 (Continued)

City and State	CD Volunteers	Construction Workers	Veterans Organizations	Service Clubs	Fraternal Associations	BSA Explorers	Total
Region 7							
Los Angeles, Calif	2.8	190.6	52.0	24.6	156.6	18.5	445.1
San Diego, Calif.	14.6	211.3	119.9	49.2	241.8	31.3	668.1
Oakland, Calif.	9.2	200.1	78.9	41.4	433.8	8.9	772.3
San Jose, Calif.	57.6	300.2	90.5	71.5	466.3	40.2	1026.3
Salt Lake City, Utah	13.0	226.3	111.6	80.5	243.1	397.9	1072.4
Palo Alto, Calif.	6.1	174.4	117.5	112.3	918.1	76.3	1404.7
Mean	17.2	217.2	95.1	63.3	410.0	95.5	898.1
Region 8							
Tacoma, Wash.	8.3	218.8	204.5	81.2	1033.0	38.8	1584.6
Portland, Ore.	-	198.3	200.7	89.7	787.3	64.1	1340.1
Spokane, Wash.	38.9	220.2	203.9	71.7	783.3	36.0	1354.3
Great Falls, Mont.	5.5	284.5	323.6	141.3	1120.0	46.2	1920.0
Mean	13.2	230.4	233.2	96.0	930.6	46.2	1549.7

Table A-9

RESOURCE DISTRIBUTION BY OCD REGION

CRISIS VOLUNTEERS

NUMBER PER 10,000 POPULATION

City and State	High School Students (11th & 12th)	College Students	General Public	Total
Region 1				
New York City, N.Y.	150.0	216.7	774.2	1,140.4
Boston, Mass.	143.4	1,119.3	15.8	1,278.6
Newark, N.J.	142.7	221.3	689.4	1,053.5
Providence, R.I.	145.5	552.2	221.0	918.7
New Britain, Conn.	153.3	417.4	396.0	966.7
Mean	147.0	505.4	419.3	1,071.6
Region 2				
Philadelphia, Penn.	154.5	295.5	858.7	1,308.7
Baltimore, Md.	140.8	268.7	783.3	1,192.8
Toledo, Ohio	147.3	231.1	688.5	1,066.1
Richmond, Virginia	129.6	433.7	14.7	578.1
Allentown, Penn.	135.6	111.5	709.2	956.3
Mean	141.6	268.1	610.9	1,020.4
Region 3				
Atlanta, Georgia	155.8	383.6	468.5	1,007.9
Miami, Fla.	127.4	614.6	237.3	979.3
St. Petersburg, Fla.	119.3	300.3	536.2	955.8
Charleston, S.C.	--	--	--	--
Mean	100.6	324.6	310.5	735.7
Region 4				
Chicago, Ill.	138.0	189.1	1,073.4	1,400.4
Detroit, Mich.	163.0	163.8	915.7	1,242.6
Milwaukee, Wis.	141.0	329.1	575.5	1,045.0
Fort Wayne, Ind.	151.1	168.3	634.9	954.3
Pontiac, Mich.	137.9	--	301.8	439.6
Mean	146.2	170.1	700.3	1,016.4

Table A-9 (Continued)

City and State	High School Students (11th & 12th)	College Students	General Public	Total
Region 5				
New Orleans, La.	140.6	208.4	890.8	1,239.8
Oklahoma City, Okla.	149.0	66.7	1,040.4	1,256.1
Tulsa, Okla.	158.4	172.7	931.0	1,261.4
Albuquerque, N.M.	175.0	411.9	3.0	589.8
Houston, Tex.	137.3	218.2	991.7	1,347.3
Fort Smith, Ark.	188.0	206.2	181.1	575.4
Mean	158.1	214.0	673.0	1,045.0
Region 6				
St. Louis, Mo.	120.9	352.0	638.9	1,111.8
Denver, Colo.	142.5	128.8	878.1	1,149.4
Des Moines, Iowa	142.3	256.6	600.4	999.3
Lincoln, Neb.	--	--	--	--
Independence, Mo.	146.9	540.6	348.7	1,036.2
Mean	111.7	255.6	493.2	860.5
Region 7				
Los Angeles, Calif.	154.2	363.4	894.5	1,412.2
San Diego, Calif.	153.2	393.5	711.4	1,256.9
Oakland, Calif.	143.9	130.7	860.7	1,135.4
San Jose, Calif.	149.9	728.0	--	877.9
Salt Lake City, Utah	174.5	634.6	31.7	841.0
Palo Alto, Calif.	189.5	286.0	--	475.5
Mean	160.9	422.7	416.4	999.8
Region 8				
Tacoma, Wash.	166.8	80.4	--	247.2
Portland, Ore.	162.1	284.7	100.5	547.4
Spokane, Wash.	172.1	134.6	258.1	564.8
Great Falls, Mont.	--	--	--	--
Mean	125.2	124.9	89.7	339.8

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13. ABSTRACT

Culminating several years of research on the problem of rescue after nuclear attack, this study reviews past work and presents a preliminary design of a general rescue system. In this system, the population would be dormant during the non-crisis period, but would be aroused at the earliest sign of a crisis, to prepare for attack and to carry out postattack rescue operations under recognized local leaders. In each urban area, this leadership would be provided by a small group or cadre drawing upon neighborhood leadership through an inactive reserve of citizen organizations. The cadre would supply the continuing readiness in peacetime under the guidance of the OCD.

Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Rescue						
Nuclear Attack						
Civil Defense						
Postattack						
Evacuation						
Equipment						
Command and Control						
Volunteer Organizations						
Governmental Organization						
Manpower Resources						