

Organizational Relocation Plan Development: Two Case Histories

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FINAL REPORT

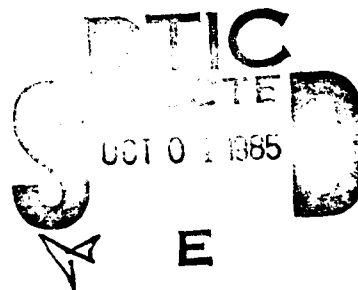
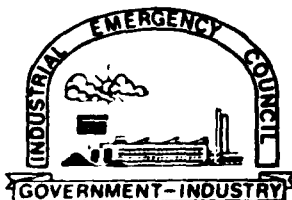
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could threaten to interrupt production and some innovative industrial concepts for survival products. Information on how both facilities plan to ensure economic survival, marshal critical resources, and protect industrial capability (PIC) in order to produce services or manufactured items within their capacity and that might be needed through and after a major crisis is included.

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(DETACHABLE SUMMARY)

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TWO CASE HISTORIES**

by

James V. Zaccor and James M. O'Donnell

Final Report

April 1985

for

Federal Emergency Management Agency
Washington, D.C. 20472

Contract No. EMW-83-C-1159, Work Unit 4511J
William Lueders, Project Officer

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Industrial Emergency Council
San Carlos, California 94070

(DETACHABLE SUMMARY)

**ORGANIZATIONAL RELOCATION PLAN DEVELOPMENT:
TWO CASE HISTORIES**

Assessment of an Organizational Relocation Planning (ORP) effort conducted by an industry, as distinguished from a general paper study, was the objective of this Federal Emergency Management Agency (FEMA) project. An Integrated Emergency Management System (IEMS) approach, with special attention focused on attack-related civil defense aspects, was spelled out in the contract requirements. Two industries were selected for the planning effort, a manufacturing company and a service organization whose chief executive officers (CEO's) had particular interest in civil defense preparedness. Each participant combined multi-hazard considerations with a PIC (protection of industrial capability) program and developed an ORP for hazards that posed threats in their locales. Contractor support and documentation was provided through a local government/industry mutual aid group.

The participants demonstrated innovative talent that suggests industry could provide strong support in their local communities, should a national disaster be threatened. Action independent of the public sector was frequently required of the participants because of constraints set by the Legislature on State funding support for population protection planning (PPP) and ORP. Nevertheless, this circumstance served to demonstrate a confidence on the part of the participants (both recipients of disaster planning training at Emmitsburg, Maryland) regarding how to proceed. A natural desire on the part of industry to ensure economic survival through any crisis was a driving force for the industry CEO's. Though complete written plans were not developed, the planning effort involved consideration of threats and responses that provided a valuable exercise and important insights. One of the outcomes was the development, by the participants, of product applications that could be used to reduce time, cost, and materials to support a threatened population in a relocated mode.

The assessment made from this extremely limited study posed several criticisms/suggestions. Among these: wider industrial participation was opined by

the CEO's involved as requiring serious effort by the Federal government at the cabinet level, or higher, to induce industry response; it was pointed out that a guidance manual on ORP for local public sector emergency planners might lead to better industry/government rapport; more programs such as those held on emergency planning at Emmitsburg were identified as a means to motivate independent industry action by supplying pertinent knowledge and facts; the need to rethink some of the early ORP concepts, particularly regarding the need for each industry to assess its own objectives in a situation that might require OR, how this should tie with the community's needs, how many employees and their families would be involved, and what might be achieved by the effort.

The recommendation was made that to further evaluate the potential of ORP initiated and conducted by industry, and to assess industry innovative talent for contributing to the solution of problems during crises, additional studies be commissioned in other areas of the United States.

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San Carlos, California 94070**

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We are indebted to a great many people for supporting this effort in a variety of ways.

First, we are especially indebted to those individuals at the Federal Emergency Management Agency who supported this private sector planning approach to treatment of multi-hazard threats - and for including the requirement that it have a strong civil defense component. In particular, we wish to thank Seymour Wengrovitz, who commissioned the study, and John Bokel, who continued it; David Bourdon, Nancy Collins, and William Lueders, who served as project officers and provided advice and contacts in the public sector; Frances Dias, who supported both the inclusion of PIC with OR planning as an integrated emergency management system requirement and the development of key worker sheltering as an integral part of an essential industry PIC program; and Don Bettge for his special support towards initiating a key worker shelter at the facility of one of the industry participants.

We wish to thank the reviewers for taking the time to read the report and to make comments and criticisms regarding both the report and the program. All your comments/criticisms were well taken and appreciated. We have attempted to incorporate as many of the suggestions as possible in revising the text.

At the local level in the public sector, we are beholden to a number of individuals in county and city governments who provided to the best of their ability information requested within the constraints imposed by policies not of their making.

Within the private sector, we are indebted to all the members of the Industrial Emergency Council (IEC), who listened to our requests (especially those who answered them), tried to understand what sometimes seemed a complex network of bureaucracy, and attempted seriously to achieve a mutually beneficial effort in partnership with government. We think some valuable progress was made as a result of your efforts.

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Section 1

INTRODUCTION

This report summarizes work conducted for the Federal Emergency Management Agency (FEMA) by the Industrial Emergency Council (IEC), in the period 1 November 1983 through 31 October 1984 on a program to support two industry participants in efforts to develop emergency relocation plans for their organizations ("organizational relocation plans" or ORP's), integrate these with existing in-house emergency plans, and catalogue this development. Two additional requirements (though not reported herein) were: to organize the information into a format suitable for an industrial workshop to convey ORP development information to representatives from industry; and to conduct a workshop to expose more industrial organizations to ORP (essentially using the two case histories to serve as interim guidance). The major subcontractor on the program was Scientific Service, Inc. (SSI), a member of the IEC with over 10 years' experience in disaster analysis and preparedness and emergency response studies.

OBJECTIVE

The intent of the project is best described by a quote from the Scope of Work, i.e., to "prepare and submit a work report or 'log,' a step-by-step description of the activities necessary to produce an ORP, detailing the successes, problems, and lessons learned." In addition to chronicling the process for the ORP's developed, detailed plans assembled by the participants that would be helpful to others in producing an ORP (omitting proprietary data and information) were to be included. The workshop to present the findings to industry participants would be the first application of an industry case history on ORP to industry peers, the ultimate aim of such an effort being to see if other industries could be induced to make corresponding efforts.

BACKGROUND

Evacuation is the oldest known response to a disaster threat; the objective is to place distance between the hazard and those threatened. Though many evacuations (such as occurred at Mississauga and Three Mile Island) have tended to be

disorganized, at least one type of event, hurricanes, has a long history of coordination and planning behind evacuations, particularly along the Gulf and East coasts. Without this, there would be a good many more deaths and injuries. Planning, coordinating, and organizing an evacuation beforehand, therefore, can greatly reduce the impact from threats that require an evacuation response.

The concept behind organizational relocation is to move complete groups out of the path of an impending disaster, as organized elements. The basic objective is to preserve intact working teams needed to support the relocated population and national security, and to accelerate recovery, post disaster. Thus, organizational relocation has been viewed by emergency planners as a way to preserve a higher level of the existing structure of society. Essentially, this concept underlays the guidance presented in Ref. 1. It is part of several volumes on the general subject of Crisis Relocation (CR) and treats organizational relocation (OR) as an adjunct to CR. Neither CR (now Population Protection Planning) nor OR involve relocation of facilities or equipment - only personnel. Under OR, however, "key workers" from organizations involved in essential production (e.g., power generation) are presumed to commute from a "nearby" relocation area back to the facility, daily, to continue production activities during the crisis period.

Following publication of Ref. 1 (a working draft), Boeing Aerospace Company - Special Projects conducted a "test case" assessment of the planning guidance contained in it as it might apply to Boeing's Space Center (Ref. 2). This first industry study also indicated steps required to make the guidance pertinent to disasters other than nuclear attack, identified technical and logistic inconsistencies and problems that were encountered in applying the guidance, and made suggestions for their rectification (many of these identified shortcomings still exist today).

At about the same time as the Boeing effort, a comprehensive report on the concept of OR was developed out of the civil defense plans of 90 companies (Ref. 3). This report discussed objectives, methods and procedures, and implications for OR as the concept was extrapolated from the planning materials that industry had supplied. An important point cited in the report was that "Contact with actual potential users in typical organizations has been limited." Thus, whether the extrapolation would apply generally could not really be discerned just from the compilation of a consensus of industries with the foresight to prepare (but the compilation could prove to be quite useful depending on industry attitudes toward it).

To address this question of general applicability, a program was conducted for FEMA by the North Carolina Division of Emergency Management, Department of Crime Control and Public Safety (Ref. 4). This was a broad study of the currency of the ORP concept because a great many industry and community planners were surveyed: "To provide evidence of the feasibility of organizational relocation and to generate a greater understanding of existing planning guidance." Unlike Ref. 2, which was concerned with technical aspects, the Ref. 4 study dwelt heavily on philosophy and measures to assess industrial and local government acceptance of the concept. This coverage included arguments related to the question of acceptance, and a survey of industries within the designated test area to determine both industry type and how many of them were likely to respond to organizational relocation. Thus, the Ref. 4 study did not assess actual application of the guidance (and problems that might be encountered in the process), but attitudes toward it.

A subsequent effort on the subject was conducted by the same organization (Ref. 5). In this follow-on study by the State agency, three companies developed "summary" relocation plans that defined for each organization: number of employees, number of evacuees (i.e., to include families); safe relocation area and headquarters locations; whether operations would continue through and beyond relocation, and on what basis; congregate care lodging, feeding, fallout protection sites (and contacts); and evacuation routes. Materials of a general nature were developed for employees describing organizational relocation and the rationale for it; shutdown routines; employee information transfer, communication and warning procedures; specifications for employee and family transportation (in general, to use their own resources with an unspecified alternative to be arranged for those without transportation); who would have responsibility for the companies' operations in the threatened area and in the area to which they moved; and who would be responsible for updating the plan on a regular review schedule.

The Ref. 5 study, though small (involving three companies), achieved an outcome of substance because the completed summary plans were bona fide "assignment plans" consistent with general evacuation (the State obtained data pertinent to each organization and assigned host area space accordingly). At this juncture, State developed summary plans for ORP were all that were available (industry initiated plans were nonexistent), and the objective in the completed studies was principally to test ORP workability from the point of view of the Civil Defense planner. Despite the excellent effort by Boeing (a civil defense contractor

with considerable experience in the general subject area), a critical factor missing from ORP assessment has been a serious examination by the key role player, i.e., industry (which has no background in civil defense, for the most part). An important question is whether ORP might not be initiated by industry to bring about the various aims it was intended to achieve. It is important, therefore, to reiterate the objectives that were originally conceived for ORP.

The rationale and approach for ORP, Refs. 1 and 3, was identified as a planning concept that offers significant advantages to planners and administrators (particularly those in public service agencies) with responsibility for dealing with large scale evacuations from hazard areas. Hazard areas are those "at risk," i.e., threatened by disaster, in the Ref. 1 and 3 discussion, principally due to nuclear attack.^{1/} In the present era, recognition has come that there are a variety of hazards that threaten a modern society and effort has been, and is being, made to orient disaster response accordingly, towards multi-hazards (Refs. 2 and 6-11). The multi-hazard approach recognizes that disastrous conditions requiring evacuation can arise from a variety of events, either natural or manmade - hurricanes, floods, hazardous materials spills, nuclear reactor failures, nuclear war.^{2/}

Where large scale evacuations are required, there are a host of potential problems that ORP, in theory, could solve. It was seen as a way to:

- o Provide a specific, pre-designated relocation address to evacuating employees and their families.
- o Provide already organized evacuee groups in numerous host area facilities, reducing the burden of staffing and managing reception care services for a significant portion of evacuee population.
- o Maintain greater continuity and capacity in organizations attempting to operate during a crisis - and facilitate the resumption of organized activity following a crisis.

^{1/} For the nuclear attack scenario, the most threatened areas were termed "high risk" areas; today there is contemplation of redesignating these "high hazard" areas.

^{2/} In multi-hazard analysis and planning there is likely to be a great deal of confusion if reference to a "high hazard area" does not specifically identify the threat for which the term applies. That is, the phrase "high hazard area" is meaningless without specifying with regard to what - a high hazard area for earthquake is not the same as for hurricane, nuclear attack, etc., though there may be overlap. For this reason, "reception care area" becomes meaningless without identifying for what purpose - at least until a truly integrated approach identifies a single set of "all-hazards" reception care areas and facilities sufficient to provide both adequate shelter and numbers of shelters for any threat.

Though no reference can be cited for the conjecture, it seems likely that these aspects of the theory would have been tested to advantage in hurricane areas; e.g., North Carolina, where the Ref. 5 study was conducted. In regard to these tabulated objectives of an ideal ORP, however, there are at least three important factors to consider that will have major effects on the ultimate form and outcome. One of the factors relates specifically to public attitudes and two of them to 'industry' attitudes (the latter expressed by chief operating officers). Before identifying these specific attitudes that portend important implications, it may be helpful to review some material that provides insights to a little of the rationale for, and developments in, community emergency planning and preparedness that have affected all sectors.

GENERAL ATTITUDE FACTORS IN DISASTER PLANNING

Historically, man's resolve and ability to deal with any given type of disaster has depended on its frequency of occurrence and costs and benefits of intervening. These costs and benefits impact lives, property, effort, time, and money (which is frequently used as a measure for the others). Closely related are the perceptions of society regarding the cost/benefit tradeoffs. These perceptions, in turn, are dependent on the degree of confidence each of these observers has that the alternatives offered are practical and effective. History also suggests that experience and firsthand observation are generally among the more important elements to the development of either, or both, capability and confidence. This has important implications for ORP development to prepare for a nationwide disaster.

Based on frequency, nuclear attack is the least familiar disaster. Thus, Hiroshima and Nagasaki provide the only experience to go by, unless one considers the weapons testing experience, which the general public has little knowledge of to direct it. Other than a few contractors, industry is in the same category as the general public. Despite the generally recognized potential magnitude of such a disaster, there is widespread reluctance to consider such an event. Contact with industry on the subject over a period of a decade indicates that the vast majority has no understanding or appreciation that any practical or tested ways exist to lessen the impact of a nuclear attack should one occur, whereas there is a general understanding and appreciation that ways do exist to lessen the risk from flood, earthquake, etc., and the certain knowledge that a good many of these have been tested. Unfortunately, most of the current general understanding and beliefs about nuclear weapons stem from information promulgated in the popular press: books,

magazines, newspapers, television - much of which is either incorrect or hearsay. This one-sided view was not prevalent in the 1960's media; it is a problem, however, that has affected industry response to overtures to implement preparedness programs for almost a decade. One part of the problem is that much of the factual information available (such as in Ref. 12) is not geared to the layman, and popular writers seldom refer to such material. Fortunately, there is evidence that a survivalist viewpoint can be presented that will draw industry support and converts to active preparedness efforts. This was demonstrated because it was accomplished on two occasions, through an intensive four-day conference (both held for industry at Emmitsburg). As a result, at least some of the participants came away believing not only that preparedness for nuclear attack is a viable survival option, but with a strong desire to do something about it at their facilities. (In some instances, this was a complete reversal of attitude!) Quite a number of those interested, including a few Chief Executive Officers (CEO's), praised the program and also pointed out the need to orient similar ones specifically to reach CEO's as a fundamental requirement of a serious effort to generate significant industry sector action.

Despite this conference turnaround of some of the business and industry attendees, the general public's negative attitude toward the relocation concept in some areas plays an important role in attempts to apply OR and related guidance. Ref. 4 described studies conducted by a state agency in North Carolina, where the benefit of OR and ORP could be easily appreciated because hurricanes are prevalent and the concept of evacuation has gained acceptance and does not raise anyone's ire. The report mentions no problems of interference from the general public; that is, a subsequent project succeeded in making shelter assignments and developing summary plans for three industries without stirring up controversy. In other states where experience with evacuations is nil, however, these same attitudes may not (in particular, in California they do not) prevail. In California, where the current study was conducted, opponents to preparing for a particular disaster, nuclear attack, have managed to pre-empt further attempts to use "state" funds to develop mass evacuation plans for such an event. This was accomplished via so-called "budgetary language" in a Senate Bill (No. 123) of the 1983-1984 Budget for California. The exact wording is as follows:

- "1. No funds, either State or federal, shall be expended by any State agency for development or implementation of crisis relocation planning or any planning whose primary or exclusive purpose is to

effect a mass evacuation of California civilian population in the event of a threat of nuclear war.

If, as a result of this provision, the Federal Emergency Management Agency (FEMA) withholds other federal funds whose purpose is the support of California's emergency planning and preparedness for civilian and natural disasters, and if the court of original jurisdiction upholds the legality of such action by FEMA, then the implementation of this provision shall be suspended until judicial appeals have been exhausted or Congress prohibits such action by FEMA."

This Senate Bill provision was filed with the Secretary of State on July 21, 1983 and has not been challenged. The result has been the cessation of the majority of projects by State, county, and city Offices of Emergency Services to carry out their mission relating to evacuation planning for nuclear attack. Notwithstanding that reception and care centers have been identified (as developed by the Red Cross) for evacuees to go to in case of a major disaster such as an earthquake, because of the above-cited restriction, contractor requests to local, reception area governments for assignments of shelter space that would (or could) provide protection from fallout have produced listings of shelter space adequate for shelter from the elements, but few of them are upgradable to provide fallout protection. In any case, preassignment of such spaces by local authorities in reception care areas in California is not part of current emergency planning because of the State Senate Bill cited.

What this means is that in California (10% of the nation's population) shelter planning is not yet proceeding in accordance with the Integrated Emergency Management Systems (IEMS) concept. IEMS is basically a strategy - one that would govern emergency planning and preparedness effects from a holistic point of view, specifically to avoid the inconsistencies and inadequacies that frequently spring up in a piecemeal approach to disaster planning. In California, the IEMS concept is even further from being realized where ORP is concerned because there is the additional requirement to find suitable fallout shelters within 'commuting' distance from industries whose continued production is essential (e.g., utilities operation). Where ORP involves essential facilities, then, the relocation site is presumably a commuting distance, less than half an hour, away for the key workers involved in the continued operations (and their families). Consequently, these relocation sites must be in the nearest suitable location outside the high hazard area. Such sites have not been

formally identified in California (though a contractor was working on this problem for the State when Senate Bill 123 forced cessation of that activity). This circumstance cannot help but affect attitudes of those in industry willing to put forth an effort for ORP.

By advancing from city to county governments, copies of the National Facility Survey that identify fallout shelters throughout each county were readily obtained; two problems surfaced immediately, however. In one county, emergency services personnel pointed out that some of the listed structures did not even exist anymore, and in two counties, they pointed out that the bulk of the shelters listed are located in nuclear attack high hazard areas (see prior footnote) where they are unlikely to survive expected blast overpressures. Although a two-way information exchange is supposed to occur, in which local emergency services personnel provide notification of these changes to those at the state and Federal level so that National Facilities Survey data files can be updated, this does not appear always to occur as planned.

In view of the clear lack of a substantial inventory of designated fallout shelters **outside** the nuclear attack high hazard areas and within commuting distance in the regions where needed, county emergency services personnel suggested the best option at this time for obtaining fallout sheltering for the ORP project most likely would be for industry to develop its own. The advising emergency planners were aware that designated shelter space suitable for a nuclear attack situation would have considerably more stringent requirements than for other disasters, that this most stringent requirement would provide better criteria for shelter designation in a comprehensive IEMS approach, and that industry is not, for the most part, qualified to identify or develop suitable shelters on its own. Nevertheless, these planners face a situation wherein an assault on the problem at their level would entail the risk of political repercussions, including possible dismissal. It is understandable, therefore, that they are not willing to assign space. Perhaps more to the point, it is even more understandable that industry would not believe the assignment to be valid if it were made. What, then, are the actions to be taken in such a Catch-22 situation?

To a large extent, operational shortcomings due to political ramifications arising out of public attitudes were foreseen. A quote from Ref. 3 on probable lessons for relocation planning efforts included these observations:

" . . . the level of organizational participation will surely reflect consensus views of a probable threat and a perceived national commitment to the preparedness policies being pursued. The manuals and plans reviewed here were, for the most part, generated in a period when civil defense was a salient issue in the public mind, when a nuclear attack was widely viewed as a logical (if not immediate) possibility, and when the national government and leadership clearly endorsed a serious preparedness effort."

and:

"It is doubtful whether the nuclear attack issue has remained sufficiently alive to cause many organizations to maintain active preparedness measures geared largely to a nuclear crisis. Organizational preparedness was largely identified with a single threat, and has suffered accordingly."

With the advent of multi-hazard threat analysis and IEMS, FEMA policy is not geared to organizational preparedness for one threat alone, i.e., ORP is generally recognized as applicable to other threats such as hurricanes, floods, hazardous materials spills, and possibly earthquakes on occasion. Even so, the fact remains that certain legislative actions have already taken place at the State level designed to leave important FEMA policy options for civil defense out of the implementation of IEMS in California. These deliberate omissions include attempts to apply ORP (or PPP, population protection planning) to the threat of nuclear attack. Thus, we have found a segment of the private sector (industry) in a State that represents 10% of the nation faced with one-way coordination of these kinds of emergency management efforts with the public sector - not at all conducive to furthering coordinated development of ORP and PPP. (We note that, because PPP represents a more general concept than Nuclear Civil Protection and is directly supportive of the IEMS concept to integrate all relocation planning activities, leaving nuclear civil protection out of the process does not accomplish that task - so is not in accord with IEMS.)

THE INDUSTRY ATTITUDE FACTOR IN ORP

For an arrangement involving different entities to work, all participants must be motivated, and each must have an understanding of the other's role and points of view regarding the issues, if the whole is to be coordinated for maximum effectiveness. Among the issues relating to ORP are the degree to which industry

should plan and prepare for major emergencies or disaster, and when this should be done. Basically, it would be preferable to see this already completed, or well on the way. But it is important that industry's point of view be understood. Industry recognizes a need for a broader range of disaster preparedness, but has more pressing problems on which to spend limited funds. As a consequence, industry tends to concentrate on the lesser emergencies that it feels are pretty certain to come, particularly those most likely to be encountered in the next few days to weeks (things such as equipment failures, production breakdowns, and perhaps also fires and hazardous materials spills). This pragmatic approach can be to the exclusion of a real effort to prepare for a truly large scale disaster that may be considered as very likely to occur (eventually), but which might not happen for some time (perhaps years).

Industry's attitude here is characteristic of most people's approach to time-dependent phenomena: the longer the expected time span until an investment of money and effort bear fruit, the less attractive the commitment. After all, industry is principally geared to producing and marketing a product or service for the sake of making a profit for the shareholders (one of which is the government). If profits are not in evidence in any short time span, there are repercussions from all the shareholders. Under the circumstances, it is fairly easy to understand industry attitudes toward potentially large expenditures that do not yield a profit, but rather reduce profits over the short haul (e.g., investments in disaster preparedness for infrequent but major events). Expenditures for OR fall in this category.

Insofar as a commitment to organizational relocation is concerned, our industry contacts have expressed two important attitudes that will affect how OR and ORP are likely to be implemented in facilities where they are considered. One of these derives from the apparent fact that a company can often be considered to comprise two groups: a relatively small number of very key individuals (most generally, those without whom the company operations would not be able to continue without equally talented replacements); and a much larger body of less important workers who carry on activities that most anybody could handle. (Perhaps directly related to this attitude is that some facilities have extremely high turnover rates for the latter kind of personnel, with a large percentage being replaced in a period as short as two years.) The consequence of this real situation is that of those industry leaders encountered none was ecstatic about being asked to shepherd the masses in a disaster situation. They were generally adamant that ORP must have meaning to their

industry function as well as to the government, hence they would opt to limit industry ORP efforts to the key workers and their families. (Following a major disaster it seems self-evident to them that the lesser positions can be filled from virtually any reservoir of personnel.) Moreover, when it comes to taking final risks in the facility (to protect it and/or equipment before evacuating), half the industry leaders consulted considered the readily replaceable group as doubtful company supporters, and perhaps a greater liability than an asset. Thus, we have learned that where an ORP program is supported by industry (particularly where it is industry initiated) it is not likely to be the full blown version (the one visualized in Ref. 1 to involve all facility personnel and their families).

The second important industry attitude that must be reckoned with (if promulgation of the ORP concept through industry is to be successful) is a definite requirement for economic survival through the disaster. Industry leaders require ORP to include playing an immediate and continuing role that relates to the company's mission; otherwise they are left without a rationale for undertaking ORP. The latter attitude is reasonably understandable. Industry leaders, in deference to their shareholders (and the desire to retain their jobs), are not going to wish to spend significant money to provide a reservoir of industrial expertise for some uncertain later mobilization by the government. Their mission in running an industry is to exploit expertise, on a timely basis, for maximum company (and personal) benefit. It is true that their efforts must also serve society (or they would not be successful), but this is not true to the exclusion of operating a profitable enterprise.

GENERAL EXPERIENCE COMPARISONS

As an example of our experiences with ORP development, consider the flowsheet in Figure 1 (extracted from Ref. 2). This flowsheet was synthesized from Ref. 1 and the experiences and observations of the team at Boeing involved in applying Ref. 1 material to produce the ORP of the Ref. 2 study. At the time the current project started, flowsheets developed in Ref. 2 appeared to us to provide a reasonable outline of what needed to be done, and they included modifications also for other disasters than a nuclear attack. Integrating the outlines from the applicable Ref. 2 flowsheets for disasters that could occur at our participants' facilities seemed likely to provide reasonable guidance and an IEMS approach to disaster planning. What we found, however, was that the Figure 1 guidance is premised on the existence of a foundation in the public sector that is believed to

ORP Preparation Flow

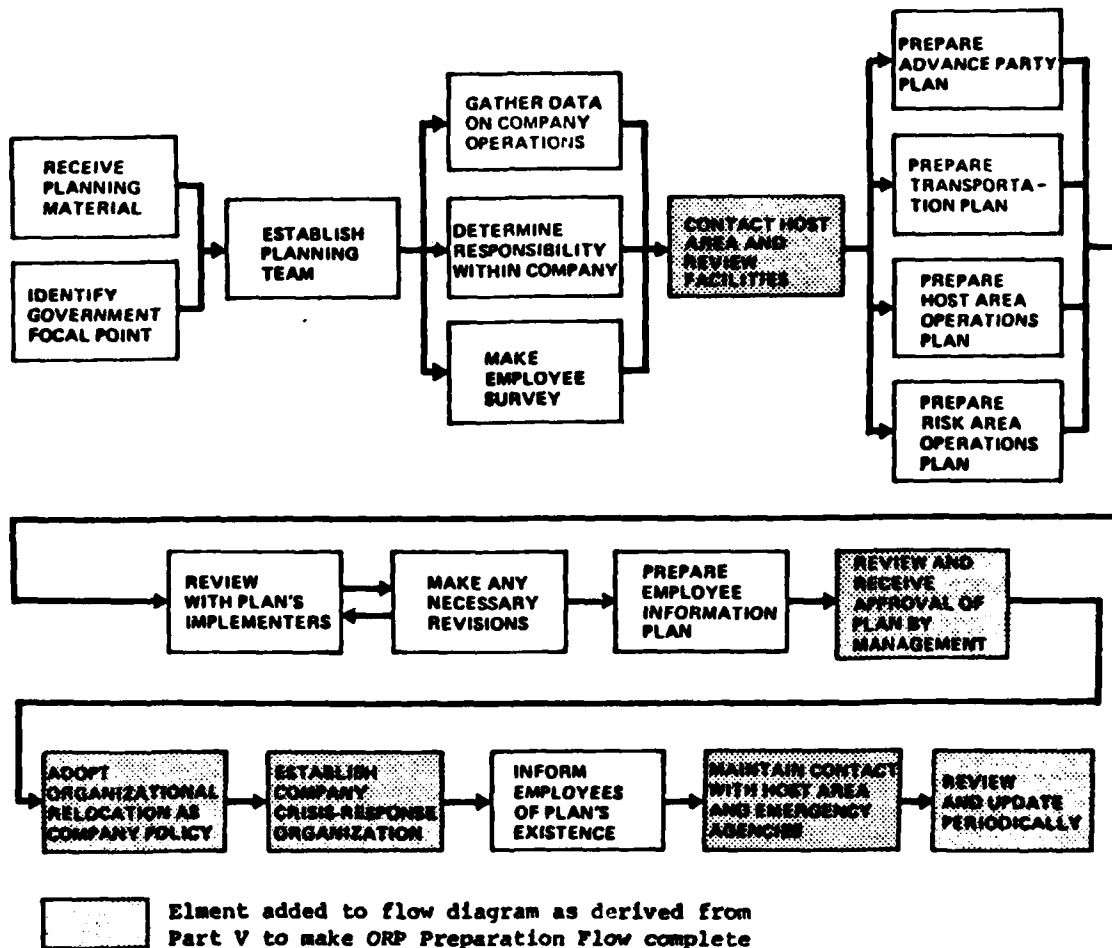


Fig. 1. ORP Preparation Flow Chart.
 Source: Miller, John M., et al., Prepare and Evaluate an Organizational Relocation Plan, Boeing Aerospace Company, April 1980 (Ref. 2).

exist but which apparently does not, at least not beyond the conceptual stage in the region where this program took place.

The lack of the proper foundation was a definite problem, but another critical factor was the related impact on the guidance sequence of Figure 1. All things considered, industry seems particularly unlikely to follow it - even if the foundation for it existed. To be sure, our experience is with intermediate-size companies (i.e., each has less than 10% of the employees that Boeing has) where individuals rather than committees initiate new programs. Moreover, the individuals undertaking the ORP assessment task in our participating companies had already received far more detailed planning material in their four-day conference at Emmitsburg than the vast majority of organizations might ever acquire without such a conference. The point here is not that a given study is, or is not, representative of what industry will do or how it will do it, rather it is to say that something new is likely to be learned from each study that will be applicable to different circumstances; there are hundreds of thousands of businesses and industries out there and few are alike. The best one can do is to attempt to chronicle industry experiences until a reasonable body of knowledge has been built up. The Boeing effort and this study of industry-initiated ORP are barely a beginning.

Continuing the current chronicle, based on his experience at Emmitsburg, one of our two participants attempted before this project started to get a program underway that would prepare his facility for nuclear attack. Unfortunately, his experience was that the individuals he contacted did not seem knowledgeable (they had not looked at how OR might work in their jurisdiction), could not supply him with useful information on where organizations might be relocated, and could not put him in touch with those that should be knowledgeable. A copy of a letter written by this participant to FEMA in response to a request for information on "how he was putting what he learned at Emmitsburg to work," is included as Appendix A.

Returning to Figure 1, our industrialist could not 'identify a government focal point' - assuming that this is intended to mean someone in the public sector who could help his organization make further progress by supplying planning materials appropriate to the issue and to the local community. Regarding the need to 'establish a planning team,' he would not feel one warranted until he was certain that the local operations people in the public sector had clear ideas of the overall plan for redistribution of organizations and people into safe areas, and that the identified

shelters were likely to be viable for the users to survive the expected environment. Developing a committee to look into this would let it get out of proportion. A single individual can be assigned to ferret out information and examine it for evidence that there is a clear and coordinated purpose at the local level behind the OR concept and guidance. After all, industry does not see itself in the role of supplying the impetus for public sector multi-hazard disaster preparedness - at least it does not as yet.

To 'gather data on company operations' before first deciding exactly what corporate objectives would be in a circumstance requiring OR seemed to be to get the cart before the horse - more important would be to decide on what operations might be pertinent in the situation. To date, industry leaders we talked to who would consider the subject were pretty realistic about the situation and assumed it unlikely to be the same as in the pre-disaster era, hence, likely to lead to completely different production requirements. It is extremely unlikely that industrialists would have given this subject any thought prior to getting into a program such as this one, and it is here where considerable time must be allocated. Fortunately, once they think about it, they also seem to be quite innovative in terms of what might be valuable and producible. (This aspect is described later.)

Before a company undertakes to 'make an employee survey' it is necessary for management to reach a decision about what company objectives might be in such instance, how they might be consummated, and who could be counted upon to help the objectives be realized. In no instance (and from the earliest discussions) did plans appear likely to include all company personnel.

The 'contact host area and review facilities' step was one that was given consideration very early in the sequence. In fact, it was the major purpose for trying to identify a government focal point - so that a relocation site might be assigned in a safe area and the allocated facilities examined. Without a relocation site, all the subsequent steps for developing an ORP become academic. Local public sector planners did not provide our participants with relocation sites. What was provided is identified in Appendix B. Moreover, State Office of Emergency Services indicated that in the present climate of public opinion it was questionable whether Senate Bill 123 would be changed, and warned that any arrangements made would run the risk of being countermanded.

Here, then, is where everything can very well terminate. (In the present case the program slowed again, but did not terminate for a number of reasons; these reasons will not generally exist for most business and industry planners, however.) The circumstance in California may be unique; i.e., not having a functional program for OR in place, but just how widespread this circumstance may be, nationwide, should be assessed. Certainly, wherever an infrastructure of planners and planning does not exist (to guide and coordinate OR on a scale such as appears to be required to prevent gross misallocations of space) there will be serious risk to the concept of industry initiated ORP, at least until the circumstances are corrected.

Our conclusions at an early juncture: preconceived notions about the nature of guidance on ORP to provide business and industry will be off the mark without a reasonable amount of interaction with business and industry. That is, actual involvement of the private sector at a significant level, in terms of types, sizes, locations, will surely be necessary to estimate the extent of planning that could ultimately take place. It seems likely there will be less involvement of the private sector where local OES are unprepared to provide clear and specific information on OR sites, routes, routines. On the other hand, as will be seen in the following material, a businessman or industrialist who has significant control within his organization, and who is also motivated to develop some kind of contingency plan involving relocation, is quite likely to put together a program even without the cooperation of the locals in the public sector. (It seems likely that the end result could be just as valuable, and may even prove more practical and useful.)

If industry-initiated ORP is to occur with significant frequency the key element will be the motivation of responsible individuals who have the necessary authority to accomplish it. This motivation will be needed in any case and will require convincing arguments that survival is possible. Convincing arguments will require a strong base of knowledge of the subject, and this is exactly what is required for independent action. (Note: 'independent action' does not signify that it is to the exclusion of consideration of others, in either the public or the private sector. What independent action does signify is **confidence** in regard to what actions will prove the most beneficial application all around of resources and expertise normally at the disposal of the CEO.) It has already been proven motivation to independent action can be achieved through conferences such as those held for business and industry at Emmitsburg; the question that remains is the extent. Considering the importance of the subject, it seems logical that effort should be

made at a high level to foster the development of ORP through stimulation from both directions: by motivating industry and business CEO's, and by bolstering the local public sector planners' knowledge and capability to support ORP actively (in California, and perhaps elsewhere, this may require legal actions).

Section 2

ORP DEVELOPMENT

CANDIDATE PARTICIPANTS

The program proposed by the Industrial Emergency Council to FEMA for ORP development was based specifically on involving industrial members of the Council. The IEC was able to provide a unique capability for this program by virtue of the following attributes. The organization is founded on dedication to a safer community through emergency planning and preparedness and it comprises responsible members within the community, from both government and industry, who feel that better cooperation of the public and private sectors is a key. Moreover, the Council is a coalition of organizations with a variety of complementary expertise represented among the membership, and with the motivation to 'get involved.' Because this is an attitude that prevails, generally, in the organization, about 25 of the approximately 100 industry members attended one or the other of the disaster preparedness conferences held for industry at Emmitsburg in 1982-83. These particular members became acquainted, therefore, with expected environments in event of nuclear attack and concepts such as emergency evacuations (crisis relocation, population protection, etc.), PIC (i.e., the protection of industrial capability), and other strategies for survival, which take time to appreciate and require still more time to develop attitudes about for decision purposes.

Selection of SSI to be the subcontractor for the program that the IEC proposed was to provide knowledge of disaster preparedness in relation to OR so that overall response planning for OR would be comprehensive. Consistent with the OR objective to contribute to an accelerated recovery (second paragraph, page 2), it was proposed to develop a PIC program as an integral part. That is, the ORP was not to be a simple group exodus with no thought to the future, but orchestrated with a plan to protect critical equipment from damage as well. To facilitate this particular integration, it was proposed to solicit participants from among the 25 industry members whose exposure at one of the Emmitsburg conferences to nuclear attack planning, PIC, and IEMS provided the necessary background. By initiating a program with a member of this informed group it was possible, then, to dispense with some of the tasks that would otherwise be necessary. For example, a responsive group did

not have to be sifted out of a solicitation to a large number of industries because this task was essentially completed when the IEC selected 25 industries out of its membership to attend the Emmitsburg conference.

Another benefit of choosing participants from this select group was that subsequent critiques of the conferences by attendees (conducted for the IEC membership) simplified the task of identifying among the potential candidates those predisposed to support the general concept. Moreover, by the very nature of this approach the participants selected were those with the best understanding and appreciation of the necessary concepts so that the program could start from a higher base within the continuum that encompasses all industries. This undoubtedly introduces a bias toward developing a successful end product, but if an acceptable OR cannot be developed in this case, there is no reason to expect it would be easier or of better quality with less understanding and appreciation. Even with this advantage, there were certain industry concerns to acknowledge.

CANDIDATE PARTICIPANT INPUT

Among the Emmitsburg attendees favoring the concept of OR enough to pursue it, all felt that in the face of a nuclear attack threat OR, by itself, would be an unsatisfying response. To them, a comprehensive and sound approach would necessarily include two additional elements - the protection of industrial capability (PIC) and an effort to maintain some kind of continuing operational capability through the crisis (a concept generally reserved in defense planning for industries essential to the military effort and/or to survival of the civilian population). This outlook seemed logical and consistent with overall objectives (i.e., it is in concert with IEMS, hence avoids piecemeal planning and actions) and it provided the opportunity to learn a great deal more about ORP potential seen from an industry point of view. The operations that would be beneficial to continue through a crisis period, however, were not immediately apparent. In the end, this aspect (defining company objectives in such an event) slowed down the participants' development of an OR policy basis and the subsequent ORP, but the development of a policy and operating principle is, perhaps, the most important stage in the process and one that will generally take considerable time for every company.

The industry internal requirement to continue operations in relation to OR appears to be part and parcel of its basic dedication to economic survival and

financial gain, which are the primary motivating forces for an industry to exist. The underlying characteristic here is the drive of industry and its CEO's to produce (for a profit), and our particular group could not relate to saving resources for some uncertain future just to 'sit on their hands' so to speak in an assigned reception area. If physical survival is achievable there is little point in holding production capability in limbo when survival products might be fabricated. Information provided to participants included the possibility of an extended period in the relocation mode. Consequently, it would have seemed inconsistent to argue for total shutdown.

What we see, then, is that the leaders of industry with real drive can be identified not just by an intention to survive, but to continue to exploit their expertise for maximum possible economic gain whatever the physical, economic, or political climate. These are exactly the representatives of industry most needed to support the survival effort, because they embody greater vision and drive than are generally encountered on average, and they are predisposed to get things done. These industries and the innovators that run them will find essential things to produce to support the civilian population in the evacuation mode. We suspect that some of the less innovative, if told something they could produce in such a situation, might show a great deal more interest and enthusiasm to take action.

PARTICIPANT SELECTION

There were many criteria considered for selection of the participants: belief in survival; interest in ORP, PIC, IEMS; proximity to the IEC; location in a high hazard area. At the same time it seemed desirable to have a participant that was representative of single site and multiple site facilities, of blue collar and white collar work forces, of manufacturing and service organizations. It was also desirable to have the ORP involve relocation within the same county and in another county. There are a great many additional desirables that could be named, but it was possible to have all the foregoing criteria met with just the two participants that were selected (about the maximum that could be handled effectively).

One of the two organizations chosen was a savings and loan institution, the other a fabricator of rubber products. The S&L is a service organization employing approximately 625 people in over three dozen locations; the rubber product fabricator is a manufacturing organization employing slightly over 400 people at a single site. It was also desirable that at least one essential industry be included as

a participant to test the key worker commuting and hosting concept that would enable production (even if limited) to continue in a crisis period. In our estimation both participants could be essential.

Banking institutions and facilities are essential because they are conceived to be needed at all times to carry on commerce. Despite the problem that not even a fraction of the cash that would be required to cover depositors' claims in a disaster would be on hand, modern computer facilities used by banks and savings and loan institutions could provide the means to keep track of transactions and thus facilitate recovery. To provide this service, a data processing capability (both hardware and software) defines the essential equipment that would have to continue to operate.

The rubber products manufacturer counted among its clients both the Army and the Navy, which it supplies with essential items used in both strategic and tactical military equipment. This suggests that at least part of the rubber manufacturing participant's operations is essential. However, the military equipment in which these items are used require such long lead times to construct that, most likely, they would cease to be produced during the initial crisis period and the rubber items would not be considered essential. Nevertheless, in the face of a national disaster the rubber manufacturer could produce an item that would be extremely valuable. In the manufacturer's inventory, something over a million square feet of rubber sheeting are available that could be converted into rubber bags of virtually any size desired and used as fluid containers. A very valuable use (see p. 32 and Appendix C) would be to provide drinking water, waste disposal, and fallout protection in the reception areas, simultaneously (and at the same time eliminate the need to move 1/3 of a million cubic yards of earth for fallout protection). The materials could also be used to construct large tents, as an alternative option depending on need.

HAZARD ENVIRONMENT

The S&L is located in San Carlos, a high hazard area for nuclear attack in San Mateo County, and the rubber products manufacturer is located in San Jose, a high hazard area for nuclear attack in Santa Clara County. Both are in areas of California that are high hazard areas for earthquake. Figure 2 shows the location of the two organizations. As part of the information package supplied at the Emmitsburg conference, SSI had provided data on blast environments for IEC attendees as determined from TR-82 (which was specified by FEMA as the resource

base to use for this ORP program).^{1/} Thus, the participants knew they were in high hazard areas for nuclear attack even before they became participants in the current program and were well aware they were in high hazard areas for earthquakes. Figures 3 and 4 are copies of printouts, obtained from the California Office of Emergency Services some time ago, that overlay a grid system on a map as a means to identify expected peak overpressures. Each box in the grid is roughly 2.2 miles on a side, and the expected peak overpressure at the center is printed in it. Nothing printed in a box signifies the peak overpressure there is less than 2 psi (each 2 psi is equivalent to applying a weight equal to two and a half feet of earth overburden so that 16 psi would be equivalent to applying 20 feet of earth overburden); if two dots are printed it signifies an aiming point and very high overpressures.

SAVINGS AND LOAN

In Figure 3, the box that identifies where the S&L main branch in San Carlos lies shows two dots, so overpressures expected there are very high, too high for key worker shelters onsite to be viable. Thus, the commute concept with continued operation onsite until attack warning (allowing perhaps 15 to 20 minutes to shut down and reach a safe shelter - necessarily nearby) is not an acceptable strategy. An alternative strategy has been proposed, however, to ensure continued operation whatever the disaster that causes loss of the central office. It appears to have been developed as a practical necessity of the industry.

Standard emergency planning at the S&L requires dumping of computer records to a satellite station daily. This is done through computers via landlines (telephone lines) to a branch office in an outlying area. The objective of transferring these financial records and making a redundant set is to ensure survival of as up-to-date

^{1/} TR-82 is based on assessing the outcome of one possible attack strategy - considered to represent a full attack. It assumes an adversary would select potential targets from the following list, in descending order of priority:

- o U.S. military installations
- o Military-supporting industrial, transportation, and logistics facilities
- o Other basic industries and facilities making major contributions to the economy
- o Population concentrations of 50,000 or greater

This damage assessment was maximized for planning purposes by assuming all weapons were airburst to produce the blast effects but surface burst to produce fallout effects. The attack represents approximately 1500 weapons totaling 6500 megatons allocated by a logical strategy for war. Weapon sizes and specific targets are not indicated (they are classified).

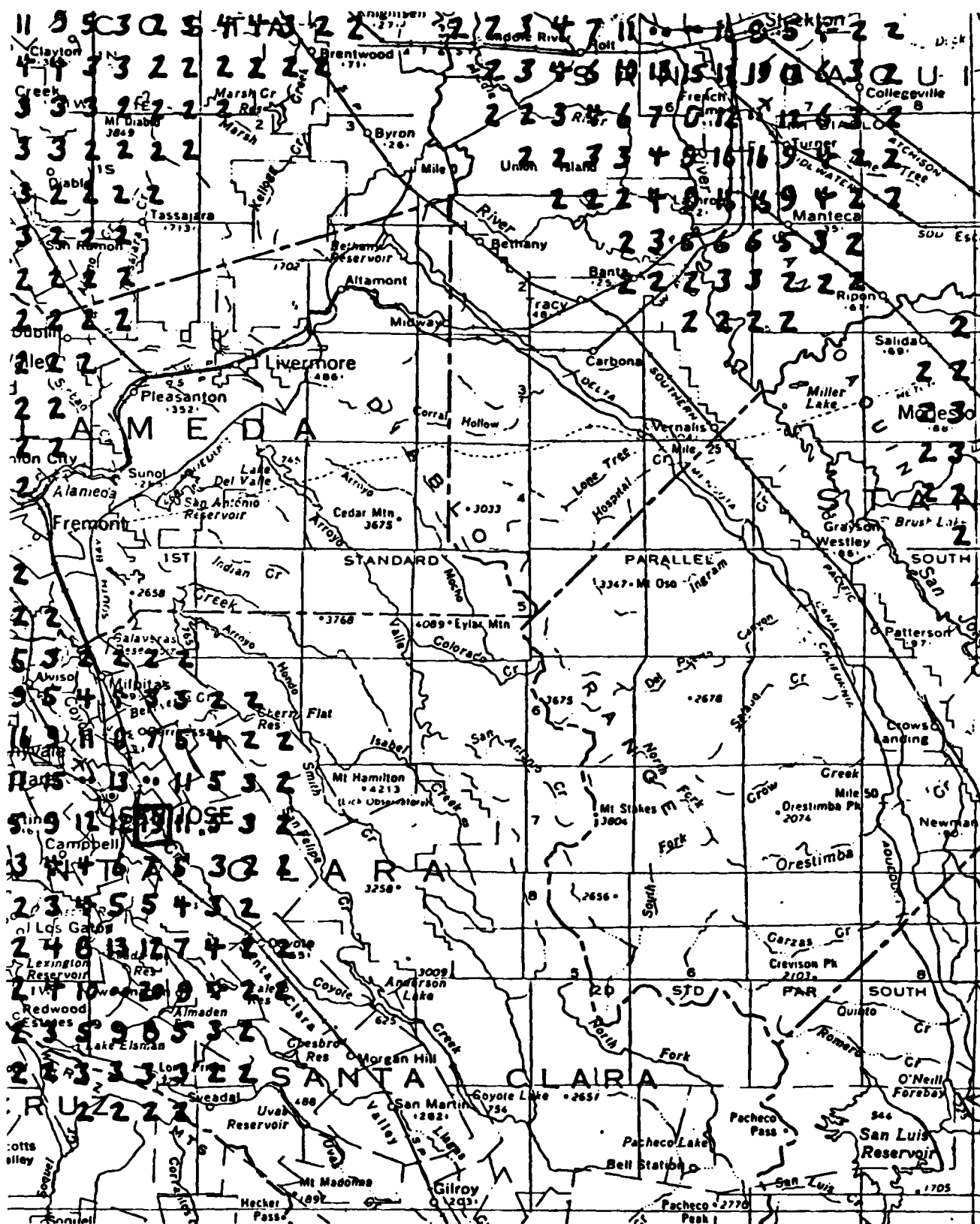


Fig. 4. Nuclear Attack Blast Environment for CD Planning, South Bay.

information as possible in case of a local disaster (assuming it does not hit both locations). Thus, it is possible to reconstruct the complete financial records (for all customers) of the S&L in a reasonable amount of time if the master set is lost. Very little cash, or securities that would be irreplaceable, are kept in the vaults so it is the computers and the financial files (computer records) that constitute the important items to preserve at this facility. When the IEC entered the scene, the S&L was deliberating an approach to make operations proof against interruption by earthquakes. This is where the IEMS concept plays a key role, the solution should be based on taking into account vulnerability to other threats as well. Hence, a threat and vulnerability analysis (Ref. 11) should be (and was for this study) a prerequisite to developing an effective solution.

The problem under scrutiny at the S&L was that all the computers were located in a single facility, so if that were lost there would be no way to update the records dumped off to the satellite station and saved (to process by hand would be overwhelming). As the organization's computer capability was to be increased in the near future by one third, it was decided to locate the additional equipment at an outlying site as a disaster preparedness measure. By operating this new equipment for 24 hours a day, it would be possible to keep abreast of the data processing for a reasonable but not extended period of outage for the main computer center. The main facility, however, was designed as a modular system, to preclude the entire system going out in event of an equipment failure, so one of these three modular units could be transferred to the new data center as an additional precaution, if desired, and if the new facility were designed for it.

Overall, the concept for ensuring continued operation of a computer capability was simple: select a second site not in the high hazard region for the same threats as the first site; choose this other site to correspond to an existing branch facility, if possible; establish all the satellite operations at the branch facility nearest the new computer facility; distribute the four modules of computer hardware evenly between sites; operate both sites regularly to ensure each is serviced and functional on a day-to-day basis; build key worker shelters at the second site if necessary; and develop an ORP based on this arrangement. Unfortunately, concepts have a way of seeming straightforward and simple to state, but in the process of developing an implementation program the specifics frequently require considerable modification and are very slow to materialize. This is apparent from the following summary of events that occurred.

Essentially, the daily use of both computer facilities was an established emergency preparedness criterion - to ensure that maintenance teams would be proficient and that the equipment would be instantly functional. Because three modules are required to be in operation for a regular day shift, this mandated continual crosstalk between facilities. The consequence is that landlines and telephone routing and switching systems are required to link the facilities, and therein lay an immediate problem - because of the split-up of American Telephone and Telegraph (AT&T) and Pacific Bell.

It would have been quite enough to deal with the fact that establishing the alternate computer facility at some of the better site locations in the state fell into significantly higher cost regions according to the new rate schedules, but there was a greater problem. Responsibility for installations in these particular areas was assigned in the AT&T domain, and the S&L was informed by AT&T that the best time schedule for implementation would be close to two years, an intolerable delay. The alternative was to seek a site that might entail more risk (but less than the risk at the present facility) somewhere in the same Pacific Bell domain as the main facility.

Several possible locations in the same Pacific Bell domain as the main computer facility were considered in terms of threats, transportation access, and communications access. Branch facilities in a suburban/rural neighborhood in the same county at Half Moon Bay looked promising. At Half Moon Bay (see Figure 2) the above identified conditions were: location where TR-82 has predicted overpressures of 5 psi (see Figure 5, which is Figures 3 and 4 combined); unlikely to be affected by the same earthquake that devastates San Carlos; single landline routing for communications; ready access by ocean but inconvenient alternatives to Highway 92 (see Figure 2) if that should become unusable. After some discussion, it was decided to look further for a site less vulnerable to communications isolation and with better land route access.

Another branch facility was located in Fremont in Alameda County. Here, the corresponding conditions were: multiple access to major highways (but no water access); multiple landline routing for communications; location on a different fault; and 2 psi anticipated overpressures (Figure 5). These characteristics seemed suitable on the face of it, but the industrial base in Fremont has grown significantly since the TR-82 study (now being updated) and it was the subcontractor's recommendation not to consider relocation there for fear it might by now be

designated a target area because it has a significant industrial and economic base. (Another area that seemed likely to the subcontractor to have become designated a target in the new laydown is Livermore, identified in Figure 5 as being located at less than 2 psi in the TR-82 attack scenario - yet Lawrence Livermore National Laboratory would certainly be ranked as a leading target, right after counterforce.)

The current choice for location of the new computer facility is in San Ramon in Contra Costa County (Figures 5 and 2), but neither the branch facility nor the second computer facility has yet been built. Pacific Bell is still looking at switching and routing options from the standpoint of disaster protection and assembling cost information. Until the facility is actually built, the S&L does not now plan to progress to a written ORP. The rationale for this decision is based on an assessment of operations alternatives. In the event a major disaster causes shutdown of the computer facility and/or the main branch in San Carlos, the OR response appears to the S&L management to be disaster specific. The rationale is as follows:

For a devastating earthquake or hazardous material spill there would be no special impetus (from the standpoint of the organization's operational and economic survival) to move families. OR for these two events would consist of moving the computer facility team temporarily to another site - one located any place where compatible computer facilities could be negotiated and the telephone company could arrange lines to the S&L branches that were unaffected. The family relocation problem appears solvable simply by providing adequate cost reimbursement for living expenses at the relocation site (there being no definite ongoing threat to families to be concerned about). Thus, OR needed to deal with an earthquake or hazmat spill event that denies access to the main branch and computer facilities is straightforward. It requires a very simple ORP, one that can be (in fact, one best) devised after the event occurs - because it is dependent on a post-event assessment of operational telephone lines and computer rental facilities that are still available.

At the S&L, then, the single disaster event large enough to require development of an OR prior to its occurrence has been determined by the S&L management to be a nuclear attack. This is because an ongoing threat of uncertain duration would exist to both the key employees (and families) and the organization. In such case, it is anticipated that family bonds would most certainly prevail over job loyalty so that it is imperative in this case to provide a solution that satisfies both the needs of the organization and the key employees and their families, simultaneously. This is where

ORP is at the same time humanitarian and good business sense (most generally an industry requirement). Accepting the merit of developing an ORP for this case, the S&L management finds its value is still contingent on having a computer facility at an alternate site, because there would be no operations the S&L could continue or initiate without resources that it would have to negotiate from some other organization, which it conceives would be extremely scarce should a nuclear attack occur. In such event, organizations having resources are the obvious ones to command them. To enter the competition it is necessary to be in command of one's own resources. Hence, the decision to establish a permanent alternate facility at a second site as a means for being prepared for the earthquake and hazmat spill threats was extended to include the nuclear attack threat through the selection of a site based on an assessment of the anticipated nuclear attack threat environment by using the State OES maps.

Once the alternate facility is completed, it will completely eliminate the concern that a total shutdown could be forced by damage or devastation of the main facility in the event of an earthquake, a hazardous material spill, or a nuclear attack. To prepare for the latter possibility, an ORP concept has been given consideration. Once the new site is installed, an ORP specifically for nuclear attack will be justified in a business sense; the OR policy, however, will be limited to moving somewhere between sixteen and twenty key members of the staff. Seven staff members are key employees associated with the present computer facility and some of these would be relocated (with families) to operate the new facility as soon as it was completed (as part of the permanent OR). It is also expected that there would be a few transferees to the new branch office and some locals hired to staff it. It is impossible just yet to tell how many personnel and their families would be involved in an OR should it be needed (though with families, the present estimate is between fifty and seventy individuals), but it is anticipated that space for a hundred individuals (give or take ten) would be adequate for fallout sheltering. This would be required for the local employees (once they are established in San Ramon at the new facilities) and for key employees relocated with families from high hazard areas. Ample space should be available in the two new San Ramon facilities themselves to accommodate this many, once shut down.

In the relocated mode and prior to actual shutdown, particularly in event of a prolonged crisis period, alternative accommodations are required for the relocatees so as not to be in the way of operations. Some (and perhaps all) relocatees might be

accommodated in the homes of local staff members so that few, if any, would require sheltering in a mass care facility. Based on an appraisal of the listing of local mass care facilities supplied by Contra Costa County Office of Emergency Services (OES), there are 1900 shelter spaces (at 40 square feet per congregate care space) potentially available at the San Ramon Valley High School. Contra Costa County planners feel very strongly, however, that all available mass care and fallout shelter facilities will be required by county residents (see Appendix B). Thus, company policy at the S&L will likely be to arrange for sheltering entirely independent of local authorities. This would be for the period both prior to and immediately following an attack - in the former case, by using local staff members' homes and garages, and in the latter case by using company facilities upgraded for fallout sheltering. Clearly, such planning must await the development of the new facilities and the establishment of personnel in the area before these sheltering resources can be identified specifically.

Although a written ORP has not been produced by this organization, some important planning steps have been taken toward an integrated emergency management systems approach. At the S&L, the IEMS concept was applied to threat assessment, to the development of plans to cope with those hazards that pose a threat locally, and to the selection of an alternative backup site. Some very real progress has been made on the problem of preparing for any of several disaster situations that could temporarily or permanently terminate operations at the S&L's main operations and computer facilities. A variety of scenarios have been contemplated, solutions debated for dealing with them, many things considered that would not have been otherwise, and a new level of awareness has been initiated that will likely be retained. As a result, the exercise has even led to a program for a permanent OR to protect a critical part of the organization. This S&L has already initiated actions that will make significant contributions to each of the three major ORP objectives listed on page 4 of this report - and that in itself is an important step forward, even if all the specific details have not yet been worked out and committed to a written plan.^{1/}

^{1/} Ref. 13 makes a case for an Eisenhower quote: "Plans are worthless, **planning** is everything." (The emphasis is ours.) We believe, as apparently DCPA did, that there is a great deal of truth to this rejoinder; we have seen too many emergency plans copied from somewhere, with company and employees names inserted to make it official - thus, a plan, but no planning or exercising to make it viable or functional.

RUBBER PRODUCTS MANUFACTURER

In Figure 5, the box that identifies where the rubber products manufacturer is located shows a reading of 19 psi, an overpressure that is low enough for key worker shelters onsite to be viable (one of the situations we desired to explore). Here, the commute concept with continued operation onsite until attack warning is an acceptable strategy, provided a key worker shelter is located onsite or nearby. (At present, there is not now such a shelter onsite, nor anywhere within a reasonable distance, but one is contemplated - see Appendix C - and is a necessary element in this participant's ORP development.)

Contact with the local (city) OES yielded little information (see item "a 1." of the letter in Appendix A). A telephone contact with a staff member in the county OES provided copies of the National Facility Survey for the county (updated by the local communities). As in Contra Costa County, the number of adequate shelter spaces is limited in Santa Clara County while the 'grass looks greener' in the adjacent Santa Cruz County (based on overpressure information in Figure 5). An early contact with the OES in Santa Clara brought the suggestion that Santa Cruz would probably be the best area to consider for an OR program. This does not seem to be a case of 'passing the buck,' but rather a part of the problem brought on by Senate Bill 123, which has precluded, at all levels in the state, further effort to develop and coordinate evacuation plans associated with nuclear war.

Further examination of Figure 5 shows that there are equally good prospects for negligible overpressures in Santa Clara County, e.g., Morgan Hill and Gilroy. These two communities are located at highway distances of 20 and 27 miles away as compared with 32 miles to the city of Santa Cruz. When the nature of the highways is examined, the one to Santa Cruz is a two-lane (in each direction) winding road over the Santa Cruz mountains that could probably be negotiated in 30 minutes (when there is essentially no traffic - as in the relocation mode). The highways to Morgan Hill and Gilroy are straight lines with four lanes (each direction) that can be negotiated in 15 and 20 minutes, respectively, under similar conditions.

Actually, forays were made first to Uvas reservoir and Anderson Lake (see Figure 5). These areas seemed attractive in that a water supply was assured but, unfortunately, there were few habitable structures available so these two locations were necessarily abandoned in favor of possible relocation to Morgan Hill or Gilroy.

Nevertheless, accessibility of a considerable store of water remained an important consideration. In addition to the problem of being confined to a shelter for two weeks (with no assurance that the plumbing will work and no way to rectify it), there may be need for a considerable supply of water for decontamination purposes.

Further thoughts on water supplies are of interest as a side issue here because they demonstrate the innovative talent that industry can apply - once interested. Setting aside the problem of a water supply for decontamination purposes and concentrating on shelter needs, even restricted to one gallon a day per person, a store of two cubic feet of water per shelter space is required to provide a two-week supply. This should then be doubled as an emergency measure, and there is also a need to provide for food storage and waste disposal (maybe another four or five cubic feet). Out of 80 cubic feet of space per person, food, water, and waste will take seven to eleven percent of the available volume unless there is a safe, easy, reliable way to move it in and out of the shelter. An ideal solution seemed to be to combine the need for water and waste disposal via a single, double-compartmented package. Placed on the shelter roof the mass would provide radiation protection and eliminate many man-hours of labor to provide earth cover for this shielding (see Appendix C). Containers of this sort are relatively simple for the rubber products fabricator to produce. A letter on the subject to FEMA from the participant in this program is included in Appendix C. Some half a million square feet of double compartment containers could be produced with materials on hand. (Similar containers have been tested in the early days of nuclear weapons testing and found to survive 9 psi blast loadings readily.)

Returning to the problem of a relocation site, both Morgan Hill and Gilroy are sizable communities (20,000 to 40,000), with Gilroy the larger of the two. National Facility Survey (NFS) listings provided by the County OES show few fallout shelters at either location so the subcontractor, SSI, decided to examine some of the mass care facilities to determine the extent to which these might be upgradable. Contact with the local OES in Gilroy provided a source in the Red Cross who furnished a copy of the mass care facilities compiled for Gilroy. It was estimated by the Red Cross that there were probably spaces for twenty to twenty-five thousand individuals in the aggregate of these facilities. A number of facilities were picked at random and plotted on a local map of the city and a tour was made to check out about 15 of them to see what kind of opportunities existed for conversion to fallout shelters. Many were unsuitable altogether. Of the four found suitable to upgrade, only one

seemed worthwhile (the library) because the level of effort required to upgrade the others was too high per shelter space developed. A little more searching through town turned up another promising prospect (and undoubtedly there are more), which was an abandoned Department of Employment building. Appendix B provides photographs showing five of the facilities that were visited in the tour, including the two promising prospects for use as fallout shelters.

Conversion of the library would be simplest. Most of the books would need to be moved to provide room, but some could be used as room dividers with the majority moved to the outside walls to provide radiation shielding there. The roof could be shielded easily with one of the water-filled double-compartmented rubber bags - after shoring inside to take the load. Covering the roof would require 14,000 square feet of the available 500,000 square foot inventory of finished bags (i.e., 2.8%) and would produce 1900 fallout shelter spaces at Pf 65. At this rate, rubber sheeting on hand could provide for 60,000 shelter spaces. Conversion of the abandoned Department of Employment building to provide fallout sheltering could be done entirely with waterbags. This would require eight bags (see Figure C-1) and 12,000 square feet (2.4%) of inventory to produce 800 to 900 shelter spaces. Using this technique (to provide both the roof and wall shielding) the shelter spaces that could be produced out of the total inventory would be limited to 35,000. Other materials are needed for this particular shelter upgrading design, however. (This includes 280 each 2x10's 21 ft long, 30 each 4x4's 15 ft long, 300 sandbags plus 9 yards of sand or dirt to fill them, and 140,000 gallons of water.)

An optimum application of water supply and shielding would be to use it in conjunction with railroad and highway tunnels. For example, there are three highway tunnels over 3,000 feet long that join Contra Costa and Alameda Counties, two of which would not be required in the relocation mode. There is also a railroad tunnel 17,000 feet long that would not be in service at such time. It would take only 45,000 square feet (9%) of inventory to close the tunnel ends and supply water and waste disposal for 43,000 sheltered spaces having a Pf of 100+.

Because the public sector inventory of fallout shelter spaces (both 'as is' and upgradable) is generally less than 10% of the space required by local residents (true in all the counties where we looked), finding sufficient OR spaces in public structures close enough to make commuting possible looks to be a questionable concept in major metropolitan areas. Moreover, the additional problems of getting

space allocated, and having that remain valid (even for the much less demanding OR concept industry seems inclined to support, i.e., key workers and their families, only), would seem to mandate that OR sites be found in the private sector. Our rubber products manufacturer found such a site in the Morgan Hill area, in an orchard where there was also a plentiful supply of well water, fruit and nut trees, and a truck garden, plus a barn-like structure with a concrete floor area of 1200 square feet. With use of the technique shown in Figure C-1 to supply water, waste disposal, and shielding, the 30 ft x 40 ft structure could supply 190 shelter spaces - about 80 more than required. Thus, the resources of the organization (labor, materials, equipment, know-how) could be supplied to create fallout shelters for the relocated personnel and their families - plus the owners and all their relatives in the area (several families) as a cooperative survival enterprise. Moreover, the extra spaces remaining could be bartered for special needs (see Appendix C) such as additional shelter materials, food supplies, gasoline for company vehicles. To solve the problem of crowding in the relocated mode when fallout is not a problem, additional rubber sheeting could be used to put up several tents (using a simple pipe framework) to provide mass care facilities for the estimated 30 key employees, 70 family members, relatives of the property owner and their families, and bartered spaces.

In conjunction with the ORP, the rubber products manufacturer developed a PIC program. Key elements of this are described in Appendix D. For the S&L, the permanent OR for half of its computer capability is equivalent to a PIC program. On implementing an ORP, the equivalent data processing capacity of the total S&L facility can be achieved by running two shifts at either of the two units. Thus, no production capability need be lost.

Section 3
SUMMARY/CONCLUSIONS/RECOMMENDATIONS

SUMMARY

This study was initiated to develop ORP's using an IEMS approach and to identify problems, successes, and lessons learned in conducting the study (these are reiterated in outline form below). IEMS is a relatively new strategy for dealing with emergency situations and its objective is to ensure better overall disaster coordination and efficiency in the process. Clearly, a comprehensive multi-hazard approach is implied in such an integrated effort, and attack-related Civil Defense (CD) must be an integral part. Hence, treatment of CD aspects (nuclear attack preparedness, including the protection of industrial capability, PIC), were specifically called for in the Statement of Work. With regard to discoveries relating to civil defense, some problems (and lessons) that need to be resolved (or applied) were rediscovered (they were already in print - Refs. 3, 2, and 14). Perhaps IEMS will speed this process of resolving problems and applying lessons learned in relation to CD, but surely not where CD is deliberately left out of the multi-hazard analysis.

Many of the observations that have been made herein relate especially to civil defense. Industry has given a general indication that a multi-hazard treatment under the IEMS concept will make CD aspects more palatable - a FEMA objective. This industry preference for IEMS and a multi-hazard treatment does not necessarily mean that industry wishes to dismiss civil defense, but rather that it wishes it kept in perspective (measured on an industry frame of reference, keyed more to day-to-day problems and emergencies). If CD has seemed to be the lion's share of our study, the rationale is as follows. CD is too important to national survival to be played down or ignored in applying the integrated emergency management systems approach. A nuclear attack - no matter how unlikely - is potentially the most damaging disaster threat to the nation that is conceivable, and the purpose of developing an ORP in the first place is to mitigate against devastating major disasters, not minor day-to-day ones, which certainly do not require organizational relocation.

It is our belief that the items listed below have had (and probably will continue to have) an important bearing on how OR and ORP are developed by industry.

Nevertheless, we grant that the study conducted has been quite limited in scope. A myriad industries of different types exist, many of which are critical to the United States economy and its political and military might. Two case histories are certainly inadequate to describe more than a vestige of the situation (so generalizations therefrom are risky), but they can be used to provide some insights. Another aspect that should not be generalized without further assessment depends on whether the situation pertaining in California is widespread or unique. (In any case, this state represents over ten percent of the population of the country and produces over half the nation's food supplies in many categories, so its status regarding CD preparedness should be of general concern.) Thus, no matter whether the situation in California is unique, it seems important to us to deal with this problem. Moreover, assessments of the situation in other locales and climates (including political) would seem to be desirable, if not prudent.

Many of the items listed below were either observations of industry, or are simply facts, but some are viewpoints that might be construed as conjecture on the part of the contractor; those that fall in this category have been marked by an asterisk.

General Problems:

- (1) Legislative actions taken at the State level (in California) specifically designed to impede ORP (California Senate Bill 123, of record).
- (2) Lack of a functional infrastructure (in California) in either the public or private sectors that can support a truly integrated ORP (and PPP) at present (also a result of SB 123).
- (3)* A need for industry to find its own shelters in case of nuclear attack (in most California communities).
- (4) Lack of a program tailored to reach CEO's, the decisionmakers in industry (a repeated observation by industry representatives, including CEO's).
- (5)* Lack of a Federal policy that is able to deal decisively with the basic problems identified above (e.g., such as in the second paragraph within the quote on page 9).
- (6)* A basic general-public understanding, belief, and resolve regarding nuclear attack and survival options needs to be developed in this country to serve the public and provide a grass roots basis for

effective development of survival activities (e.g., activities in support of such as PPP and ORP).^{1/}

Program Successes:

- (1) Pre-designated relocation sites have been established for key employees and their families from the two participating industries (with specific addresses for one of these).
- (2) Organized groups from the two participating industries now have plans that are likely to reduce the overall burden on population protection planning and operations in their communities.
- (3) Continuity of operations and an ability to make a real contribution in the crisis period in case of the threat of a nuclear attack (desired goals) were not only an outcome of the ORP effort, they were an industry prerequisite to continued participation.
- (4) Mutual aid, reflected by arrangements developed for acquiring needed resources in exchange for a place and role in the group ("networking"), appears to be a natural outgrowth of ORP developed through independent industry action.
- (5) Project effort helped to contribute to a decision by one of the participating industries to establish a permanent relocation site for one-half of its most critical element as a means to ensure uninterrupted operations - this permanent "dispersal" was the outcome of considerations to make the implementing industry less vulnerable to any disaster (an IEMS objective).
- (6) Evidence of innovative talent and ingenuity (including "networking") on the part of industry was identified that has not yet received much consideration in existing planning documents.
- (7) As an outcome of one of the Emmitsburg conferences on protection of industrial capabilities, a participant involved in this study completely changed belief and attitude towards individual and plant survivability and developed sufficient interest in civil defense to wish to participate in an ORP development program.
- (8) The industry participant in 7 above believes the facility has been better able to relate civil defense efforts to other emergency preparedness projects.

^{1/} As a basis for this conjecture, we cite item 7 in the next category, and civil defense efforts in Sweden, Switzerland, Norway, and other countries, all indicative of positive actions that develop out of positive attitudes.

Lessons Learned:

- (1) ORP's developed by industry in peacetime for national emergency use will have to satisfy industry's need for economic as well as physical survival.
- (2) Consistent with the above, industries that develop ORP's in peacetime for emergency use will generally design them for continuing production in the crisis period rather than as a mechanism to provide pre-organized units for reception area assignments.
- (3) OR implementation planned by industry in peacetime will most likely be limited to a small percentage of employees who are considered critical to solving problems and/or capable of engineering recoveries from disaster.
- (4) Industry leaders expect to satisfy general labor needs following a national emergency out of the reservoir of surviving population, post disaster.
- (5) No satisfactory public or private information is yet available (in California) that identifies suitable sites specifically for the implementation of OR.
- (6) Lack of a coherent, consistent, coordinated disaster preparedness program in the public sector in California (because of the limitation on civil defense aspects) did not go unnoticed by the participants (see Appendix A). *This sort of circumstance cannot possibly have either a positive or neutral effect on those that put forth effort to develop a realistic ORP within the state.

CONCLUSIONS AND RECOMMENDATIONS

Recognizing that only two industries in a single locale out of hundreds of thousands in the United States were involved in actual plan development^{1/} - we have been called upon to interpret the results, generally. From the various points made in the summary, it seems to us that industrialists, in general, will probably approach OR like any other business proposition: they will require out of it something commensurate with what they put into it. Plans may be expected to be short and to the point, will encompass more than evacuation, will be designed principally around

^{1/} Others were involved until two were selected, so items in the "lessons learned" category are observations based on more than just two.

self-starters and innovators (rather than the masses), and may bypass involvement with authorities.

- * In some locales this may occur both frequently and beneficially, the latter because it may be necessary in order to make any progress - particularly where help does not seem to be forthcoming, for whatever reason.

Whatever the motivation, industries' efforts at ORP will reduce the burden on local authorities in regard to both population protection planning and its execution. Thus, it would pay local level public planners who were serious about civil defense planning to foster development of ORP's by industry.

With regard to specific support for OR development currently available from local government through the public sector infrastructure established to support emergency and disaster planning and preparedness, our industrialist contacts do not feel they have the time to spend digging for information that ought to be generally available and supplied automatically. This lack of ready access to pertinent information will undoubtedly change as a result of recent efforts to initiate multi-hazard assessment at the local community level, but this will take time. At present, it appears to us that development of a manual on OR/ORP to provide guidance to local offices of emergency services (rather than to industry), might be a more profitable way to speed implementations by industry. Such a manual should include a list of information to be developed by public planners to supply to industries who may request OR/ORP information.

In regard to an overall rate of progress toward general industrial preparedness for disaster, and to civil defense preparedness in particular, the latter seems slow to develop in relation to world events. Granted - there are more industrial facilities today prepared to deal with disasters, in general, but there are fewer that have achieved the level of civil defense preparedness that existed in industry in the early 1960's. Our interpretation is that civil defense has lost ground, particularly when the risks of a major disaster have increased (more nations now have nuclear weapons). Currently, the infrastructure of knowledgeable individuals at the local level who can provide organizational relocation guidance to constituents that will include the subject of civil defense has been compromised in California. (This is a fact by design of the California Legislature that should raise questions about the state of affairs in the rest of the country.) The circumstances encountered in the locale where this study was performed were not strictly the fault of the individuals

involved (though sometimes some of the blame can be laid there), rather the responsibilities of these individuals to this task have been subverted. At a higher level, we are made to believe this is presumably a result of public opinion. Yet, polls show that the general public favors a strong civil defense and disaster preparedness. We can only note that one or the other of these must surely be incorrect.

The above observation concerning the apparently conflicting aspects of public opinion may appear to diverge from the topic at hand because this study was not assigned the subject of assessing public opinion, but we believe it has affected the program significantly. It certainly appears to have damaged the morale of some of the public sector emergency planners who have tried to support civil defense as part of the task they were put in place to do. One of the realities of this particular situation has been the requirement for action by the two participants without public sector coordination (admittedly, however, with guidance provided by the contractor and subcontractor). Action by the participating industries independent of local government planning was not the direction preferred by FEMA. Nevertheless, it is our conclusion that this study did result in beneficial outcomes for the two industries, and for their communities as well. In the long view, this approach involving supplying a knowledgeable private contractor to industry may not be practical as a general procedure. We do not believe there is a sufficient infrastructure of private consultants knowledgeable in disaster preparedness in general, and civil defense in particular, to support widespread ORP development - and the cost to proceed with private consultants, if there were a sufficient number, is likely prohibitive. It might be beneficial, however, to use this approach to ensure initiation of a few industry OR/ORP projects in each FEMA region to serve as models.

Aside from the public sector guidance problem, there appears to be a great deal of latent promise within industry once it does get to thinking about the problem, and a program to identify the extent of this promise and then to tap it would seem to be highly desirable. A prerequisite to such an effort is a program to get industry thinking about the subject. The Emmitsburg conferences were a start, and industry participants themselves identified the need for such programs specifically designed to reach CEO's. One of the pieces input by industry participants at the Emmitsburg conferences indicated a very high level office (cabinet member or the Vice President of the United States) would be required to initiate such action if it is to get the attention of many CEO's.

In summary, despite the drawbacks cited, we believe that the results of this study were positive and that similar attempts to foster industry development of ORP's in other regions, where there is less or no hampering of local emergency planners, might be considerably more positive. But there is no way to know this for certain until it is assessed. Enough information does not yet exist to apply the limited ORP development results to date to produce general guidance for industry; two industries are a far cry from being representative of all industry - and other industries, particularly in other areas, are needed to conduct similar efforts to establish exactly what the capabilities of the infrastructure for local guidance might be, nationwide. A follow-on program conducted in other regions by additional mutual aid groups is recommended to help achieve this and to assess what other contributions industry may conceive in the process.

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APPENDIX A

**PARTICIPANT'S LETTER
FOLLOWING EMMITSBURG CONFERENCE**

APPENDIX A

Subsequent to the Emmitsburg conference, a survey questionnaire was sent out to the participants requesting answers to specific questions; there were many respondents. These letters were available to the subcontractor (SSI) on this project by virtue of participation in those earlier conferences. In reading the letters, members of SSI's staff found, by and large, that they all included serious attempts to be helpful to the conference objectives and to FEMA. Proof of that lies in the participation of two of the hardest judges of that conference in the ORP development project being reported on here.

The letter that has been duplicated and included in this Appendix was considered by SSI to do the best job of expressing the key attitudes that this contractor has encountered in its many industry visits and consultations over the last seven years. The letter was written after an attempt by its author to apply what was promulgated at Emmitsburg, and it includes an honest and succinct appraisal of civil defense programs and agencies in his area. Knowing the author of the letter personally, being aware of his dedication to emergency planning and preparedness, and knowing that his interest and concern for civil defense far exceed that of the average CEO, we deemed it important to get a wider audience for the messages in his letter. All of them are important to survival in a nuclear age, and some of them are particularly pertinent to a program to develop ORP's in and by industry.

Lt. Col. Eugene A. Lupia
Acting Chief, Industrial Protection Division
Office of Civil Preparedness
Federal Center Plaza, Ste. 625
500 C Street, SW
Washington, DC 20472

Dear Colonel Lupia:

In response to your request to comment on the eight points of our civil defense program, and on plans for a viable program:

- a. "Civil Defense Program in general, and the Protection of Industrial Capability Program in particular."

This question must be answered from two points of view:

1. Currently at the local government level, I cannot detect that we have any civil defense program whatsoever. Santa Clara County has an Office of Emergency Services, and plans for some types of emergencies; however, by design, no plans for nuclear incident, accident or war.

I know of no plans in the industrial community for protection of industrial capability, other than on a plant-by-plant basis, plans to mitigate problems from fire and earthquakes. I know of no coordinator of these plans on a plant-to-plant basis or with local government. Most plants have no plans for any emergency. ***** has an active internal fire prevention program with trained employees. We are currently upgrading our building and equipment to meet the requirements for survival in a 7.0 Richter Scale quake.

2. Responding to this question as related to the FEMA presentation:

It unquestionably brought to my attention the magnitude of the problem of civil defense and the lack of any preparedness for protection of industrial capability in light of the potential for an international nuclear crisis.

The presentation for industrial protection was too generalized to formulate plans that would be of value to my organization. However, it did demonstrate that procedures could be employed to protect some industrial equipment at some level of blast pressure, and that methods could be employed to protect the industrial population. Thus, I left the session with information that was new, and certainly of value, to me.

- b. "Specific suggestions you would offer regarding improvements that might be made in the formulation and execution of the Protection of Industrial Capability Program"

In order to improve the possibility of the execution of the P. I. C. program:

1. FEMA must define and/or create a reason why local governments and industries would develop cooperative plans for P. I. C.
2. Pre-crisis plans are imperative for an effective program, for both local government and industry.
3. Pre-crisis plans must be funded and implemented.
4. The Federal Government must fund pre-crisis plan implementation or it won't happen. Funding could be through tax incentives, or through a requirement of qualification as a prime or subcontractor on DOD contracts. The same condition should apply to public and private utilities and to the suppliers to such utilities. Also, a similar requirement to food processors and suppliers to the food processors.
5. More definitive costs of various methods of people and facility protection.
6. New Federal government emergency regulations that would allow for the fiscal or economic survival of corporate entities after a major nuclear exchange.

If a corporate entity had no assurance of its economic survival, even with the most comprehensive facility protection program, it would most likely not invest or implement a P. I. C. plan or program.

FEMA must develop communication with the CEO's of industry to promote this program. The plan most likely to bring the CEO's to Washington to hear the FEMA pitch would be an invitation to the meeting by the appropriate member of Reagan's Cabinet, and an introduction to the program by a Cabinet member. Also, first-class airline ticket and accommodations.

- c. "With some time passing for reflection, what is your reaction to the Guide for Business and Industrial Protection."

The Guide for Business and Industrial Protection is, after a week of review by and with knowledgeable people, a viable document, although it is poorly written in some chapters. But, as it is written now, it will most likely do very little to promote a P. I. C. program.

I have not reviewed any of the reference material listed in the Guide, having some of this reference on hand may add to the credibility and value of the Guide.

- d. "What you and/or your firm plan to do with the Guide..."

I plan to use the Guide in discussions with the appropriate employees on the potential problems and protection possibilities from a nuclear incident, accident or war.

Will use it as a source material to determine how protection from other hazards might also be protection from nuclear crisis. It should help us look at the commonality of protection from a multi-hazard program of industrial protection.

- e. Your reaction to this workshop".

My overall opinion of the workshop was that it was excellent, well structured, with quality speakers and staff, good location, fantastic food, lousy beds.

- f. "Your reaction to our planned follow-on events..."

I will encourage our CEO to attend the proposed meeting in Washington. I will, if possible, return for the two-day follow-up. Probably will not have had time to make meaningful modifications in protection plans. I will meet with the local Civil Defense/Office of Emergency Services coordinator and share with him my knowledge and concern with the lack of planning.

- g. In what other ways, if any, would your firm be willing to assist us..."

In any way that we can, under the economic constraint of the times.

- h. My comment on the IEMS program concept, and our involvement:

The IEMS concept will, for certain, expand the cost and complexity, for the Federal government, in developing a program for P. I. C. However, I think that this is the only way that planning of this magnitude will be accepted by the majority of the industrial firms or the majority of local government.

Sincerely,

APPENDIX B

OES SUPPORT MATERIAL

APPENDIX B
ORGANIZATIONAL RELOCATION MATERIALS SUPPLIED BY
STATE AND LOCAL OFFICES OF EMERGENCY SERVICES

In the course of this program, contact was made with the Office of Emergency Service (OES) at a number of levels and locales. These OES contacts included the State; the counties of Contra Costa, San Mateo, Santa Clara, Santa Cruz; and the cities of Gilroy, San Jose, and Santa Clara. OES agencies throughout the United States have been charged with the responsibility for coordinating emergency response and preparedness, generally, so have an important role to play in situations where evacuation is required. These coordinating roles are critical to the establishment of efficient evacuation routes, safe relocation areas, mass care facilities, and protection from subsequent threats (e.g., fallout). Evacuations may be required to prevent loss of life posed by a variety of threats associated with: floods, hazardous materials spills (including events such as Three Mile Island), hurricanes, earthquakes, and nuclear weapons. The IEMS strategy calls for an integrated approach to evacuation requirements. Organizational Relocation is also a strategy, i.e., an evacuation strategy involving additional sophistication and, therefore, the need for additional coordination. Whether it will work and accomplish its objectives is highly dependent on how well this coordination is developed; that will be evident in the nature of the materials available and supplied to industry for the OR task.

Materials developed by the state OES include maps such as those in Figures 3 to 5 in the main text. (These maps relating blast overpressure to geographical location were obtained by the subcontractor, SSI, before this contract was initiated.) In response to a telephoned request to the State for support to develop an industrial ORP for this program, however, no materials were received. Following a quarterly project report to the project director indicating this circumstance, a letter (attached to this appendix) was received from the State of California OES indicating why support could not be provided.

Contact with the company that served as a principal civil defense contractor for the State brought essentially the same response, i.e., an inability to help because of Senate Bill 123. The report the State's contractor was compiling on population relocation, commissioned by FEMA funding to the State, was never completed

because of the Senate Bill "budget control language" restriction. The report would have identified relocation sites for populations located in nuclear attack high hazard areas. That contractor did supply this project with a computer printout of population by county indicating allocations to other counties, but no listings were available that could be used to identify shelter facilities for OR (i.e., locations within a reasonable commute distance).

Contact at the county level produced considerably more information than that just described. San Mateo County provided a copy of the mini-plan for evacuation of San Mateo County, copies of the OES Directories for Regions 2 and 4 (areas in each would be involved in the relocation of San Mateo's population), and National Facility Survey (NFS) data for San Mateo County. No specific information on where to relocate key workers from organizations that would be involved in essential production in San Mateo County was available. (There is no information available to identify the essential industries in the county.)

Contra Costa OES provided a list of mass care facilities, NFS data, and information developed in a recent assessment of multi-hazards for the county, the latter as a result of a specific request from SSI for this information. (Because this county became the choice of the S&L participant for both a permanent OR project and an emergency ORP in case of nuclear attack, the NFS information for Contra Costa is of more interest than that for San Mateo County. More on this subject is described later.)

Santa Clara OES provided a list of shelter facilities in the county and a contact at the Red Cross who provided a list of mass care facilities in Gilroy.

City of Santa Clara OES indicated the prevailing movement in relocating would be toward Santa Cruz County, but there was no official declaration on the subject.

City of San Jose OES indicated that there was no official pronouncement on relocation because of Senate Bill 123. An additional observation was that it looked as if civil defense would stagnate until the Federal government took a stronger interest in it, i.e., by challenging the Senate Bill and by applying IEMS at the Federal level and including shelter space in new Federal buildings (one just completed in San Jose has no sheltering capability).

Santa Cruz County OES indicated that rumors about turning away evacuees in an emergency was incorrect, but that public feeling had put a damper on any attempts to organize and coordinate sheltering in the county. Nevertheless, every effort would be made in an emergency situation to care for evacuees (but there are no plans specifically for the nuclear attack problem).

Gilroy OES provided a tour of the city to show mass care facilities available for emergency situations and indicated these were precisely those facilities on our Red Cross list, i.e., not designated as fallout shelters.

Excepting Santa Cruz County, all of the other county OES contacts pointed out that the majority of NFS facilities listed as fallout shelters in their counties were located in high blast overpressure regions, so were of little use for nuclear attack purposes as they were unlikely to survive.

Using the Contra Costa NFS data and the map for the area that has the overpressures printed on it from the TR-82 weapons laydown, the fallout shelter space identified in blast zones where pressures were expected to exceed 20 psi were written off. The rationale for this action is that no study has been made to determine the extent to which any of these might be upgradable to survive 20 psi, and there is a 75% chance anyway (based on 1 Mt weapons and the grid areas represented) that the overpressure (in each box with two dots in it) will exceed 20 psi where a shelter is located. The shelter space remaining in public buildings after this deletion is made will be adequate for only 6% to 7% of the county's population. Some of this space will be required for key worker relocations sites for essential industries located in Contra Costa County, and quite likely the remainder will not satisfy county needs for emergency services personnel (hospital, fire, police). It is anticipated from looking at the data in San Mateo and Santa Clara counties that the same sort of situation prevails there.

Thus, it becomes apparent that a major shelter space allocation study is needed that takes into account blast overpressures, locations of essential industries, needs of the local county for space, etc., before critical information required for developing an ORP will exist. Without first establishing this basic information, it is questionable if the necessary coordination of evacuation routing, allocation of space, transportation facilities, food and fuel supplies, etc., will occur. Absent an established level of coordination in the areas just mentioned that will supply

industries with information and methods to enable them to draw up an ORP that is likely to be operationally sound, it is unreasonable to expect industries to make detailed plans on their own with so many opportunities to have them short-circuited. In such instance, the only alternative to prevent frustration and abandonment of the project is to use the procedure applied here -- have a qualified contractor provide the guidance. The major drawback with this approach is that there is no widespread infrastructure of qualified contractors to undertake the task.

Using the limited data provided, the co-project manager and a qualified civil and structural engineer on the subcontractor's staff examined structures in Gilroy, all but one of them identified on the mass care facility list supplied by the Red Cross. Figures B-1 through B-5 show a cross section of available structures. Two of them were considered adequate for rapid upgrading to provide fallout sheltering in an emergency situation. The method proposed for the building in Figure B-4 is described in Appendix C.

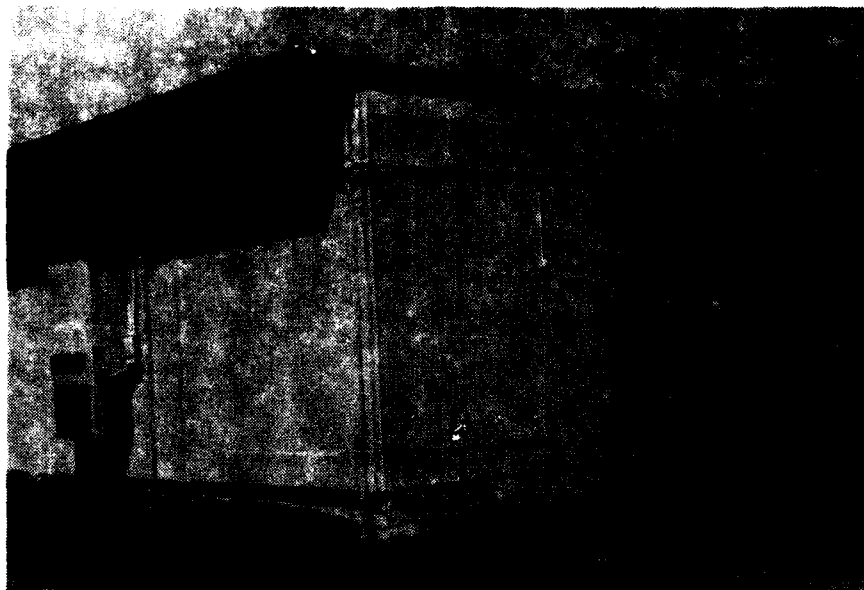


Fig. B-1. Potential Mass Care Facility (School).



Fig. B-2. Potential Mass Care or Fallout Shelter (Jr. College).

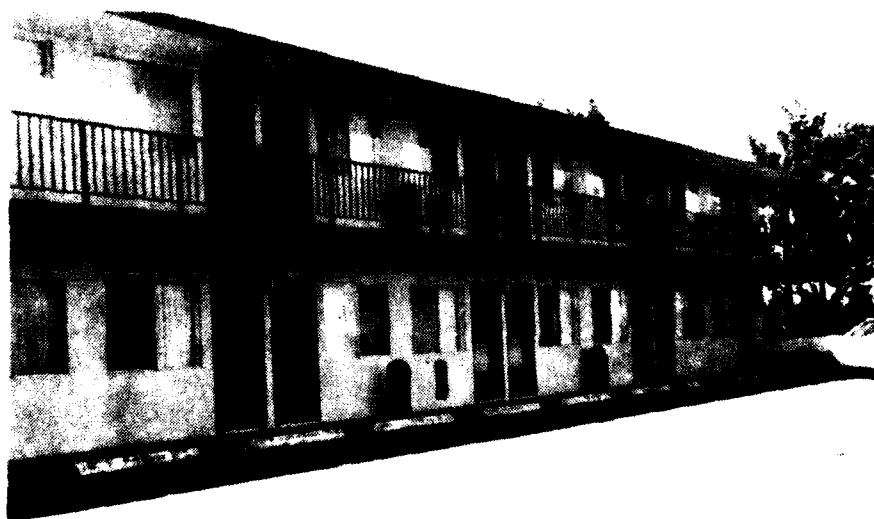


Fig. B-3. Potential Mass Care or Fallout Shelter (Motel).

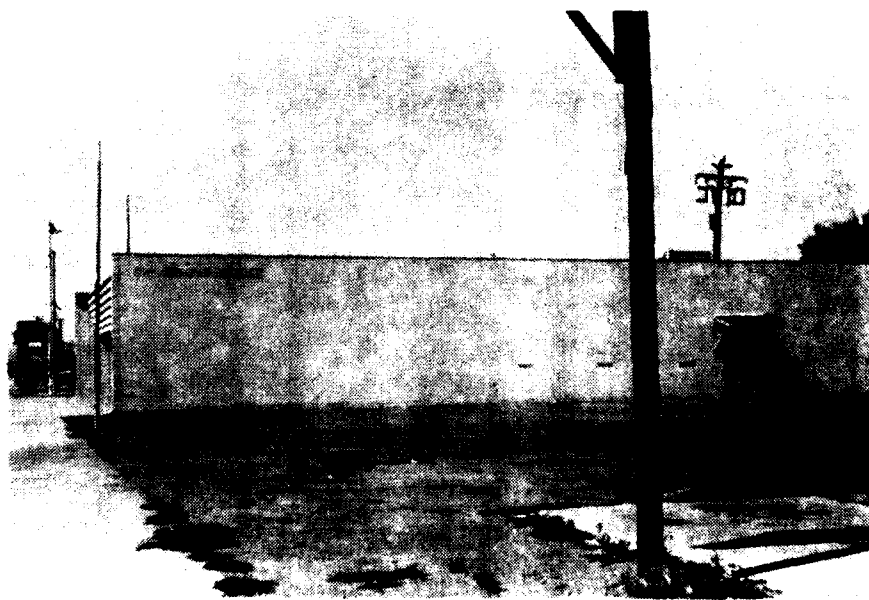
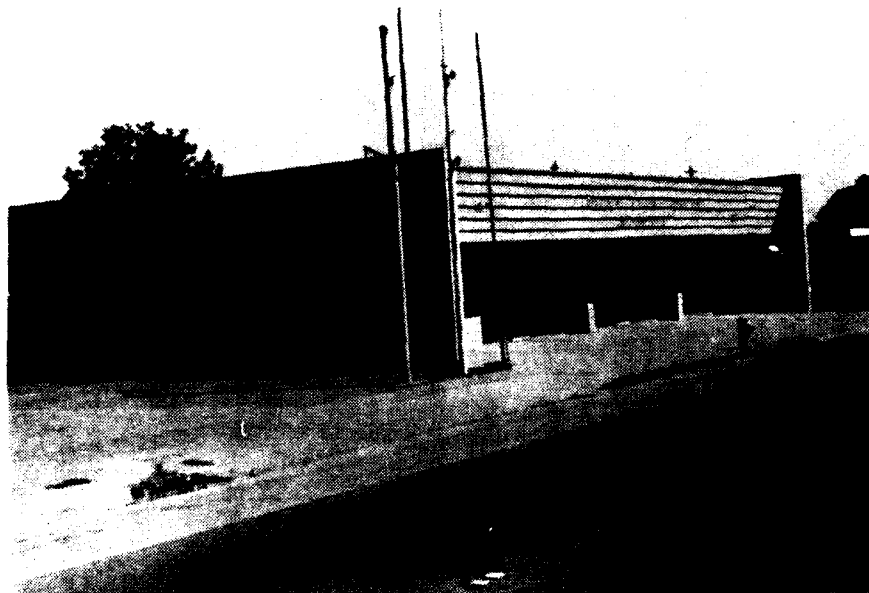


Fig. B-4. Potential Shelter (Dept. of Employment).

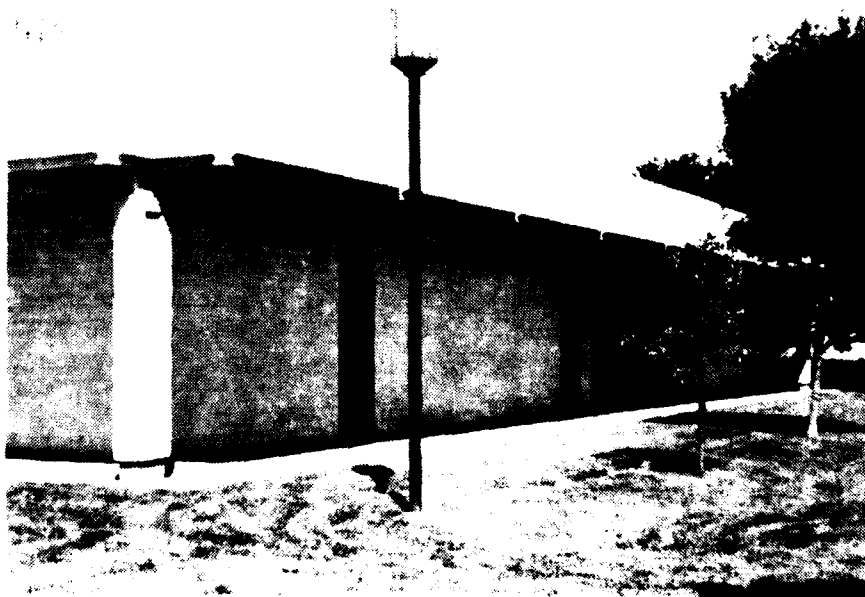


Fig. B-5. Potential Shelter (Library).

OFFICE OF EMERGENCY SERVICES

POST OFFICE BOX 9577

SACRAMENTO, CALIFORNIA 95823

(916) 427-4998 427-4205



May 10, 1984

Mr. J. O'Donnell
Industrial Emergency Council
c/o South County Fire
666 Elm Street
San Carlos, CA 94070

Dear Mr. O'Donnell:

A copy of your April 13, 1984, letter to Mr. David Bourdon was provided to our office by FEMA Region IX.

Upon reading the letter, I thought it might be useful for you to have a copy of the budget control language in effect in our current budget year which was imposed by the State Legislature. Needless to say, this control language tends to impede our full participation in your project. We are not sure what will happen in next year's budget bill.

I am assuming that you are familiar with the draft NCP plan prepared for California in 1981. If you do not have a copy of this document, we can provide a copy to you. Also, we would like a record of the representatives contacted in host areas, as indicated in your letter, for our county files.

If we can be of any further assistance, feel free to call me.

Sincerely,

A handwritten signature in cursive script that reads 'Donald Pinegar'.

DONALD PINEGAR, Chief
Civil Protection Section

enclosure

APPENDIX C

SHELTERING

APPENDIX C

SHELTERING

SAVINGS AND LOAN

The OR policy of the S&L is essentially to implement a permanent relocation of part of the organization (both equipment and personnel) right now. This relocation will protect the organization's most critical production element, its computer capability, by relocating half of it. The new site is located where the hazards are the same as, but the threats posed are different from, those posed to the present facility. The TR-82 prediction at the new site is for less than 2 to 3 psi where it is fairly easy to upgrade a structure to survive the blast environment and also provide fallout protection (see, for example, Ref. C-1).

With this organizational change, the S&L will be able to solve its most pressing sheltering problems, whatever the disaster event. For the worst case, a nuclear attack, the new facilities (both computer and branch office) can be used to provide fallout sheltering when needed. In the interim, relocated key personnel and their families can be accommodated in homes of staff personnel permanently reassigned to the area. Thus, critical sheltering is provided without any demands on the public sector reservoir of shelter spaces, either fallout or mass care.

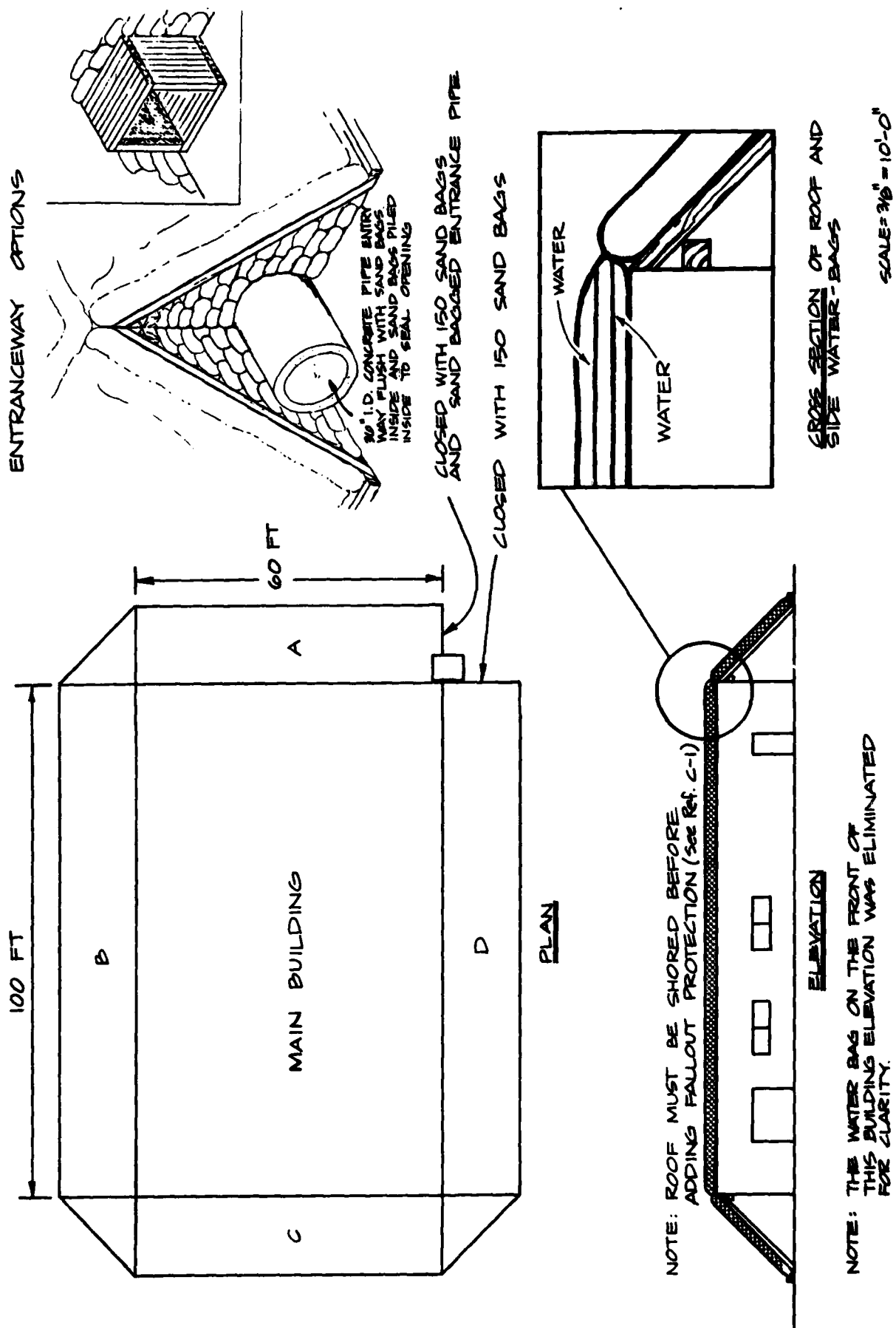
RUBBER PRODUCTS MANUFACTURER

The OR policy of the rubber products manufacturer requires both a key worker shelter onsite and mass care and fallout shelters at the relocation site. As a result of the letter attached to this appendix, efforts to coordinate development of the onsite key worker shelter as part of a company expansion have been initiated. It will require public funding to be allocated only for the incremental cost of such a shelter over the cost of the structure originally contemplated. An existing FEMA program, involving a study of shelter development in which a planned structure is

modified and the incremental cost is documented, is currently under consideration by FEMA personnel as a mechanism for implementing a key worker shelter onsite for this ORP participant. Actual designs will be developed as part of the other FEMA project, so cannot be a part of this report at this time.

A relocation site for key workers has been selected that is located on private property in a rural area of Morgan Hill, within 15 minutes commute distance from the present facility (when there is little traffic on the highway, as anticipated in the relocation mode). Plans for a fallout shelter facility that can be implemented in a matter of two days have been conceived and diagrammed; Figure C-1 depicts an example. The figure identifies a simple method that could be applied to any building with a flat roof, e.g., the one shown in Figure B-4, to upgrade it to provide fallout protection. A list of materials required for the structure in Figure B-4 appears in Table C-1. For this innovative approach, the mass required for radiation shielding is supplied by water (and waste) rather than earth. The fluid radiation shielding is contained in hypalon bags, as described in the letter attached to this appendix. For the structure in Figure B-4, a plentiful supply of water is available from the hydrant, visible at the front of the building in the figure. The rate of delivery using a fire hose is more than adequate to complete the filling in a matter of hours. Before filling, it is necessary to place shores inside the structure at appropriate locations (see Ref. C-1), to prevent roof collapse under the added load of the water mass required for radiation shielding. Figure C-2, extracted from the reference shows equivalent options for radiation shielding.

A viable fallout shelter can be created with a variety of materials. Because the important parameter is mass, the thickness of the radiation protection required is a direct function of the density of the material used. One of the least expensive, readily available materials useful for this type of radiation shielding is earth. Nevertheless, equivalent radiation protection may be provided by other common and readily available materials, such as concrete, brick, steel plate, wood, water, as well as stacked paper or books. The chart in Figure C-2 indicates the relative protection afforded by alternative materials in inches of thickness, and for radiation Protection Factors, or Pf, of 40, 65, 100 and 1000. For example, 15 in. of earth would provide a Pf of 65 (i.e., radiation effects inside the shelter would be 65 times less than



NOTE: ROOF MUST BE SHORED BEFORE ADDING FALLOUT PROTECTION (SEE REF. C-1)

NOTE: THE WATER BAGS ON THE FRONT OF THIS BUILDING ELEVATION WAS ELIMINATED FOR CLARITY.

Fig. C-1. Upgrading of Building to Provide Fallout Protection.

SCALE = 3/8" = 1'-0"

TABLE C-1
MATERIALS LIST FOR SHELTER SHOWN IN FIGURE C-1
Number of Spaces: 800 - 900; Pf 65

130 lb/ft² shielding (water)
Roof load 150 lb/ft²
30 each 15-ft 4x4 shores

6000 ft² double compartmented water bag on roof
for water storage and waste disposal: 90,000 gallon capacity

2 each 2100 ft² water bags at sides
2 each 1260 ft² water bags at ends
3 each 15' x 15' x 21' corner bags
280 each 21-ft 2x10's

Total water requirements: 190,000 gallons
20 hrs fill time @ 120 gal/min.
5 hrs fill time @ 500 gal/min.

Entryway:
320 each sandbags
9 yards sand or soil

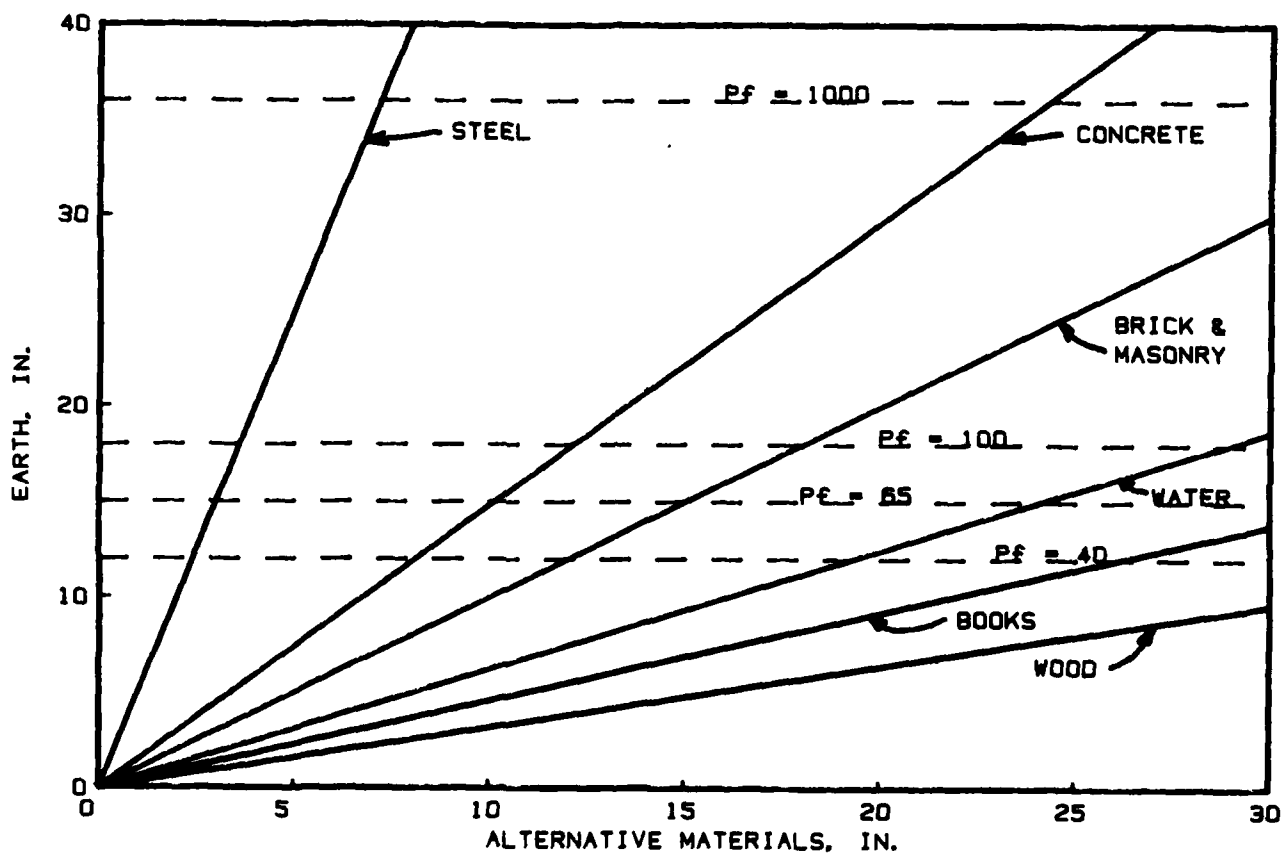


Fig. C-2. Equivalent Material Thicknesses and Resultant Radiation Protection Factors.

outside) and be equivalent in protection to 27 in. of books, 24 in. of water, 10 in. of concrete, or 3 in. of steel. (In determining the thickness of protective shielding, credit may be given for the thickness and composition of the materials used in the construction of the overhead floor, roof, or wall. For example, if a 4-in. thick concrete slab is to be upgraded to a Pf of 65 by the addition of earth fill, an addition of only 9 in. of earth would be required.)

A very critical factor in the application of radiation protection to any roof system is maintaining the structural integrity of the system to prevent roof collapse under this additional loading. The great majority of roofs in the United States are designed by code to support a superimposed loading of approximately 20 psf. This is equivalent to less than 2½ in. of earth. Although this 20 psf code value may be higher in certain areas of the country for accommodation of snow loading (and may be as high as 200 psf in particularly high mountainous areas), a roof system is generally not designed to carry any significant additional loading over its specified design. As the design load condition is a frequent possibility, addition of materials for radiation protection would always be in excess of allowable loads. Accordingly, some type of supplemental support system would always be required for the roof prior to addition of radiation protection shielding, or collapse would be likely.

The Shelter Upgrading Manual (Ref. C-1) provides a number of methods for maintaining the integrity of roofs, the primary method being the shoring from below of the principal structural roof members. This may be accomplished by the use of dimension lumber, timber beams, round poles, stud wall sections, or steel scaffolding. The cited Manual describes the application of these shoring systems, provides charts for selection, sizing and spacing the shoring, and provides worksheets for determination of the required materials. As the author of Ref. C-1 is on the staff of SSI, the structure upgrading problem to obtain a viable shelter posed no difficulty. In general, however, either Ref. C-1 or a competent structural engineer would be required to make upgrading decisions.

Rather than use the Gilroy building, however, it was decided that, on warning to evacuate, the method described would be applied to modify an existing barnlike structure at the Morgen Hill site that has a 30 ft x 40 ft concrete floor and a flat

sheetmetal roof supported by wood beams. Upgrading procedures presented in Ref. C-1 would be applied to shore the roof system sufficiently to take the additional load. The double bag units that provide water supply, waste disposal, and radiation shielding simultaneously would be fabricated, on warning, in 36 hours. A materials list and equipment required for erection are on a checklist in the company ORP (see Appendix D) and a supplier has been found in Morgan Hill who has these materials in stock and will make them available at the time of need, in exchange for space in the shelter.

The four shelter areas that lie outside the structure but inside the waterbag radiation shielding (corresponding to the areas marked A, B, C, D in Figure C-1) would be assigned for particular functions that are best left outside the main shelter. For example, one of the 30 ft x 16 ft spaces (between the structure wall and the sidewall shielding units) would be assigned to the generator and to tool storage. The other 30 ft x 16 ft space would be assigned to food storage. One 40 ft x 16 ft space would be assigned as the cooking area and cooking equipment storage. Each of these three areas, being outside the main building, has no concrete floor. To provide protection against the possibility of these areas becoming a muddy mess in event of rain or waterbag leakage, plywood decking on 2x4's would be laid down in these three areas adjacent to the main structure (leaving the inaccessible and generally unusable space at the outside edges uncovered). Although there would be a "no pet" restriction, some pets will be unavoidable (it seems they are always being brought into shelters in tornado and hurricane country despite restrictions, and it is unlikely that this circumstance would be any different). These "unwanted" burdens could be consigned to the remaining 40 ft x 16 ft space - which would not have decking. Two empty 55-gallon drums would be assigned for sanitary cleanup. Outside the segment where the generator is located, two 70-ft³ storage bags, filled with gasoline, would be connected to two 55-gallon drums located inside the shielded area and below grade (for gravity filling). Gasoline from the drums would be hand pumped to supply the generator.

Mass care facilities to be used in case of an extended uneventful crisis period would also be erected. Rubber sheeting in inventory would be transferred to the relocation site on evacuation warning. Again, the materials supplier would provide

the necessary additional materials out of stock (pipe and cable). The rubber products manufacturer has an ample supply of company trucks to make all equipment transfers. It is anticipated that a fuel supplier will be found who can supply the necessary fuel in exchange for space in the fallout shelter.

This OR program element is simple and practical, makes no demands on existing public facilities for sheltering, and places the participant in a position to provide considerable support to others in a prolonged crisis period - providing the key worker shelter receives the incremental support required to implement it. Some of the rubber products manufacturer's neighbors, mentioned in the attached letter to FEMA, have equipment that would be useful in rescue and recovery work and an interest in joint use of the key worker shelter. (It would be beneficial to have, for example, some all-terrain vehicles from FMC to rescue the key workers in a postattack situation.) Commute distances (and travel time in normal traffic) from these organizations to the rubber products manufacturer's facility are given in Table C-2. Survival, in the long run, may depend heavily on the barter system. Industry is already well aware of this and is planning accordingly.

Reference

- C-1 Tansley, R.S., and R.D. Bernard, **Upgrading Structures for Host and Risk Area Shelters Phase III: Manual Development**, SSI 8144-17, Scientific Service, Inc., Redwood City, CA, February 1984.

TABLE C-2
COMMUTE TIME AND DISTANCE TO RUBBER PRODUCTS MANUFACTURER
FROM SELECTED NEIGHBORING PLANTS AND LOCALITIES

COMPANY	TRAVEL TIME* (minutes)	DISTANCE (miles)
FMC	11.2	6
American Bakeries	1.5	1
GE	2.1	1
IBM	9.6	7
ITT	4.3	2.8
LOCALITY		
Morgan Hill	25	20
Gilroy	33	27

* in traffic

November 28, 1984

Industrial Protection Division
Federal Emergency Management Agency
500 C Street, Room 625
Washington, DC 20472

Attention Frances Dias:

***** ***** has been cooperating with a Federal Emergency Management Agency contractor (the Industrial Emergency Council) in a project to develop an Organizational Relocation Plan (ORP). One of the more important objectives of an ORP, presumably, is to enable an industry to continue some of its operations, particularly those essential to survival of the populace during a crisis period. In this latter category, among *****'s many products, is the capability to fabricate rubber bags, in quantity, in a variety of sizes that could be used in a crisis period to cover the roofs of shelters to provide radiation shielding. Made into double-deck units and placed on the shelter roof with the top bag filled with water, these units could provide drinking water as well as radiation shielding for the shelter below. Sanitary disposal of shelter wastes would be made possible by returning wastes to the lower bag via a hand-operated sludge pump. Thus, the radiation shielding would remain unimpaired despite consumption of the potable water in the upper bag. Very large areas can be covered with these units.

In addition to providing the shelter with a water supply, waste disposal, and radiation shielding, another major benefit of this innovation would be the elimination of the need for scarce earthmoving equipment that would otherwise be needed to move acre feet of soil for shielding in the shelter area, and many hours of hand labor to spread the soil over the roofs. Moreover, the materials in the storage bags become a resource in the post attack environment. They could be reused then to fabricate containers, large or small, to substitute for tanks and containers that were damaged, or to make the latter available for fabrication into other applications; for example, small distilling or cracking units to produce low-grade fuels.

November 28, 1984

To make these options possible, the ***** ORP would need to include a key worker blast shelter, because the facility is located in a 19 psi region based on the enclosed map produced by the State of California. It appears to us that without a key worker shelter the objective of organizational relocation falls flat - if production is not to be continued in the crisis period and beyond, there is no incentive for an industry to go to all that trouble.

Among ***** neighbors are: a large manufacturer of bread products (American Bakeries), a motor manufacturer (GE), a major defense contractor (FMC), an IBM plant, and an ITT facility. It has occurred to us, in view of the fact that ***** is planning an expansion, it would be possible to design the new employee lunchroom to place it underground and make it upgradable to 50 psi. This could be accomplished in a matter of minutes via shoring onsite. If the Federal Emergency Management Agency would arrange to pay the incremental cost for the change required to provide blast and radiation protection capability (the radiation protection would be in place, and the shores could be pinned overhead and swung down in a crisis period), ***** would cooperate by implementing it.

Though the subject has not yet been explored, the structure would be large enough to provide space for key workers from several nearby plants and ***** would be willing to establish joint usage in a national crisis. This joint usage involving a larger shelter would make it possible to include a few individuals not involved in production; e.g., a medic and a communications equipment specialist. With the larger shelter, staggered shift changes would be more efficient while ensuring space for everybody without overloading in the event an attack should occur just at the time of change.

If ***** could have an expression of interest from FEMA on this subject, the key worker shelter could be integrated into the planned expansion and completion of the ORP would seem more viable.

Sincerely,

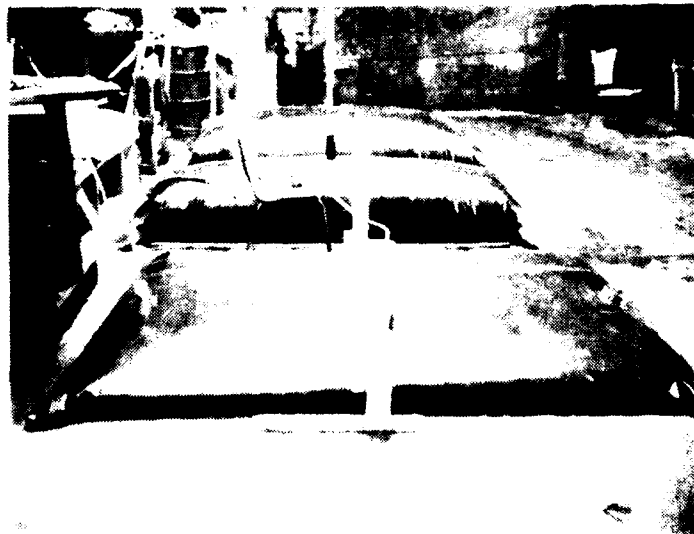
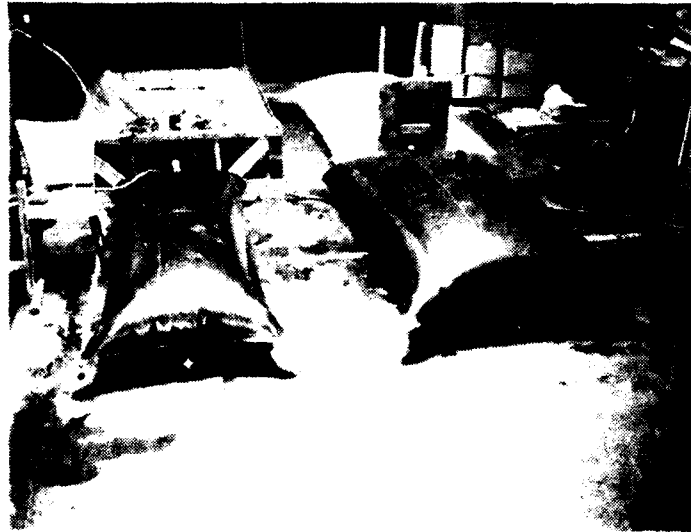


Fig. C-3. Pillow Tanks Made of Rubber Sheeting.

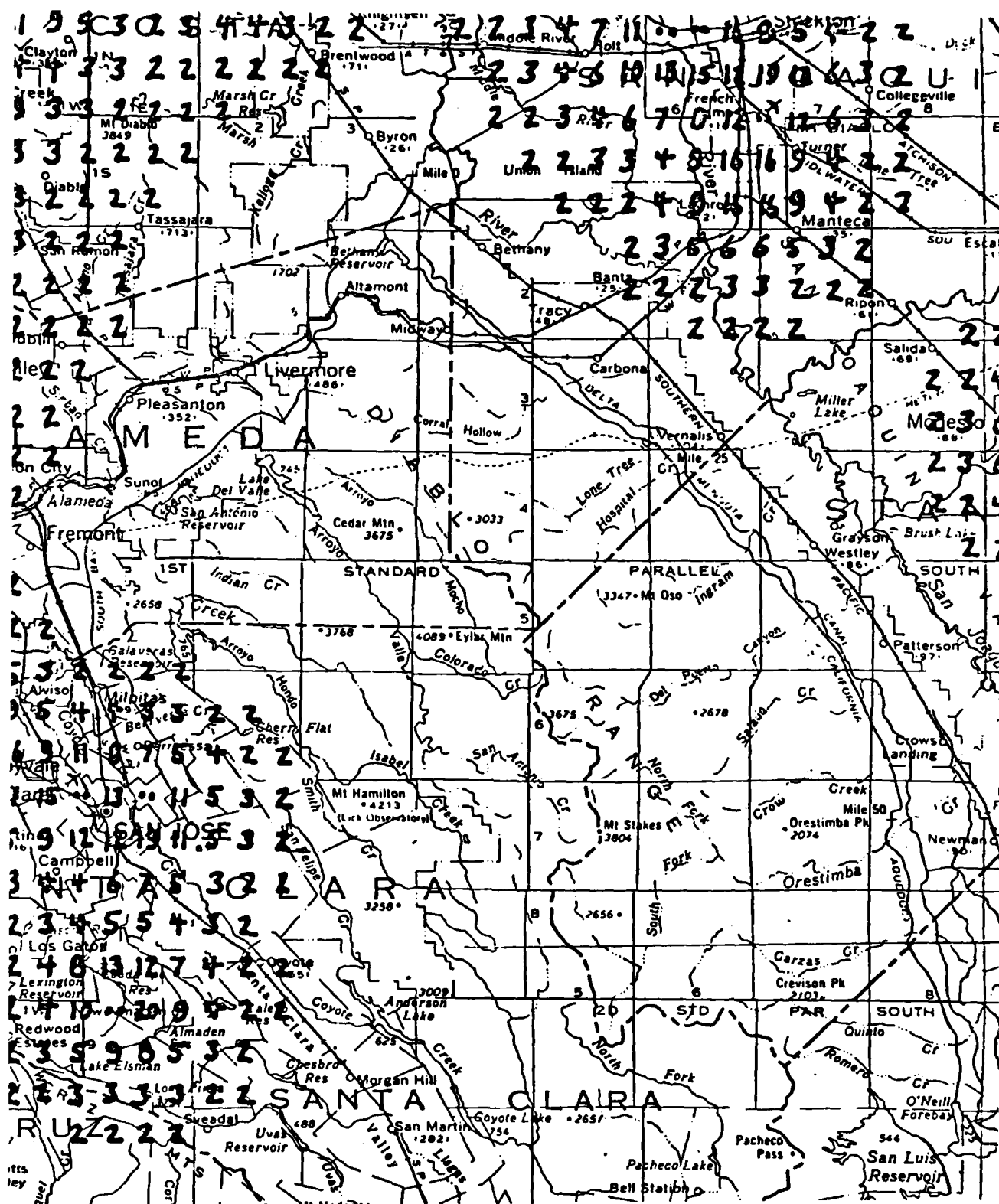


Fig. C-4. Blast Environment Map Enclosed With Letter in Appendix C.

CALIFORNIA NUCLEAR ATTACK BLAST AREAS FOR CIVIL DEFENSE PLANNING PURPOSES ONLY

APPENDIX D

**RUBBER PRODUCTS MANUFACTURER
ORGANIZATIONAL RELOCATION PLAN**

APPENDIX D

ORP/PIC PLANS FOR BLANK INDUSTRIES

This appendix contains elements of an Emergency Response Plan for a major disaster that requires general evacuation of a large area. Plan development is still in process (it is expected to be constantly updated), and some of the material in it, at present, is proprietary so that material presented here is not complete. Still, what has been included may provide others with needed insights and some information and concepts that will be of use in their own deliberations and ORP/PIC development programs.

Figure D-1 presents photographs showing two of the buildings in the participant's complex. The planner for this rubber products manufacturer is well aware that these structures will not likely survive a nuclear blast according to TR-82 (this is apparent from the letter included in Appendix C). Figure D-2 provides photographs showing the yard area (which is typical of most industries) contains many drums and other containers, some of which are full and other partially filled with liquids (generally combustible). The removal of the drums to a more remote location on the property and the clustering technique (Ref. D-1) will be the PIC approach used on those containers not relocated to the OR site. Other aspects of the protective housekeeping activities include cutting up steel racks on which inventories are kept to provide "hardening" resources (i.e., to harden critical items against damage from blast effects), and removal of onsite fuel supplies and one of the three 100 kW generators to the relocation site.

Figures D-3 and D-4 show the nature of the principal equipment used in manufacturing rubber products. These molding machines would be unbolted, the piping cut free, and the machines laid down between the rows of foundations on which they are currently installed. This is depicted in Figure D-5. (The piping is considered expendable.) Additional obsolete, but still useful, equipment in storage would be placed in similar locations or used to add mass to clusters of shop equipment (items not removed to the relocation site) as a means to help anchor them. (A 15,000-lb forklift recently acquired can be used to support movement of equipment for the organization's PIC program.) The plant operation requires a considerable supply of clay, which is stored in 60-lb bags (see Figure D-6) that can

be brought from the warehouse and used to cover the equipment laid out as in Figure D-5, to provide protection from the collapsing building(s). These methods have been tested at the 20 psi overpressure level in weapons simulation tests conducted at White Sands Missile Range (Refs. D-1 and D-2). Two of the three generators (see Figure D-6) would remain onsite to operate equipment used during the crisis period to continue production of useful items. The generators remaining onsite would be partially 'sand'bagged (with the clay bags) so that they can operate but could be quickly protected from damage by covering them at the last minute.

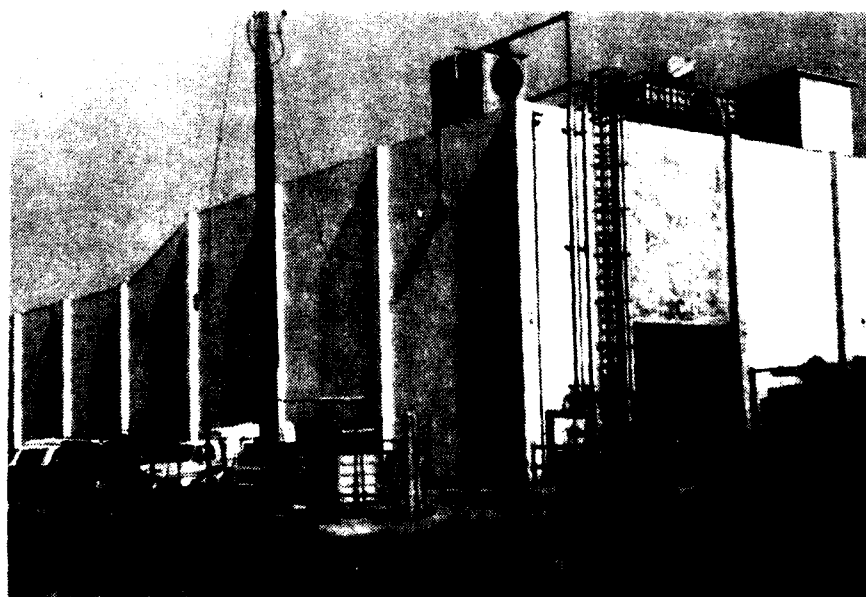
Parts of the ORP/PIC plan that has been developed are attached to this appendix.

References

- D-1 Zaccor, J.V., et al., **Industrial Hardening: 1981 Technical Status Report**, Scientific Service, Inc., Redwood City, CA, September 1982.
- D-2 Tansley, R.S., and J.V. Zaccor, **Testing of Shelter Design and Industrial Hardening Concepts at the MILL RACE Event**, Scientific Service, Inc., Redwood City, CA, January 1982.



Office and Plant



Plant

Fig. D-1. Rubber Products Manufacturing Plant.

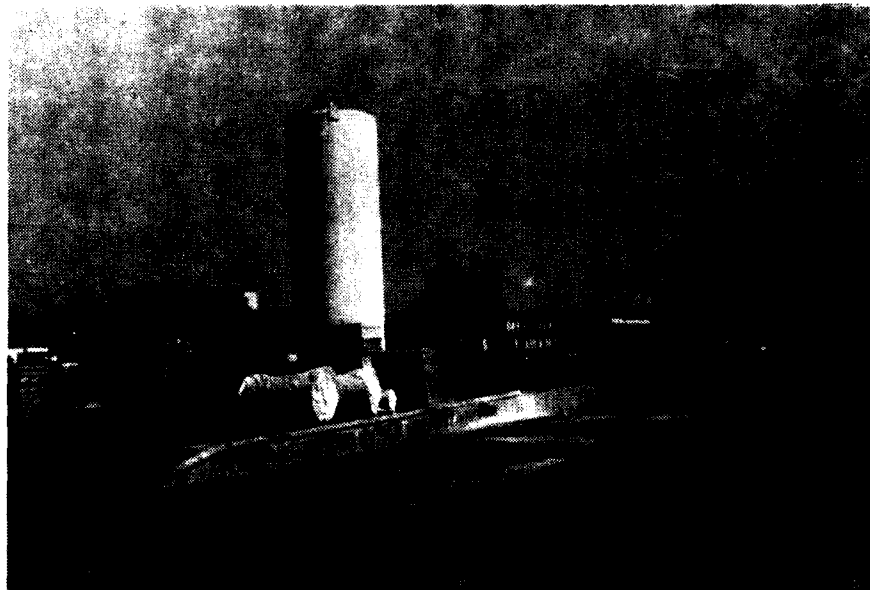
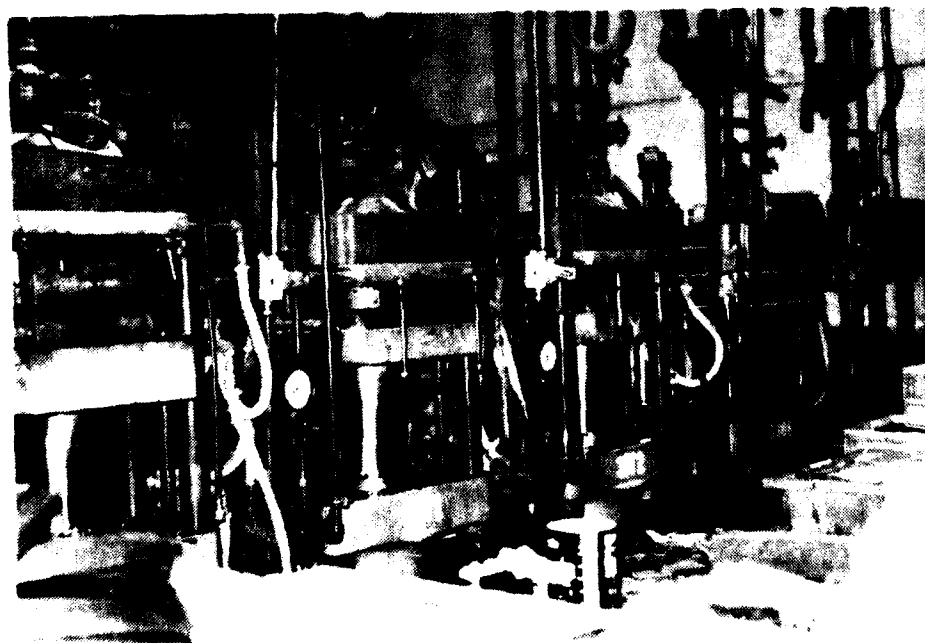


Fig. D-2. Rubber Products Manufacturing Plant Yard.

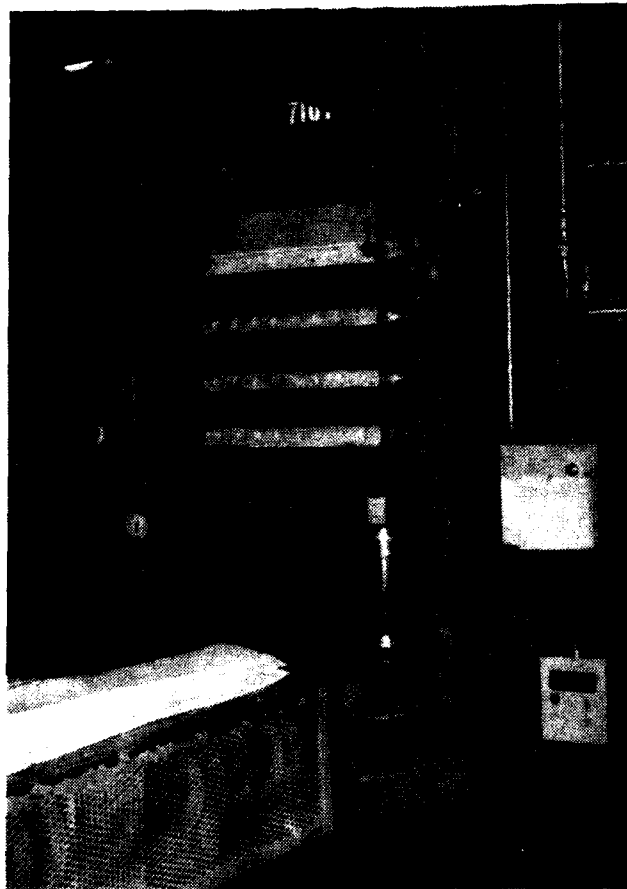


Layout and Overhead Piping



Pressure Molding Machines

Fig. D-3. Inside Rubber Products Plant.



Molding Machine Closeup

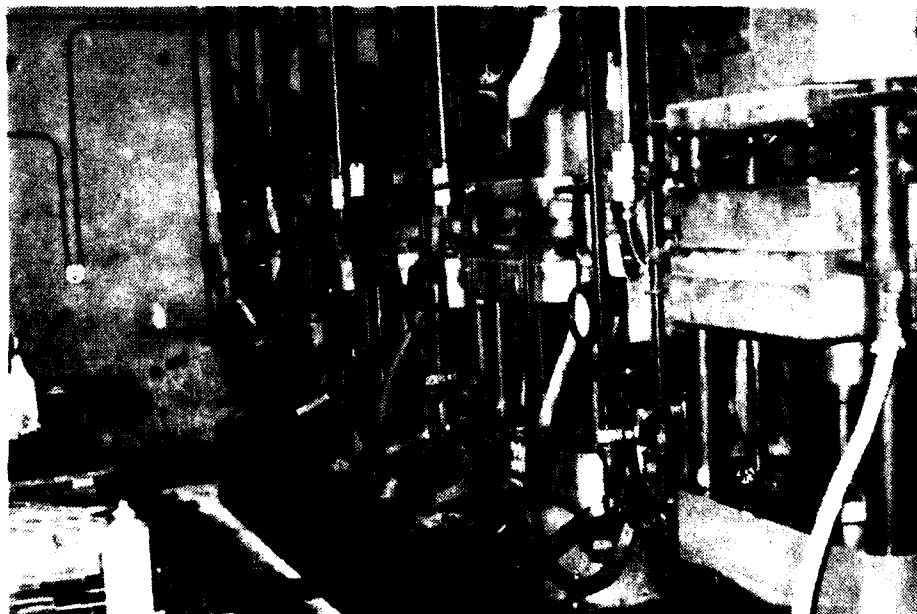


Fig. D-4. Molding Machine Foundation and Mounting.

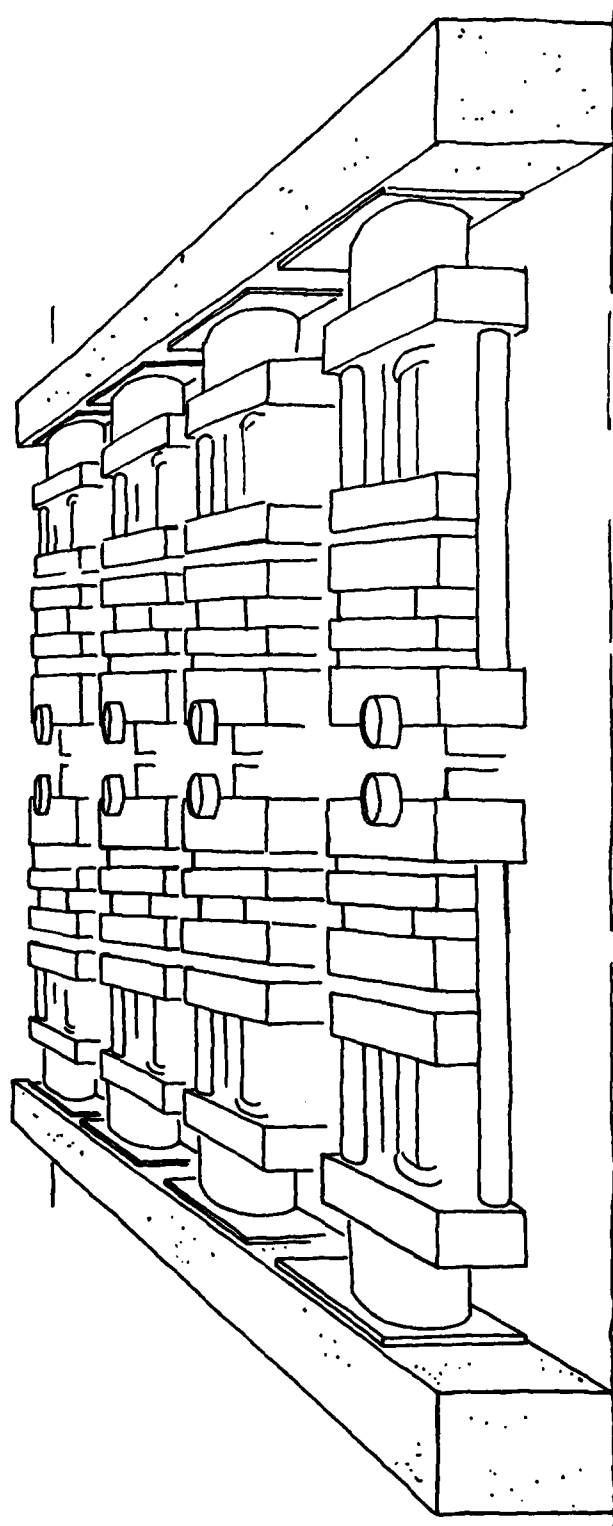
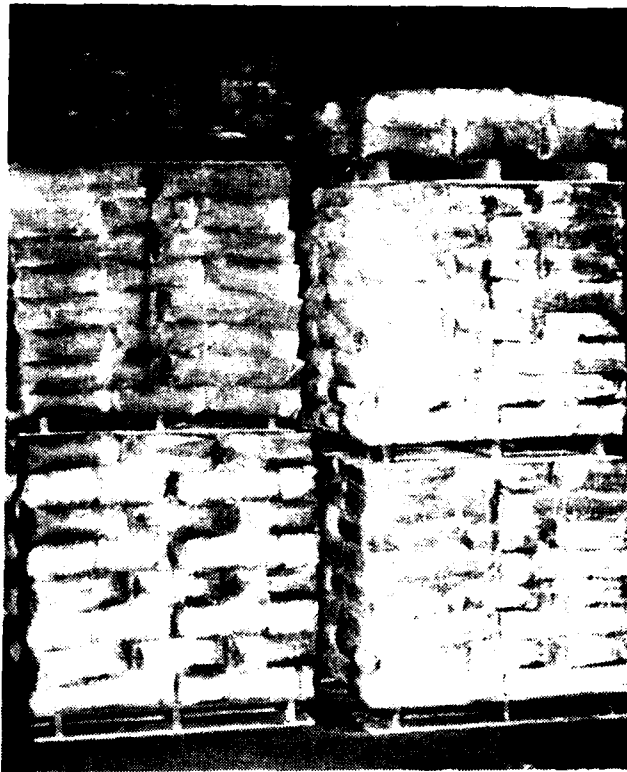
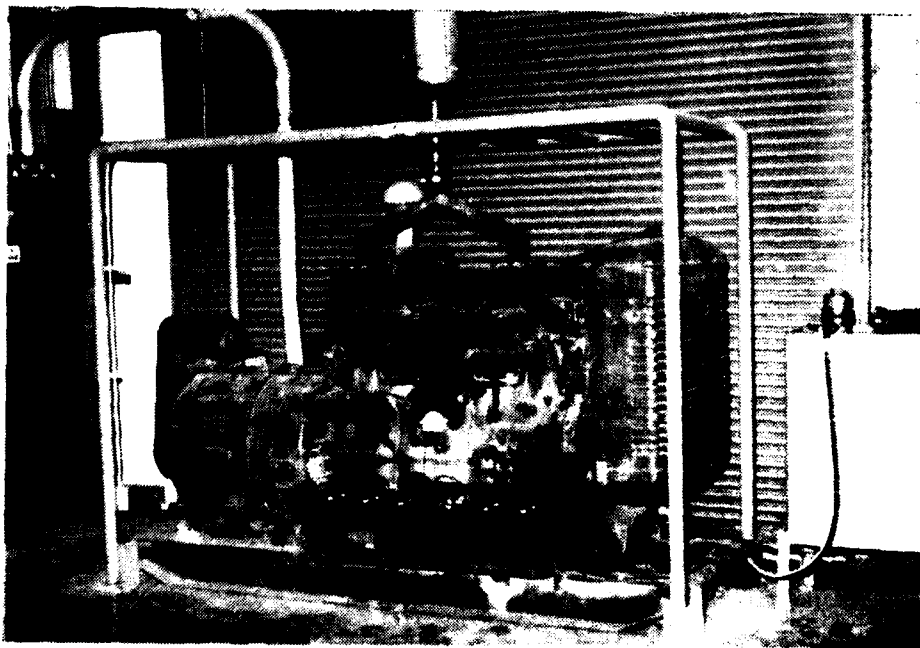


Fig. D-5. Molding Machines in Hardening Mode.



Sixty Pound Sacks of Clay



100 kW Generator

Fig. D-6. Rubber Product Manufacturing Facility Emergency Resources.

ORGANIZATIONAL RELOCATION

INTRODUCTION

Organizational Relocation (OR) is just another name for evacuation. The objective of evacuation is to avoid a life-threatening situation by moving far enough away from it, and the difference between OR and any other evacuation is that the process is carried out at a corporate level to keep key expertise and production capability together through an emergency situation.

Historical Background

Evacuation is the oldest strategy for surviving a disaster, and it is still viable today. The risk of an unprecedented disaster increases daily, particularly with regard to technological hazards. This circumstance stems from an enormous growth in technology, the increased use of hazardous materials supporting that technological growth, and the greatly increased magnitude of population, national wealth, and productive capability concentrating in urban areas. Development of an evacuation capability looms ever more important because of this.

In the Gulf Coast region evacuation (in a matter of hours) is a familiar response to hurricanes, also along some of the major river systems in the United States, when they reach flood stage. Such movement has been proven an effective way to reduce loss of life due to local threatening disaster. In the last couple of decades similar movements, but generally disorganized, have become familiar (both during and post-disaster) for an entirely new class of situations, i.e., massive hazardous materials spills. Well known examples are Mississauga and Three Mile Island (TMI). In addition, regional evacuations could be required following a particularly damaging earthquake, to limit loss of life from collapse of damaged structures, hazardous materials releases, and fires. Relocation, then, represents an alternative to "in-place" weathering of a disaster when normal shelter and life-support systems are untenable, damaged, or destroyed.

BLANK Industries

Rationale for Organizational Relocation Capability

Organizational Relocation is simply a more sophisticated and organized level of evacuation with the advantage that it is geared to deal with higher potential levels of disaster. Besides providing a response capability for the disaster situations described, it is currently considered an effective response option for nuclear threats characterized by long warning periods.* Nuclear threats with long warning periods (hours to days) might be posed by events such as Three Mile Island, or could result from terrorist demands, the escalation of international tensions during negotiations over issues that might be resolved by war, or the widening of a limited war to include nuclear weapons.

Experience in the Gulf Coast area with hurricanes has demonstrated that advance planning for evacuation is effective; the Mississauga and TMI events have shown that risks are substantially higher without advance planning. When evacuation is required, it is generally assumed that relocation movement would be planned to occur over a period of several days, and that the duration of a relocation for the worst case, a nuclear threat, might be days to weeks - or longer. If one is going to develop plans for a major disaster, one might as well consider the worst case.

If the nuclear threat is from nuclear attack (rather than a reactor problem or a local terrorist threat), it is further assumed that certain critical production and economic activities would need to continue, mostly in-place, necessitating organized commuting to facilities in the threatened areas by some workers temporarily living in adjacent safer communities. Such circumstance would require the installation of onsite shelters for those continuing critical operations and the establishment of arrangements for facilities for these key employees and their families in the relocation area.

Examples where continuing operations would be very much in need are: utilities, police and fire services, military production, and production required to support

* The option for several minutes warning requires special shelters, both at home and at work (such as those Sweden and Switzerland have installed), but this is expensive. A warning period of several days is anticipated in the case of terrorist threats, and also in the case of nuclear attack - because a massive attack would be prefaced by the attacker evacuating cities and this would be evident via satellite surveillance.

survival of the population through the crisis period. It is our belief at BLANK Industries that in event of a national disaster the company has unique capabilities that fit in this latter category. Consequently, there are several reasons that Organization Relocation Planning is of interest to us.

Related Planning Elements

The major objective of disaster planning and preparedness is a reduction in injuries and loss of life, but an important secondary objective is to cut property losses and enhance the chances for economic survival of the business. Economics is the major motivating force for developing a business in the first place and economic success is necessary to its continued functioning. Thus, whatever disaster befalls a business also has an impact on its personnel. At BLANK Industries, our objective in disaster planning and preparedness will be oriented to prevent injury, protect life and property, and ensure economic survival.

Through participation in a local mutual aid group, the Industrial Emergency Council (IEC), BLANK Industries became involved in a Federal program on disaster planning and preparedness and was introduced to a concept called IEMS (which stands for Integrated Emergency Management Systems). An integrated systems concept is one with which almost anyone would agree, but the realization of a truly integrated system is a function of the user and the user's experience. To start, an analysis is made of the hazards that could become threats to a facility (or community) by virtue of location, type and quality of construction of plant buildings, and type of contents and operations, both onsite and in nearby facilities. Following the identification of the threats of concern, an analysis of vulnerabilities is made so that potential countermeasures might be identified. These would then be ranked and implemented based on costs and benefits. Principal threats at BLANK Industries are: earthquake, fire, utilities outage, hazardous materials spill, and nuclear attack.

Depending on the threats, there are a number of strategies that have been conceived that can be applied to deal with them. Guidance in application of these strategies is either available in manuals or is being developed. Specific tactics depend on resources and ingenuity of the user. Among strategies available to consider are OR and PIC (the protection of industrial capability). Not yet included in the guidance, however, are some equally important factors, i.e., how to maintain

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communications when landlines are gone and what might be done to ensure economic survival. Management is concerned about both of these situations and has taken steps to address them. Among the great concerns at BLANK Industries is a major earthquake. We have already done much to reduce this threat and intend to do more. In addition, it seems prudent to consider all the strategies and factors mentioned above in relation to such an event. In recognition of the integrated systems approach, it would be worthwhile to consider the possibility of an evacuation forced by a large hazardous material spill (on Highway 101), or because of the threat of nuclear attack.

A benefit of addressing and integrating additional factors at this time is that BLANK Industries will receive government support for the differential cost of some of them, in exchange for providing a case history. Among the benefits we would realize are some consulting services and the installation of special structural features in a new building when it is constructed. The latter will provide a safe location for an emergency operations center and will have radiation shielding and blast protection suitable for protecting occupants from 5 Mt (five megaton) nuclear devices detonated as close as the San Jose airport. It is management's belief that the planning and preparation involved in pursuing this course will significantly enhance the company's ability to survive a national disaster and that the experience will strengthen general response capabilities, whatever the event. The following outlines first the PIC element and then the OR element of BLANK Industries' plan. In process still are two development programs. One will provide industry-to-industry emergency communications through establishment of a new communications net called SCRIPT (for Santa Clara Regional Industrial Preparedness Teams). The other will identify products that will be in demand in a disaster period and that BLANK Industries can produce.

BLANK INDUSTRIES' EVACUATION PROGRAM

BLANK Industries will maintain an Organizational Relocation Plan (ORP) commensurate with the company's charter and its role in the community. The intent is to ensure that BLANK Industries is able to function effectively in the event that an areawide disaster or national emergency requires a general area evacuation. Four circumstances that could require facility evacuation have been identified. These are: hazardous material spill on Highway 101, a devastating earthquake, a terrorist threat with a nuclear weapon, and a nuclear attack threat. All of these events might require an extended shutdown period; all but the hazardous material spill might require evacuation of San Jose and an effort to protect production equipment. Only a nuclear attack would require the company's OR plan to go into effect, but some elements of the plan will be useful for other circumstances. Two valuable products that BLANK Industries could supply the community in a national emergency have been conceived in the process of developing this plan. These items are readily fabricated out of existing inventories of rubber sheeting, e.g., large tents and bags of any desired size (to serve as vessels for holding fluids). To accomplish this it would be necessary to arrange safe conditions for production.

In an emergency situation, it is a BLANK Industries' policy to cooperate with clearly drawn Federal, State, and local government plans and directives that are publicly on record. Notwithstanding, the orderly relocation of employees and their dependents commensurate with the company's charter and how this relates to the particular circumstance and the community, will be arranged for implementation in the event of an officially declared emergency. In such event, it is also company policy to shut down unnecessary operations and protect equipment, but during a threatened crisis to continue those operations that are safe to continue and that can support general survival efforts. As part of this particular aspect of BLANK Industries' disaster capability, it will maintain in a state of preparedness such in-place protective shelters as are established onsite for key worker protection in case of nuclear attack, share key worker shelter space in such structures with neighboring plants in an emergency, provide adequate measures for shutdown of emergency operations immediately prior to an attack warning (to ensure time for all key employees onsite to reach the shelter), and be prepared to resume operations to the maximum extent possible and with minimal interruption of company capabilities following threatened or actual crises.

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Basic plans have been completed to facilitate this policy. Execution of the plan will be the responsibility of Mr. N. BLANK (Vice President), or his designee.

It is recognized that actual relocation in accordance with this plan, should such be invoked, could well be only part of a massive evacuation involving a major part of the total community population. To minimize the difficulties inherent in such an evacuation, basic preparations are identified in this plan. They can be adjusted as necessary to reflect the company's needs and the particular circumstances requiring evacuation. Currently, there is no designated all-event reception area sanctioned by authorities for use by relocated personnel who may be engaged in critical operations. Consequently, BLANK Industries has made private arrangements for such an emergency relocation site, but could and would undertake an alternative in the city of Gilroy, provided a realistic assignment of dedicated space suitable to the circumstances were made by local authorities.

In line with company policy it is BLANK Industries' position that it is more important to define tasks, the logistic support requirements, and procedures, than to specify personnel who are to undertake preassigned roles in event area evacuation is required for an extended period. Assignments will be expedient in any case, based on actual circumstances and on qualifications among those available when the circumstance arises. Management is confident these assignments can be made in a matter of minutes so long as the procedures are well developed. Consistent with company policy, worst-case scenarios have provided a planning basis together with requirements to meet BLANK Industries' objectives, support for which is required to make ORP viable to the company. In a national emergency involving the threat of nuclear attack, company ORP will embody emergency production, shutdown of all other operations, protection of equipment, establishment of key personnel who will continue emergency operations, relocation of key personnel and families to a safe site within commute distance, logistic support for both the onsite shelter facility and the relocation site. The latter is being arranged with organizations located in the relocation area. Employees either not designated key personnel, or unwilling to support BLANK Industries' ORP, will not be included in any OR process, but will follow the general evacuation program for population protection, or their own dictates, as the case may be.

SAMPLE ORP/TRANSPORTATION CHECKLIST

I Tractor/trailer Unit #1 Driver/backup SCRIPT Com. Unit Map
5 packets marked A through E

1. Refuel, then load and take to Morgan Hill site (marked X on your map) for offloading at site:
 - a. Welding Unit #1
 - b. 20,000 ft² rubber sheeting from warehouse
 - c. 6,000 lb fork lift
 - d. 100 kW Standby Power Supply (Unit 1)
 - e. Sump pump and 4 empty 55 gallon drums
 - f. 2 laminating units
2. In exchange for packet marked A, pick up from supplier designated "A" on your map and offload at site the following:
 - a. 70 sheets 1/2-in. plyscore
 - b. 4x4's, 50 each 8 ft
 - c. 2x10's, 170 each 21 ft
 - d. 2x4 studs, 70 each 8 ft (nominal)
 - e. 350 sand bags
 - f. 8 shovels
 - g. 2 wheelbarrows
 - h. 1 sledge
 - i. 1 gross carriage bolts 1/4 x 6 in. with nuts
 - j. 1 gross 3/8 x 4 lag screws
 - k. 50 lb keg each, 16 d and 20 d nails; 10 lbs 6 d nails
3. In exchange for packet B, pick up 240 each 2 in. diameter x 21 ft lengths of black pipe from supplier designated "B" on your map and offload at site.
4. Deliver packet marked C to the local Office of Emergency Services people in Gilroy at the location marked "C" on your map.
5. In Gilroy, in exchange for packet marked D, pick up 20,000 units of dried food products from supplier designated "D" on your map, offload at the site, and store in protected location. Keep 8,000 units separated for return to Key Worker shelter at the plant site.
6. In exchange for packet marked E, get generator and tractor fuel from supplier designated "E" on your map.
7. Return to site and help crews involved in shoring and upgrading the shelter and setting up tents. Maintain radio alert on SCRIPT Communication unit.

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II Tractor/trailer Unit #2 Driver/backup

Pick up from storage 5 trailer loads of sacked clay and deliver back at plant to crews involved in equipment protection. Then check in with supervisor there.

III Pickup Truck Unit #1 Driver/backup SCRIPT Com. unit Map **Lists 9 packets 1 drum motor oil 2 drums gasoline hand pump and fuel transfer hose**

1. Follow route on map and sequence in list. Pick up camping gear listed; pay special attention to obtaining the chain saw, skill saws, hand saws, 1/2 in. power drill, drill set, tool kits listed. Give each person a packet telling them where to go and what to bring. Check out the two camper units on the list, make certain they are completely fueled (fuel them, if not), start them to make certain they operate, check tires, water, oil.
2. Go to the site (marked X on your map), offload all except: 1 full drum of gasoline (with hand pump), 2 Coleman stoves, 10 gallons of Coleman fuel. Contact driver of tractor/trailer unit #1 as to where the dehydrated food units for the Key Worker shelter are located. Load as many of the units as possible and return to plant site.
3. Offload food units, Coleman stoves, Coleman fuel and put in kitchen in the emergency shelter.
4. Check in with the supervisor in charge of equipment protection.

IV Pickup Truck Unit #2 Driver/backup SCRIPT Com. unit Map **Three packets marked A, B, C. Two additional drivers**

1. Load two 55-gallon drums of gasoline, one hand pump and fuel transfer hose.
2. Follow route on map and sequence A, B, C. In exchange for packets marked A, B, pick up Vans, refuel each, leave a driver for each to bring it to the plant site, have each report to the CEO.
3. In exchange for packet marked C and the company truck, refueled, and the keys to it, pick up the Van and go to the site marked X on your map. Contact Tractor/trailer Unit #1 and load remaining units of dehydrated food for the Key Worker shelter, return to plant site, and offload and store food units in emergency shelter kitchen. Report to CEO.

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V Van Unit A **Driver/supervisor** **Map** **Package of plans**
for site preparation.

1. Under direction of the supervisor, pick up following personnel: 3 carpenters, 2 welders, 1 electrician, 1 forklift driver, go to Morgan Hill site marked X on map, offload personnel, return to plant site with Van.
2. Under direction of the supervisor, personnel are to upgrade indicated structure for fallout protection per site preparation plans using timber and hardware delivered by Tractor/trailer Unit #1.
3. Under direction of the supervisor, personnel are to assemble frameworks for tents per plans using pipe, welding unit, generator/fuel supply at site.

VI Van Unit B **Driver/supervisor plus 3 personnel** **Map**

1. Follow map to Morgan Hill site marked X.
2. Make up 12 each 24 ft x 56 ft rubber sheeting tent covers for 12 each 20 ft x 30 ft tent frames
3. Van, driver, and personnel to return to plant site when job is complete and report to CEO.

VII Van Units A, B, and C and Pickup Truck Unit 1 with SCRIPT Com. unit to remain on standby at plant site for final evacuation of equipment protection teams.

**ORGANIZATIONAL RELOCATION PLAN DEVELOPMENT:
TWO CASE HISTORIES**

Unclassified

Industrial Emergency Council, San Carlos, CA
Contract EMW-83-C-1159, Work Unit 4511J
April 1985
100 pages

This report presents the results of a study to evaluate organizational relocation planning by industry. The report provides two case history chronicles of these efforts, by a manufacturing industry and a service organization in two different high-hazard areas in California, to locate and establish suitable alternative sites in safer locations. Civil Defense aspects were a primary consideration, but a multi-hazard approach that assessed a variety of emergency planning needs was an industry (as well as program) requirement. The final outcome is an integrated effort to prepare for hazards that could threaten to interrupt production and some innovative industrial concepts for survival products. Information on how both facilities plan to ensure economic survival, marshal critical resources, and protect industrial capability (PIC) in order to produce services or manufactured items within their capacity and that might be needed through and after a major crisis is included.

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