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INFORMATION NEEDS FOR POSTATTACK RECOVERY MANAGEMENT

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SUMMARY

The information requirements for managing civil defense activities in the postattack period have been considered by many investigators. Their studies and the plans resulting from them have been confined largely to events associated with movement to and emergence from shelter and subsequent survival efforts. These requirements are better appreciated and understood than those relevant to the subsequent initiation of policies and activities concerned with economic recovery. OEP, with the cooperation of delegate agencies, has centered discussion of this phase of recovery around plans for emergency agencies: the ODR (Office of Defense Resources) and the OES (Office of Economic Stabilization). Existing consideration of information requirements for the recovery phase has been derived from the proposed organization, functions, and mission of these agencies.

Previous SRI work on assessment of total vulnerability has examined some primary and secondary effects of an attack on vital institutions such as private property, credit, contracts, and others of more sociopolitical character. Research in progress has continued the institutional approach, narrowing the objectives to questions of legislative imbalance, solvency of corporate and governmental bodies, the viability of corporate structure and management, the preservation of recognized channels of business activity, and the increased interactions between government and business associated with imposition of controls. Concomitant with this effort was this study of information requirements for coping with institutional problems identified and of those needed for proper coordination and guidance of economic recovery efforts. Attention has been directed primarily to information needed for monitoring the effects of actions taken by governmental bodies at federal, state, and local levels and for providing business management with the overall information it needs for making business decisions in the absence of undistorted indicators of economic developments.

The break in traditional economic time series and the need for drastic reorientation of industrial efforts in the postattack period would greatly restrict the amount of information available and expand the amount needed. The imposition of controls; the need for well-directed investment by government, business, and private individuals; and the dominating economic significance of government public works expenditures for projects in the general interest would all complicate the decision process. These factors are all highly relevant to information requirements for policy determination and for day-to-day operations in the first several months postattack. Information requirements have thus been studied with such factors in mind and in the light of available information on plans for ODR, OES, and other relevant government agencies at federal, state, and local levels.

CONTENTS

I POSSIBLE POSTATTACK ENVIRONMENT 1

Levels of Attack 1
Results of Attack 2
Existing Plans to Recover from Attacks 8

II DECISION PROBLEMS IN RECOVERY MANAGEMENT 13

Relationship of Decision Problems and Level of Attack . . . 13
Decision-Making Responsibility 19
Representative Recovery Tasks 23

III DECISION ALTERNATIVES AND TRADE-OFFS 27

Selection of Alternatives 27
Economic Model for Use in Selecting Alternatives 32

IV CONTINUING EVALUATION OF COSTS AND TRADE-OFFS 41

Updating of Evaluations 41
Trade-Off Analyses 42
Ranking of Proposals 48

V INFORMATION REQUIRED FOR ANALYSIS AND CONTROL 51

Background 51
Information Requirements for Local Coordination 52
Public Welfare Questions 52
Product Mix Questions 53
Capacity Modification or Development Questions 53
General 53

VI MINIMAL REQUIREMENTS FOR A RECOVERY MANAGEMENT INFORMATION SYSTEM 59

Interactions of Various Government Levels 59
Information for the Local Level 61
Information for the Federal Level 65

VII ORGANIZATIONAL ALTERNATIVES 67

State Agencies 67

CONTENTS

VII Continued

Regional Agencies 68
District Agencies 68
SEA Agencies 68
Responsibilities of Various Levels 69

VIII CURRENT PLANNING FOR THE OFFICE OF DEFENSE RESOURCES 75

IX FEDERAL, STATE, AND LOCAL INVOLVEMENT 79

Introduction 79
Local Involvement 80
State Involvement 81
Federal Involvement 81

X MAJOR GAPS IN PLANNING TO DATE 83

Introduction 83
Interaction Gap 83
Alternative Analysis Gap 84
Cost Data Gap 84
Stockpiling Gap 85
Reporting Procedure Gap 86

XI RELEVANT GAPS IN POSTATTACK RESEARCH 89

Introduction 89
Data on U.S. Economy 89
Research Task Categories 90
Hardware Category 94
Economic Category 95
Systems 95

XII POSSIBLE PREATTACK ACTION 97

Introduction 97
Alternative Actions 97

XIII PROBABLE POSTATTACK MANAGEMENT DEVELOPMENT 101

General 101
Existing Plans and Their Relationship to Future Needs . . . 101

TABLES

1 Classification of Possible Attacks and Characteristics of Associated Postattack Environments 5

2 Major Federal Plans or Agencies with Postattack Programs or Responsibilities 9

3 Typical Decision Problems Relevant to Managing Recovery from a Heavy Immobilizing Attack 13

4 Examples of Specific Postattack Problem Situations--Illustrative Case Study Suggestions Presenting Typical Decision Problems 17

5 Examples of Possible Actions Resulting from Postattack Decisions 21

6 Probable Postattack Projects or Production Tasks 24

7 Decision Tree by Grouping Specific Questions 28

8 Decision Tree by Further Specification of General Policies . . 29

9 Classifications of Goods and Services and Parties in Simplified Model 35

10 Types of Trade-Off Analysis Needed and Cost Data Required . . 43

11 Data Requirements for Analysis and Control at the Local Level 54

12 Data Requirements for Analysis and Control at the Federal Level 56

13 Essential Elements of Information for the Local Level 62

14 Essential Elements of Information for the Federal Level . . . 63

15 Gaps in Current Planning 87

16 Possible Approaches to Research Tasks 91

I POSSIBLE POSTATTACK ENVIRONMENTS

The character of the environment following a thermonuclear attack would depend on specific circumstances. Possible attack objectives have been viewed in different scenarios ranging from accidental attacks on an isolated random point, through shows of force in a strategic bargaining interchange, to preemptive counterforce attacks, or to an all-out attack on industry and population. Attacks could thus be conceived to range anywhere from isolated single weapon detonations to a massive simultaneous attack on all centers of industry and population with special attention devoted to critical industries such as gasoline refining.

Levels of Attack

The single weapon attack, even if it were detonated in an important city, whether accidentally or intentionally and however devastating, would have limited call on civil defense and recovery machinery, primarily because the remainder of the country could be mobilized to bring in whatever assistance was necessary or desirable. Strategic response could depend on the accepted conception of enemy intent, but rescue, decontamination, and subsequent reconstruction would be provided for nationally.

A sequence of isolated attacks executed intermittently as part of a threat-counterthreat exchange could present an entirely different set of recovery problems that could prove less easy to handle than some level of simultaneous attack under present civil defense and emergency planning. It is difficult to imagine circumstances so neatly balanced that a few such strikes would not trigger a preemptive counterforce attack, massive retaliation, or some escalation eliciting an all-out attack by the enemy. Even if this did not occur, the threat of such escalation and the continuance of an intermittent exchange would result in full application of all emergency plans for recovery management. Even though damage did not reach the same order of magnitude possible from collateral damage associated with a counterforce attack, the damage would be considerable and would require centralized federal organization of recovery efforts.

A counterforce attack would inflict heavy collateral damage on port cities and other industrial centers near concentrations of military targets. It could result in a loss of industrial facilities roughly equivalent to a loss of from 10 to 20 percent of preattack capacity. It could also result in loss of from 10 to 20 percent of preattack housing.

A massive attack against industry, on the other hand, might destroy all gasoline refinery capacity and virtually eliminate a few other specially targeted industries but would spare at least 20 percent of aggregate preattack capacity and at least 15 percent of preattack housing.

The number of casualties from attacks of these various types would vary greatly with the amount of strategic and tactical warning given, the passive and active defense measures taken, and the advance defensive posture of the country. The damage sustained would vary with the effectiveness of active defenses but would be little affected by the few passive defense measures currently being implemented since little is being done to increase industrial dispersion (away from target concentrations) or to harden plants and other industrial facilities.

The effects of different attacks on standards of living are somewhat less variable since the drop in GNP might be paralleled in part by loss of population. Secondary effects such as intermittent bottlenecks, lack of transportation, poor adaptation of surviving capacity to postattack needs, shortages of some materials and specific producers goods, could all lead to some degradation of productivity and to underutilization of facilities. Organizational difficulties could further lower output and degrade the standard of living and the economic strength of the country.

Results of Attack

A decade of research on postattack problems has failed to identify any insurmountable obstacles to recovery of either physical or organizational nature. The virtually certain survival of an interim supply of foodstuffs, some industrial capacity, and some population would make it possible for the nation to survive even the heaviest attacks conceivable during the next decade--excluding recourse to suicidal weapons as the cobalt bomb. Ultimate recovery, moreover, would also be possible although the time required to regain some semblance of preattack conditions and preattack national power could vary greatly with the attack circumstances.

Although national survival (excluding further external intervention) and recovery would be possible even from the heaviest attacks, they would not be assured. Gross mismanagement of recovery efforts could quickly dissipate inventories and industrial capacity. The margin for survival would be so slight in the case of a heavy attack that any failure to make the most of available resources could start an accelerating economic decline precluding any diversion of output to capacity regeneration. Unsolved social and political problems could lead to such mismanagement and could be aggravated by the resulting drop in standards of living.

This brief review of the possible postattack environments is of interest primarily with respect to its implications for recovery management. The present report will be concerned with such questions only to the extent that they indicate limits on or requirements for information relevant to planning or control of recovery efforts.

The light attacks, whether continuing intermittently or concentrated in a short transattack period of at most one or two days' duration, would create an emergency situation that would trigger imposition of standby freeze orders and all-out mobilization. In the concentrated attack case, civil defense responsibilities would carry through emergence from shelters, decontamination efforts, debris removal, and restoration of vital services and then probably would diminish as other government agencies took over rehabilitation and recovery efforts. In the intermittent attack, the assignment of periods of responsibility would be less clear and civil defense would continue to play an active role. If the total damage were light, as assumed for this case, the secondary effects on the economy and the departures from normal free enterprise business management would be minimal. The case of intermittent or partially withheld attack would require continued close governmental control of shelter and evacuation policy and would result in considerable loss of production time and thus of monthly output. This would decrease output below that achievable following a concentrated attack of comparable level. In all these cases, however, the problems of management would be no worse than those of the major belligerents in World War II--requiring an industrial mobilization equivalent to that of the U.S. in 1942 but carried out under intermittent attack as in Britain or Germany.

The consequences of heavy attacks, which are even more likely to be concentrated, would be affected more by targeting petroleum refining than by prolongation of the attack phase. The significance of a successful attack on petroleum refining is that it could lead to an extreme shortage of fuel that would immobilize diesel locomotives, trucks, and farm implements as well as private autos and thus effectively eliminate transportation.

The level of casualties could be reduced by: enemy ultimatum or by other effective warning properly acted on: enemy choice of timing for initiation and concentration of the attack; preattack preparations including training, pre-positioning tools, evacuation, and shelter planning; and successful execution of active or passive defense maneuvers during the attack itself. As the level of fatalities drop, the per capita measure of surviving productive capacity will also drop because of the increased number of survivors. The level of fatalities is thus inversely related to the postattack standard of living.

In the heavy attack, a follow-on strike or even continuing strikes would in some respects be relatively less disruptive than intermittent lighter attacks. Residual targets would be more equal in importance and would be dispersed, unless enemy first-strike strategy deliberately spared certain major targets to save some vulnerable spots for purposes of bargaining. Complete evacuation from such spots would defeat that strategy at the cost of sacrificing the production capacity abandoned. A program of equipment evacuation would provide an additional countermeasure but would be costly and of limited applicability.

The conditions for a continuing, intermittent, or segmented attack are not too easy to imagine in detail, but some balance between the two sides and some symmetry of strategies seem to be essential prerequisites of such a delicately controlled strategic situation. If the situation were initiated by heavy attacks on a few selected targets with some equally forceful but equally constrained counterattack, any passive defense would probably emphasize evacuation of all but essential people in the major untouched target areas. The effect of such evacuation would be denial of the full use of many industrial facilities and most of the housing available in the hostage cities. The consequences of the initial losses and the restricted use of much of the surviving plants would approximate the results of an all-out heavy attack. The task of managing a rehabilitation effort while remaining alert to the possibilities of attack would approximate that of managing a recovery from a full-scale, all-out attack.

These various attack situations are classified in Table 1, with the classification based on enemy intent (counterforce or counterindustry), severity, timing (continuing or single strike), and whether petroleum refining was specially targeted. Table 1 further indicates the nature and severity of the recovery problem for each case.

The possible elimination of the petroleum refining industry as part of a heavy attack would present special recovery management problems. Whether this were accomplished in the original strike or carried out over a longer time period, the eventual depletion of motor fuel inventories and the means for replenishing them would effectively immobilize the population, stop freight transport, and cripple agriculture. Since at least one or two years is required under present construction technology to build a refinery, the restrictions on transport would persist. Over and above the problem of transport itself would be the task of reorganizing industry to be less dependent on transport. Should this become necessary, it would impose a major constraint on the organization of recovery efforts and on any associated information systems.

Table 1

CLASSIFICATION OF POSSIBLE ATTACKS AND CHARACTERISTICS OF ASSOCIATED POSTATTACK ENVIRONMENTS

	Heavy Attack		Light Attack	
	H P		W P	
Mixed--immobilizing	ICF ICV	Heavy continuing attack on industry, gasoline, and transport. Worst case	ICF ICV	Light continuing attack on population, gasoline and transport--unlikely
	ICF ICV	Heavy single attack on industry including gasoline and transport, country fragmented	ICF ICV	Single attack on population gasoline and transport. Light damage but transportation shortage
Mixed--nonimmobilizing	ICF ICV	Heavy continuing attack on industry. Some immobility from continuing attack. Slow recovery	ICF ICV	Light continuing attack on industry. A bargaining strategy
	ICF ICV	Heavy single attack on industry. Heavy damage but recovery rapid	ICF ICV	Light single attack on industry

LEGEND:
H = Heavy
P = Against population (and hence industry)
I = Immobilizing
C = Continuing
F = Heavy fallout
W = Light
P = Population (and industry) avoiding
I = Adequate transport
C = One single simultaneous attack
F = Little or no fallout

Table 1 (concluded)

	Heavy Attack		Light Attack	
	H P		H P	
Counterforce--immobilizing	ICF ICP	Heavy continuing counterforce targeting gasoline and transport. Immobilizing	ICF ICP	Light continuing attack or gasoline or transport Very unlikely unless war continues
	IC̸F IC̸P	Heavy single counterforce targeting gasoline and transport. Light industry damage and quick recovery	IC̸F IC̸P	Light single attack on gasoline and transport. An inadequate surprise attack?
Counterforce only	YCF YCP	Heavy continuing counterforce attack. Unlikely	YCF ICP	Light continuing attack on military targets in a bargaining situation
	YC̸F YC̸P	Heavy single counterforce attack. Heavy military damage but rapid recovery	YC̸F YC̸P	Light single attack on military targets in a bargaining situation

LEGEND:
H = Heavy
P = Against population (and hence industry)
I = Immobilizing
C = Continuing
F = Heavy fallout
K = Light
P = Population (and industry) avoiding
Y = Adequate transport
C̸ = One single simultaneous attack
P = Little or no fallout

A segmentation of the national economy into scattered local complexes, whether entirely isolated from one another or tenuously connected by high cost transportation and communications networks, would constitute a profound change in the organization of U.S. business. Persistent trends toward centralization of management, specialization of industry, dependence on national or world markets, economies of scale, and other traditional marks of industrial progress would be abruptly reversed. These changes in turn would also have fundamental consequences for the entire American culture.

In these heavy attacks, loss of or evacuation from housing would create a major housing shortage and present complex problems in finding or improvising shelter through barracks living, doubling up, billeting, or other emergency measures. A fuel shortage could aggravate this situation by constraining workers to live within walking distance of their place of work. Insolvency of businesses and individuals, with or without some plan for implementing the stated loss-sharing policy, and uncertainties as to management succession could raise many questions as to title to property and decision-making authority.

Segmentation of the country would put local officials or local leadership in a position of unprecedented responsibility and under tremendous pressure from the local population, from the tense situation, and from local groups and influences. Any long delay before the state and federal governments exerted their leadership in the national interest would result in general collapse into a kind of interregional anarchy. On the other hand, the shortage of transportation, in the case of a refinery attack, and the high real cost of transportation would put a high value on measures increasing local self-sufficiency, and such emphasis should be included in all national plans.

The heavy attacks, when oriented toward destruction of transportation, would disrupt the traditional bases for many business arrangements, including effects on such institutions as national markets, national credit systems, the sanctity of contracts, much of the preattack brokerage and distribution activity, and most private financial operations. The problems of local and regional economic life would generate pressures for reorganization of the corporate structure of industry and for modification or suspension of legislation regulating it--including antitrust laws, fair trade laws, collective bargaining acts, special subsidies or parity price agreements, restrictions on integration of interstate commerce, and other keystones of a regulated free enterprise economy. Moreover, emergency measures typical of wartime or mobilizations for war would be imposed including at least rationing, price and wage fixing, control of critical materials and facilities, limitation orders, priorities, and allocation

programs as well as unprecedented controls on construction and facility conversion or utilization.

Even the lightest attacks, except possibly the isolated single weapon case, would create sufficient devastation to warrant imposition of some wartime controls whether or not there is any full scale mobilization. If transportation were attacked (principally by targeting petroleum refineries) in conjunction with a counterforce strike, the resulting situation would differ from the heavy counterindustry strike mostly in degree. The same institutions would be threatened in each case and a qualitative description of the resulting situation would be about the same. The condition of transport in the postattack period is thus extremely important, if not crucial, in characterizing the postattack environment.

The economic fortunes of different individuals and businesses could prove quite different in the course of the transattack period. Direct losses and indirect financial ramifications of settlements would be quite important in this regard, and the exact workings of any loss-sharing plan, however equitably intended, would probably affect various groups differently. Subsequent developments during the rehabilitation and early recovery periods would be even more diverse. The transition from preattack to postattack conditions would bring about drastic shifts in economic requirements and values. Those in the best position to fill postattack needs would prosper even with strenuous government efforts toward economic stabilization. The postattack period would thus bring about rapid changes in social and economic status and market changes in the relative values of different types of skill, knowledge, or occupational experience. This could result in a relatively mobile social structure and a fluid situation with regard to individual authority and responsibility.

Existing Plans To Recover from Attacks

Existing plans for recovery management envisage the establishment of some new federal agencies, the assignment of new functions to present ones, and the parallel implementation of state plans to establish complementary or temporary prototype agencies and activities. Table 2 lists the most important of these proposed federal measures, agencies, or programs and indicates their primary function. The final listing, the Comprehensive Plan, is an OEP program for assisting the individual states in the preparation of plans for interim action until federal activities can become operative. State agencies or activities established under such plans would evolve into state resource management agencies or be absorbed in or become complementary to federal activities.

Table 2

MAJOR FEDERAL PLANS OR AGENCIES WITH POSTATTACK PROGRAMS OR RESPONSIBILITIES

Measure, Agency, or Program	Primary Function or Objective	Status
Office of Defense Resources	Coordination between resource and claimancy agencies	Paper plan
Economic Stabilization Agency	Price, wage, and rent controls and other stabilization measures	Paper plan
Business and Defense Services Administration	Controls industry in emergency as resource and claimant	Exists in Department of Commerce
Defense Material System	A system for control through allocation of critical materials	Available for limited war or for nuclear attack
Office of Emergency Transportation	Controls transportation during any emergency as a resource and as a claimant of fuel	Existent in Department of Transportation--spin-off of OEP
Telecommunications Office	Controls telephone and certain other communications as resources	Associated with OEP
Office of Emergency Planning	Coordinates emergency planning efforts throughout government, operates Natural Resource Evaluation Center data banks	Active. Effectively becomes ODR, ESA in an emergency

Table 2 (concluded)

Measure, Agency, or Program	Primary Function or Objective	Status
Resource agencies including the Departments of Agriculture, Labor, Interior, and others, together with similar independent agencies	Agencies controlling basic resources such as fuels, minerals, labor, agriculture, and forests; able to speak for resource availability and capacity	Recognized emergency function of existing designated agencies
Claimancy agencies including AEC, NASA, DOD, HEW, and similar departments or independent agencies	Agencies with missions requiring support from the economy or representing classes of consumers, for channeling claims on resources through ODR and government	Recognized emergency function of existing designated agencies
Asset Validation and Equalization Agency	A program for processing claims of loss and ultimate partial reimbursement from postattack tax revenues	Proposals being considered among OEP, Treasury, and the FRB
Comprehensive Plan	Plans for interim action by individual states to disseminate general freeze orders, and to establish rationing and other emergency measures	OEP's model state plan being adapted to needs of individual states and implemented

These various plans have evolved from wartime controls applied in the Korean conflict and World War II and undoubtedly provide a picture of what would be necessary and likely in the case of a light or purely counterforce attack. Although they provide for emergency operation of a damaged transportation network, they do not appear to be adequate for an immobilized society such as that likely after a heavy attack. Evidence in support of this conclusion is contained in earlier reports,[1,2,3] and will be supplemented in this report. It is mentioned here incidental to the general observation that in the event of a heavy attack, new forms of government intervention would evolve as dictated by necessity. One of the more striking characteristics of the postattack environment would be extensive interinvolvement of local government and local business and the major role played by the federal government in economic life and particularly in facility construction. A corollary to these developments would be the unprecedented involvement of business and government in the affairs of the ordinary private individual.

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1. Dresch, Francis W., Review of Research on the Supply-Requirements Problem (prepared for Office of Emergency Planning), Stanford Research Institute, Menlo Park, California, February 1962.
2. Dresch, Francis W., Resource Management for Economic Recovery Following Thermonuclear Attack, Part I: "A System for Synthesis and Feedback of Essential Information"; Part II: "Effective Control of Resources in Recovery Management (prepared for Office of Emergency Planning), Stanford Research Institute, Menlo Park, California, June 1964 and January 1965
3. Dresch, Francis W., and Hazel Ellis, Methodology for Assessing Total Vulnerability (prepared for Office of Civil Defense), Stanford Research Institute, Menlo Park, California, August 1966

II DECISION PROBLEMS IN RECOVERY MANAGEMENT

Relationship of Decision Problems and Level of Attack

The decision problems in the postattack period would vary somewhat with the environment but less so than might be expected. The immediate problem would be that of making an accurate appraisal of the environment itself. Preattack damage assessment programs combined with transattack data on bursts would presumably provide preliminary estimates of the situation, and these could be updated as local inspection became possible. Even more precise and more detailed information would be needed for recovery management. For discussion of the nature of the decision problems themselves, however, such detail is not necessary and the crude classification of possible environments presented in Chapter I is more than adequate.

Even in the light damage case, there could be room for debate about the desirability of attempting to restore particular cities that may have been heavily hit. Criteria must be developed for judging the unique geographical or economic features of historically significant locations in the context of the current national situation to reach rational decisions about recovery goals. This is not so much a question of attempting to derive benefit from catastrophe by applying principles of aesthetics, economic location theory, and other neglected yardsticks to the task of rebuilding the nation as it is a practical and inescapable question of meeting the requirement for new facilities as intelligently as possible. Alternatives would include expansion of facilities in undamaged cities, relocation of the heavily damaged city, rubble clearance and reconstruction of the damaged city more or less at its original location, or some compromise among all these possibilities. In the heavy attack case, such problems would become more global in scope. The variety of recovery plans would increase greatly but the constraints would also increase in number and become more restrictive because of basic limitations on the capacity of the stricken economy to rebuild at all. A fundamental problem would arise with respect to the analytical task of identifying, screening, and evaluating, even in a crude way, all the more plausible alternatives. To provide some perspective for discussing decision areas relevant to recovery management, Table 3 presents a list of decision problems likely to be typical in the case of an immobilized and heavily damaged economy. Codes indicate whether the problem or a variant would be likely to arise after a light attack and whether the problem could be resolved locally or

Table 3

TYPICAL DECISION PROBLEMS RELEVANT TO MANAGING RECOVERY FROM A HEAVY IMMOBILIZING ATTACK

Problem	Significance For a Light Attack	Government Bodies Involved
Identification and display of alternatives	Less	Federal and local governments
Methodology for costing	Less	Mostly BDSA, ODR
Identification of scarce materials, skills, products, and capacities	Less (and easier)	BDSA, ODR
Cost in effort and scarce materials or capacities	Less (and easier)	BDSA, ODR
Cost in elapsed time	Less	ODR, Local
Opportunity cost of closing decision flexibility	Less	ODR
Methodology for benefit evaluation	Same	Mostly ODR
Identification of national objectives	Same	Mostly ODR
Identification and valuation of requirements	Same	ODR and local government
Dating requirements	Same	Local government
Evaluating uncertainty in objectives, requirements, and due dates	Same	Federal and local governments

Table 3 (concluded)

Problem	Significance For a Light Attack	Government Bodies Involved
Understanding the external situation	Same	Federal government
Recognition of and disposition of the legacy of the past and its commitments	Same	Federal government
The greatest good for the greatest number and compensation of those victimized	Less	Federal government
Checks and balances in the face of extreme urgency	Less	Federal government
Local viability and self-sufficiency versus specialization	Much less	Federal government
The role of free enterprise	Same	Federal and local governments
Collective goals and individual preferences	Less	Federal and local governments

federally or would require close cooperation among local, state, and federal governments for any solution.

The problems cited in Table 3 have the form of abstract decision problems rather than specific questions of the type:

Is it really needed?
Where can we find it?
How can we make it?
When should we do it?
Why do we do it this way?

The abstract formulation of these problems forces recognition of the fact that ordinary economic decisions are made in relative isolation from concerns about the nature of the economy as a whole or the reasons for or directions of its slow evolution. The postattack situation, on the other hand, requires decisions of far more fundamental character without the benefit of a practical ceteris paribus assumption since things would have changed radically, would continue to change for a long time thereafter, and would never be the same.

The typical problems listed in Table 3 can best be discussed in terms of specific illustrative cases, such as those listed in Table 4. The three examples cited will illustrate the difficulties associated with identifying and presenting a complete set of alternative courses of action. Even in the absence of price control, nothing resembling market prices would be available to indicate the total real cost of effort and materials that would be required for some of the alternatives cited, since many scarce skills, materials, and construction items would have acquired a real value of astronomical level. A few of these could be handled by rationing, price fixing, and controlled allocation, but the problem would remain of determining some rational basis for the artificial prices selected and for making the allocations. In each of the cases, the relative risks, costs, and benefits would be difficult to establish in view of the fact that estimates of the time available or the time required are probably poor and depend on the nature and consequences of other decisions. The problem of proper pricing of items in cost/benefit comparisons would be further complicated by difficulties in establishing a proper interest rate for discounting the future and in estimating dates for any anticipated events or developments that would make particular programs either critical or superfluous. Such critical dates or milestones would include those for contingency events such as the exhaustion of the diesel fuel inventory if no new sources were obtained or times related to the crop or livestock cycle.

Table 4

EXAMPLES OF SPECIFIC POSTATTACK PROBLEM SITUATIONS
Illustrative Case Study Suggestions Presenting Typical Decision Problems

Case	Situation	Discussion and Qualitative Analysis
1	St. Louis is badly damaged. Survivors have been evacuated to Kansas City, Mo., and to the countryside. Rail marshaling yards near St. Louis are inoperable. Bridges are out. Most plants destroyed. Surviving plants are damaged and relatively inaccessible.	Alternatives include (1) abandoning St. Louis, rerouting rail lines, replacing essential St. Louis industry by plants in new locations away from all target cities while expanding capacity of similar facilities surviving elsewhere; (2) building a new St. Louis somewhat away from the original site; and (3) building a new city elsewhere. These alternatives could have many variations.
2	Petroleum refineries have been specially targeted and virtually wiped out. One small refinery was missed and one small refinery was only slightly damaged and could be repaired in three months, one large refinery was moderately damaged and could be repaired in 15 months. Crude topping plants could be built in 9 to 12 months for low grade gasoline and for diesel fuel. A new refinery would require 18 to 24 months for completion under the economic conditions prevailing. Remaining gasoline, diesel fuel, and lubricants could serve surviving vehicles for a week, but if restricted to tractors, locomotives, trucks,	Repair of the second refinery would permit allocation of half the required amount per week to the essential uses. Constructing the topping plants would permit delivery of slightly less than two-thirds of this amount. Repair of the large refinery would permit full delivery to essential uses in 15 months. If the small refinery were not repaired, usage will be reduced to one-fourth of the priority requirements until the topping plants were operational or, if they were not constructed, until the large refinery was repaired. Repair and construction costs would have to be compared with loss of fuel usage.

Table 4 (concluded)

Case	Situation	Discussion and Qualitative Analysis
	and official cars only could be made to last two months. The small refineries can each produce about one-fourth of the demand under the restricted use.	
3	The New York megapolis was badly hit but the New Jersey shore suffered only localized damage, and its industrial periphery survived. Rail connections to the south and west are open. Yards and docking terminals were badly damaged and some spurs cut off. Food processing, electronics, drugs, and metal fabrication plants survived along with other valuable facilities engaged in machine tool fabrication, heavy equipment, machinery, electrical machinery. Should all operable plants continue normal operations or should product mixes be drastically changed? If so, how? Local labor force plus survivors from neighboring areas provide an adequate labor supply.	Little is probably known about the inputs to the area that would be needed to sustain operable plants. Transportation problems suggest emphasis on minimizing traffic loads into or out of the viable area. A local agency can be established from city, state (New Jersey), and federal representatives to identify (1) exports from area most urgently needed elsewhere, (2) imports most urgently needed for survivors or for essential industry, (3) essential products requiring minimal import support, (4) other products requiring minimal import support including some that should give an exportable surplus, (5) products of marginal use either locally or at large, (6) facilities under (5) that could and others that could not be readily converted to other lines. What should be produced and what conversions should be contemplated?

Postattack-decision making would be made more difficult by general confusion about national objectives as well as the unusually serious uncertainties as to possible start-up or due dates, production rates, and future requirement. It would also suffer from uncertainty as to the amount of uncertainty itself. The usual uncertainty as to the possible course of foreign affairs would be aggravated in the postattack period by a worldwide instability characterized by rapid shifts in power alignments and in relative national power.

The postattack period would be further complicated by the necessity to examine anew the compromises effected among conflicting goals in the course of U.S. history. These would include many questions to be resolved relative to past commitments such as loss equalization; pension and retirement arrangements; the plight of the aged or handicapped; losses under contract nonperformance; and losses under condemnation processes, governmental actions to promote recovery, or economic changes induced by government actions. Measures taken to assure the greatest good for the greatest number might warrant some consideration of compensation for the minorities adversely affected. The urgency of the situation and the time requirements for vital actions would conflict with the traditional systems of checks and balances and would result in new compromises between initiative and post audit. The problems of depressed regions would arise again on a wide scale with a new lineup of economic regions, and a distinction would have to be made between regions likely to be chronically depressed and those with an acceptable future but with a minor contribution to make to the rehabilitation period. A balance would have to be achieved between immediate requirements for local self-sufficiency or viability and longer run advantages of specialization. This would include the usual conflict between the economic advantages of concentration and the defensive advantages of dispersal. The proper role for free enterprise in an uncertain and heavily controlled economy would have to be re-examined. The proper roles of consumer preferences and individual valuations of working conditions, leisure, and time preferences would also have to be re-examined with full recognition of clear and conflicting collective needs and the needs of coming generations. Table 4 provides examples of specific decision situations including many of these conflicts in a fresh or unusual context. Table 3 recognizes their importance and provides suggestions for giving them a formal structure.

Decision-Making Responsibility

This preliminary sketch of the problems of decision-making in the postattack period has not considered the problem of assignment of decision-making responsibility to individuals or agencies; it has merely indicated

requirements for decision-making. However, the fundamental character of some of the policy questions and their close association with practical matters relating to public welfare and collective goals suggest that much of the decision process should permit representation of different interests and points of view. It should thus be an official process and therefore a government process. It would be unrealistic to hope that appropriate resolution of such problems could be obtained through the collective effects of uncoodinated actions of individual leaders of industry and spokesmen for interest groups. If this statement appears obvious, it should be pointed out that similar decisions and conflict resolutions have been effected over many decades by the collective results of many individual actions and eventually sanctioned by law or custom.

What has been said thus far relates to the procedure for making decisions, the rational analysis of alternatives, or the rationalization of decisions made. What types of decisions would be made and what actions would be taken as a result of them? Table 5 lists some plausible examples and indicates both the sequence and probable nature of the action and the action agencies. These decisions and the actions that implement them implicitly assign values to certain trade-off alternatives; for example, a relative weighting of current, near term, and long range payouts of services or product. Since different decisions would be made by different groups of persons in various places, the implicit values would probably be rather inconsistent. The individual decisions would usually only imply an inequality that would provide a limit on some parameter, e.g., the discount rate, and a number of consistent decisions would be required to impute a particular value. If the inconsistency were not too great, a number of relevant decisions could at least indicate a consensus discount rate providing both an estimated value and a range or variance for estimating the stability and the sensitivity of the parameter to the different decision-makers or the same group reacting to different circumstances. In normal times, the determination of rates of time preference flows from relations between the cost of money in the money markets and the internal rate of return available to corporate decision-makers from investment opportunities. The postattack period would lack any reasonable approximation to the money market and all opportunities for internal investments. The scattered imputations that might be used to bracket an intrinsic or real interest rate would be rather artificial in that they would reflect primarily the judgment of government agencies. The absence of a money market to permit auctioning of bids and offers for terms and the necessity for somehow restricting or coordinating the moods of different government officials making the effective time preference decisions would be a major problem of postattack fiscal reorganization. Similarly, coordination would be needed for other trade-off comparisons such as the price that would be worth paying for regional self-sufficiency.

Table 5

EXAMPLES OF POSSIBLE ACTIONS RESULTING FROM POSTATTACK DECISIONS

Decision	Likely Action Sequence	Likely Action Agencies
Impound all petroleum refining products and allocate selectively among most essential users	Prohibit use of refinery products during inventory period	ODR
	Take inventory	Local boards, OOG
	Rank users by essentiality	ODR
	Estimate range of rates of use by user	OOG
	Prepare preliminary allocation schedule	ODR, local boards
	Update allocation schedule and monitor	ODR, OOG, local boards
Abandon certain heavily damaged cities, for example, an important node such as St. Louis or Chicago	Plan permanent resettlement of survivors	ODR, Labor, HEW
	Reroute transport on bypasses	ODR, OET
	Organize salvage operations	OCD
	Expand industries elsewhere to absorb resettled labor supply	ODR, Labor, Commerce
	Schedule facility expansion elsewhere either at dispersed locations or all at some smaller center near or similar to city abandoned	ODR, all resources and claimancy agencies

Table 5 (concluded)

Decision	Likely Action Sequence	Likely Action Agencies
Rebuild one quarter of the preattack refining capacity in two years	Examine location alternatives	OOG, Commerce, ODR
	Examine requirement milestones	ODR, Agriculture, OET
	Examine refinery size alternatives	OOG
	Tentatively schedule sequence of construction start dates	ODR
	Analyze requirements for construction materials and equipment	OOG, Commerce
	Revise construction schedules	ODR
	Start construction program	Corporations, GSA

Representative Recovery Tasks

Table 6 returns to the question of necessary actions and provides a more complete, or at least a more fully representative, list of tasks to be accomplished with or to material assets. Most of these tasks would have to be carried out locally; some would entail interactions between two localities. Some would involve distribution of a product over the whole country, and others entail the collection of different products from many different localities. In the postattack situation with a tight transportation supply, there would be fewer instances of the last two categories than usual. Although the execution of most tasks would involve only local groups, decisions concerning facility construction and other major projects could involve national authority. Moreover, decisions regarding initiation and continuation of many of these tasks would entail coordination among different decision-makers and probably some authorizations, approvals, or assurances of supplementary tangible or policy and procedural support.

No matter what methods were used to evaluate projects either with respect to feasibility or anticipated contribution toward fulfillment of essential requirements, some procedures for reviewing proposals and authorizing work would be set up. In normal times, such procedures exist largely within corporate management for the private investment sector and within government for the public works area. Some individual private investors may act independently, but even then with some staff assistance to contribute factual material for contract specifications and other interaction with outside business or government agencies. These procedures would undoubtedly be modified to reflect changes in the total environment. The kinds of analysis and supporting argument needed for consideration of suggested or proposed tasks would follow, in general outline, their counterparts in present practice. Data would be harder to obtain, analysis would entail sophisticated welfare concepts rather than simple cost and revenue estimations, and many details normally taken for granted would have to be considered. On the other hand, the urgency that would permeate all planning discussions would force shortcuts and quick decisions.

In every case, someone would have to work up a bill of material requirements, an estimate of effort including special skills, lists of special equipment necessary, site preparation, and other unique or possibly critical requirements to be satisfied before feasibility could be demonstrated. A case would also have to be made for need, that is, for the essentiality or value of the services or contributions anticipated from completing the task. Formal comparisons with other methods of meeting essential needs or other needs might be left more to individual or consensus judgment than now, simply because of the fact that objective evaluation might be too difficult and too inconclusive. By the same token,

Table 6

PROBABLE POSTATTACK PROJECTS OR PRODUCTION TASKS

Project or Production Task	Need for Regional Support	Need for National Support
Repair transmission lines as essential or expedient	Specialized	Specialized
Repair telephone lines as essential or expedient	Specialized	None
Clear debris where essential or most expedient	Specialized	None
Store consumer goods and exportable inventories pending allocations	None	None
Start production of essential products	None	None
Start decontamination where most urgent or expedient	Specialized	None
Put operable plants to work on any appropriate essential production	Specialized	None
Convert other operable plants	Specialized	Guidance
Import national requirements for plant operation	Yes	Support
Improvise substitute materials, processes, or components	Specialized	Specialized
Organize existing "garage" industry for component production	None	None
Establish "garage" industry for component production	None	None
Improvize housing where needed (e.g., near plants)	None	None
Establish mass feeding where expedient (e.g., at plants, schools, or barracks)	None	None
Establish garden and peripheral agriculture	None	None
Organize sanitation systems and pest and rodent extermination	None	None

Table 6 (concluded)

Project or Production Task	Need for Regional Support	Need for National Support
Continue decontamination on organized schedule	None	None
Continue debris clearance on organized schedule	Specialized	None
Repair, modify, or otherwise adapt non-operating plants to appropriate essential production	Construction	None
Repair bridges or improvise replacement	Construction	Support
Construct bypass highways or tracks	Specialized	Specialized
Organize internal distribution system	None	None
Organize freight consolidation system for exports and bulk imports	Guidance	Guidance
Construct new plant facilities most urgently needed	Construction	Approval

some projects would undoubtedly be undertaken even if feasibility were doubtful in cases where the need is overriding and no alternative appears attractive.

In practice, qualitative judgment would suffice in most cases to eliminate some alternatives and to select two or three worth serious consideration. Judgment would also serve to eliminate consideration of unimportant differences and focus attention on the more significant factors. After trying such methods for simplifying models for comparative study and selecting key elements or characteristics for objective appraisal, careful efforts at quantification would be necessary. In making the simplifications suggested, some general impressions of an underlying value system would be essential. In estimating costs and benefits more objectively, the same value system would be involved at least for approximating relative values or value differences. The sources of this value structure, its evolution, and its general acceptance are poorly understood and would be topics of interest for postattack historians. Some general concepts regarding the probable development of such a value system will be discussed in Chapter III after discussion of procedures for identifying alternatives and analyzing trade-offs. The system needed, however, must be adequate to bear on a variety of decision problems including decisions about:

Districts, cities, areas, or regions
Plants and facilities
Equipment
Supplies and components
Raw materials and energy
Labor and labor skills
Movements of freight or people
Special services and utilities
Schedules and timing
Management and organization

Decisions of all these types would be entailed in the full identification and the comparative evaluation of alternatives.

III DECISION ALTERNATIVES AND TRADE-OFFS

Selection of Alternatives

The complexities of the decision process in postattack recovery management were discussed in the preceding chapter. To develop a complete set of alternatives, one might like a decision tree through which specific questions could be grouped hierarchically under more basic underlying policy alternatives to be resolved first. If the preceding chapter has not already made this seem impracticable, a preliminary attempt to describe such a tree will do so. Such an attempt is useful, however, because it provides some insight with regard to characteristics of a practical approach to the display of alternatives and trade-offs. Table 7 shows the results of such an attempt. It was prepared by starting with a number of specific questions as leaves of the tree and identifying underlying branches. The opposite approach of starting with basic policy alternatives and identifying subsidiary questions affected by the basic decisions provides the schema exhibited in Table 8. The task of proceeding very far in either direction is clearly formidable, and the chances of making the two sequences merge are very small.

A more practical approach is the classic scientific method of attempting to isolate portions of the full system even at the expense of great loss of accuracy. Such an approach becomes worthwhile only if supplemented by a procedure for iteration, successive approximation, or perturbation that permits resolution of most significant issues first and then refining of the analysis by consideration of both relevant details and of deviations from underlying or simplifying assumptions. Just as we abandoned the search for an optimal rationale for decision-making to consider some of the likely decision action sequences in the preceding chapters, we must in this chapter relax normal requirements on analysis of trade-offs to accept differential comparisons based on transient and perhaps arbitrary value systems.

The actions or tasks listed in Table 6 of the preceding chapter are all projects relating to facilities or to production or services from facilities. Relevant trade-offs concern alternative facility projects, alternative products from the facilities being considered, or alternative facilities for producing the same products. Underlying such direct comparison is a basic rating of alternative products, but this rating process

Table 7

DECISION-TREE BY GROUPING SPECIFIC QUESTIONS

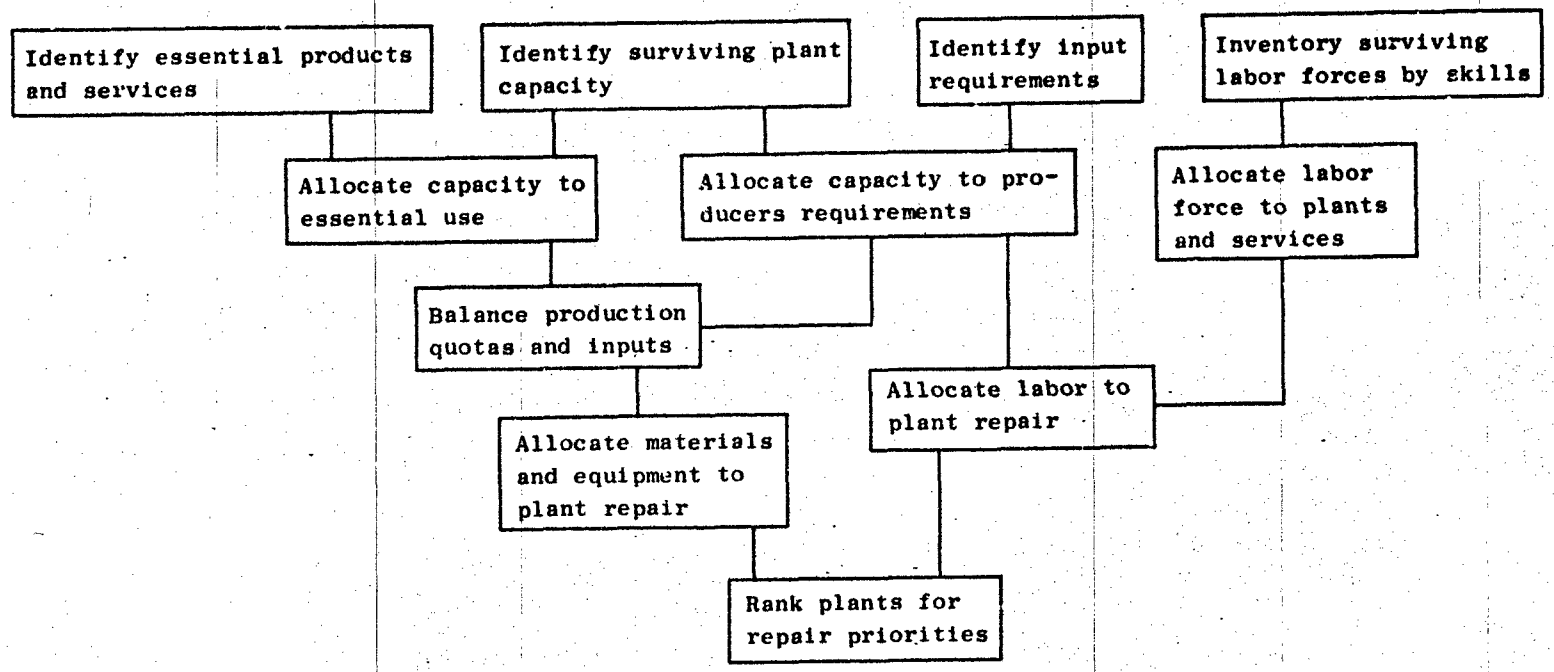
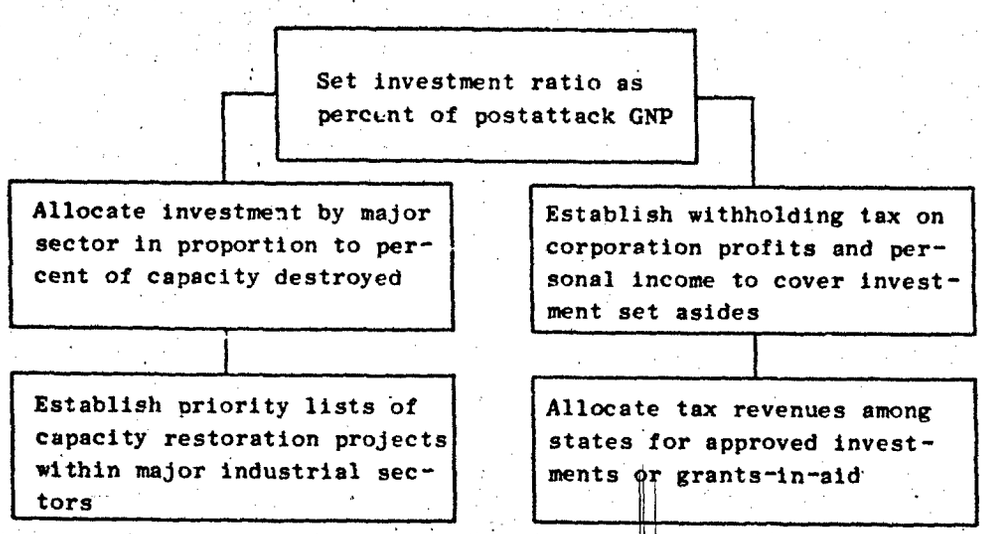


Table 8

DECISION-TREE BY FURTHER SPECIFICATION
OF GENERAL POLICIES



need not always be considered explicitly in each comparison. Certain products might be so essential to survival that they could be assigned infinite value. Others might be so unachievable that they would carry an infinite cost. Some groups of products might have great value as a group but substitution among them might be readily acceptable. For example, a minimal food supply would be essential but many different combinations of foods would be acceptable. Uniformly high freight rates might provide an easy way to encourage local self-sufficiency but nearly inaccessible areas without self-sufficiency might best be abandoned provided that survivors there could be evacuated. The alternatives in such a case would be the import of essentials for sustenance compared with the net cost of evacuation. It might be possible to resolve such questions without having available an accurate estimate of the real cost of transport. A uniformly high interest rate could force a strong preference for immediate needs or problems at the expense of remote ones. Yet certain future disasters might be inevitable if not forestalled by appropriate present action and must thus be provided for in spite of the effects of an interest rate on trade-offs. Possibly, assigning a near infinite cost to the anticipated disaster would suffice but a simpler qualitative analysis would be preferable.

The field of long range corporate planning has made use of a variety of devices or concepts that facilitate the generation and analysis of alternatives including simple listing of objectives, listing of candidate projects or products, line of balance charts, and critical path scheduling. Some of this would be applicable at least in part to postattack decision-making. Of primary importance, however, would be working out a complete plan of action with provision for obtaining necessary input requirements before starting any new project or making any significant change in production rates. The decision process in practice would be one of arriving at plausible schedules, testing their feasibility, and proceeding to carry them out. The planning devices cited are primarily scheduling techniques and the postattack decision problems are scheduling problems and the problems of organizing for scheduling.

The schedules are interrelated and can be arranged logically in at least two different ways somewhat analogously to the decision trees of Tables 7 and 8. On the one hand, one can think of a master schedule of national scope supported by secondary schedules for regions or areas, which would be supported in turn by local schedules for individual plants. On the other hand, one could attempt to schedule local activities, then schedule the support needed to meet those schedules, and finally reach a master list of requirements. In practice, something of a compromise between both these structures would be followed. The schedules would provide a framework for considering associated alternatives. Unsuccessful attempts to establish feasibility would eliminate some of the alternatives.

Alternatives feasible at one level may sometimes be blocked by encountering infeasibilities at more basic support levels and thus eliminated. But many selections must be left to decisions flowing from value comparisons or trade-off analysis.

For selection among many groups of related alternatives, comparisons need be made only with respect to factors that differ among the alternatives. Factors that affect all alternatives of a group more or less equally need not be considered even though it may be impossible to establish appropriate values. The discussion of trade-offs can be initiated simply by first considering those concerned with certain typical situations. As a first example, consider the class of alternatives related to the question of whether to import some essential product or whether to try to produce it locally. If it is possible to produce it locally, the costs could be compared with the import price plus the real cost of transportation. Three costs at the local point are needed: the cost to produce, the cost to import (import price), and the cost of transportation from the exporting area. None of these costs can be estimated readily. The transportation costs might well be set at some arbitrary aggregate level provided that they make sense relatively; i.e., that the freight rate structure reflects true relative operating costs at actual rates of demand and that other costs are geared to these. The other costs would probably include cost elements for many items for which there would exist no free market even in local areas. This problem will arise in all of the examples. The discussion of these will indicate how at least some of these items could be valued objectively.

A second representative example is the selection of an optimal product mix for an operable facility. Of all products that could conceivably be produced at the facility in question (and including any that might be produced there in the preattack period) some could readily be eliminated as inappropriate to the postattack period because they were not essential. For the remaining product possibilities, judgment would have to be exercised to rank them by priority reflecting relative essentiality either to the local community or to the nation as a whole. Ideally, this ranking would be most useful if it were scaled to reflect (and preferably be equated to) the estimated difference between value and cost measured in postattack prices. The extent to which price data were available would affect the extent to which the priority ranking could be carried out objectively. Transportation charges could serve in effect as a disincentive to importing materials or producer goods and could serve as an inducement for placing a high value on products that would otherwise need to be imported. A ranking system of this type by itself would suggest full utilization of the plant for the product that ranked highest among those feasible. Only if output exceeded local demand would production of other

items of lower priority value be considered. In practice, local management would probably prefer to limit production of each item to some fraction of the total local demand to enhance product diversification. In normal times, raising prices would decrease effective demand and accomplish the same end. In any case, the pricing problem would be critical.

A third representative example concerns rebuilding or extensive repair of a heavily damaged facility. The question of whether to repair or rebuild would be secondary to the related questions on whether the lost capacity is needed at all and if so where it should be located. Objective consideration of need and optimal location could rarely be left to local management, since alternatives concerning other areas and an appraisal of national needs are involved. Normally, local estimates of relative costs could settle the question of whether to repair or rebuild, but in the post-attack case, the probable need for nationally scarce inputs could bring in problems of subjective or arbitrary pricing best considered at the national level. In practice, all facility decisions would probably require national planning.

A final example is the question of possible abandonment of a whole city or locality. Preliminary questions relate to the viability of the city in its current state; the immediacy of threats to survival of the population; the national importance of the city as a location or as an entity supplying specialized national needs; the cost of relocating survivors; the marginal costs of expanding the gross local product on site compared with comparable expansion elsewhere; and the total cost of restoring the city to a viable level of gross product compared with the total cost of achieving the same total product some other way. The problem of identifying all relevant alternatives and elements of cost in this example would be more complex, since the number of elements would be greater and the alternatives would cover a broader range of possibilities and a wider variety of locations and industries. Although local estimates would be needed of the cost of rebuilding and the amounts of various imports required, a national point of view would be necessary to provide pricing data on imports and projected exports as well as policy determination on national issues.

Economic Model for Use in Selecting Alternatives

The critical problem in all four examples would be that of developing an adequate pricing concept and the relevant supporting data on prices. To initiate a practical but meaningful approach to the pricing problem, several idealized constructs will be convenient. First, imagine that each surviving locality would be incorporated into a profit-motivated but integrated structure. Imagine also that this corporation would have to buy

from similar corporations elsewhere at the best available delivered price and sell its exportable surpluses in competition with others at delivered prices. Assume that each corporation would pay local taxes sufficient to support all activities of the appropriate local government including welfare or relief payments, if any, and that the corporations would collectively pay the costs of state and federal government activities. We would thus reduce most of the task of decision-making to the level of corporate management and government in various local cities or city states. Also assume that one federally controlled corporation would have fiscal responsibility for integrated operation of all national transportation, power, or communications nets and another would have responsibility for all construction or facility repair.

Resources available to the local corporation would be local inventories (other than consumer goods in the hands of the general population), local labor force, and local facilities plus the net gains in materials or credits that could be achieved from intercorporation trade. Resources available to the transportation network would be a distributed labor force; surviving transportation facilities and equipment; fuel inventories in the hands of transportation activities; and the materials, facilities, or net credits that could be realized from operation of the transport system. Similarly, the construction corporation would control construction equipment, materials, and labor. All corporate managements would operate to maximize profits. All healthy persons of working age would be employed by the local corporation, the national transportation or construction agency, or by local or federal governments; they would be guaranteed a minimum wage plus incentive pay.

The model sketched has thus simplified the discussion to concern the federal government, two national enterprises, 2,000 or 3,000 localized ones, and a comparable number of local political or governmental entities. It should perhaps be emphasized that this is not a suggested organization for the sociopolitical economy but a model useful for examination of information requirements and flows. The model provides a skeletal background against which more practical organizational structures can be analyzed.

Obviously, this model differs from usual economic analysis in that it emphasizes geographical relationships rather than economic sectors. Each local corporation would engage in all lines of production economically feasible in its local environment. Dispersed industries such as interarea networks and heavy construction would be organized on an integrated national basis. The profit-making goals of local corporations would be related to achieving large net export balances and manufacturers' surpluses usable for construction purchased from the national construction company.

Lower limits on wages would be established by minimum guarantees and would otherwise be adjusted to marginal productivity locally. Purchases by government would include purchases of essential consumer goods not available locally and to be distributed at cost on a rationed basis. Schools and other direct public benefit projects would be supported by the government from tax revenues derived from a combination of property, net worth, retained earnings, or corporate income taxes all levied against the local corporation or from selected excise taxes on particular products levied against consumers. Federal taxes would be levied against the local corporations based on corporate income. The construction company would compete locally for labor and some materials and would price its services to reflect local demand and local cost differentials. Any local corporation unable to reach break-even operation would become a problem for the federal government, which might grant subsidies to the local government or to the local corporation or might arrange to relocate the population in other localities at federal expense.

The utility corporation would have to supply some type of service to all localities, but might raise rates to cover costs, charge for premium service, and differentiate freight rates among commodities on the basis of handling costs. Local distribution of power or commodities and other local utility services would be under the control of the local corporation.

Initial financing of the two national companies would come from the federal government but as self-liquidating credits. Initial financing of the local corporations would come from local governments via bonds sold to the federal government to be redeemed from tax revenues and loan repayments from the local corporation.

A classification of commodities can now be useful according to the participants in sale, purchase, distribution, or pricing. This is provided in Table 9. In analyzing the decision system, it will be convenient to use the abbreviations employed in Table 9 identifying the participants with P_i for local population at i, C_i for the corporation at i, G_i for the government at i, G_f for the federal government, U for the federal utility, and C for the federal construction corporation. Management of C_i will be M_i, that for U will be M_u, and that for C will be M_c. The C_i deal with P_i, C, U, G_i, and G_f. The P_i deal with C_i and G_i, but collectively (i.e., for all i) with G_f. G_f deals with G_i, C_i, C, and U. In effect, C_i is a monopoly at i and could take advantage of monopoly pricing to maximize the rate of local investment. Some inequities could result for items having inelastic demand. Such items, when essential (and most items with inelastic demands tend to be essential), could be price-fixed by the government and distributed under rationing and at manufacturers' or procurement cost with only a prescribed markup permitted.

Table 9

CLASSIFICATION OF GOODS AND SERVICES AND PARTIES IN SIMPLIFIED MODEL

Commodity or Service	Seller	Buyer	Distribution Mechanism
Essential consumer goods	C_i	P_i	$C_i \rightarrow \begin{cases} G_i \rightarrow P_i \\ P_i \end{cases}$
Essential producers goods	C_i	C_j	$C_i \rightarrow G_i \rightarrow G_j \rightarrow C_j$
Construction materials	C_i, C_j	C	C_i, $C_j \rightarrow C$
Plant equipment	C_i, C_j	C_i, C_j	$\{C_i \rightarrow G_i \rightarrow G_j \rightarrow C_j\}$
Housing	C	C_i	Rental by C_i
Household equipment	C_i	P_i	Sale on rent by C_i
Electric power and fuel	U	C_i	$U \rightarrow C_i \rightarrow P_i$
Premium transportation	U	C_i	$U \rightarrow C_i$, rates set by U
Other transportation	U	C_i	$U \rightarrow C_i$, rates set by U
Imported consumer goods	C_i	P_i	$C_1 \rightarrow G_1 \rightarrow G_i \rightarrow C_i \rightarrow P_i$
Production work	P_i	C_i	$P_i \rightarrow C_i$ at wages set by C_i
Construction labor	P_i, P_j	C	P_i, $P_j \rightarrow C$ at wages set by C
Utility workers	P_i, P_j	U	P_i, $P_j \rightarrow U$ at wages set by U
Local corporate managers	P_i	C_i	$P_i \rightarrow C_i$, paid % profit of C_i
Construction management	P_i, P_j	C	P_i, $P_j \rightarrow C$, paid % profit of C
Utility management	P_i, P_j	U	P_i, $P_j \rightarrow U$, paid % profit of U
Local government employment	P_i	G_i	$P_i \rightarrow G_i$, wages set by G_i, P_i
Federal government employment	P_i, P_j	G_f	P_i, $P_j \rightarrow G_f$, wages set by G_f, P_k
Consumer goods retailed	C_i	P_i	$C_i \rightarrow P_i$ at prices set by C_i

In the model, the pricing policy of the national corporations (utilities and construction) would provide the determinants for the national price standards toward which the area economies would gravitate. When investment funds accumulated to the credit of the more successful local corporations, the wealthier areas could command more of the service of the construction corporation and thereby convert their financial strength into productive capacity. The least successful areas would require federal assistance as previously described. The movement of capacity to the more successful areas could in general be to the national good and might be permitted to control expansion if it were not for the fact that some of the initial success of particular areas could arise from transient circumstances and could better be evaluated from a longer range point of view. It would thus appear preferable to involve the federal government in the decision-making process for facility expansion or at least for major construction.

This simplified model has been introduced as a tentative step in the identification of alternatives and as an approach to the problem of comparative valuation required for trade-off analysis. How would trade-offs be identified and evaluated in the hypothetical world conjured up in the preceding pages? How would the task of decision-making be distributed among the corporations, the government, and the population?

The decisions available to the general population are (1) choice of employer among the five possible or a decision to stay on relief (presumably at an income considerably below the minimum wage scales), (2) choices on how to spend income among products offered for sale or rent by the local corporation or among rationed items distributed by the government, and (3) choice of how to vote in local and national elections. Under (2), the local corporation would decide the prices for unrationed items, and the government would set those for rationed items.

The local government would exercise most of the usual governmental functions; it would operate the schools and the rationing system, collect taxes from the corporation, and deal with the federal government as appropriate. It would employ teachers, firemen, policemen, and other normal government personnel. It would issue bonds for sale to the federal government to provide funds for support of schools and governmental functions, for loans to the local corporation, and for public works. These would be redeemed from local taxes, interest on loans to the corporations, or proceeds of loan retirements.

The federal government would collect taxes from all the corporations, coordinate facility expansion, assist depressed areas financially, and buy local bonds and the bonds of the national corporations. It would program

public works not associated with any local jurisdiction or the national utility and would perform the other functions of the federal government as appropriate under the circumstances. It would employ personnel as needed and construct federal government facilities. It would operate the postal service (although some might argue for turning this over to the national utility so that it could be operated for profit) and would issue currency.

The utility corporation would operate all the present interstate transportation, power transmission, and communication systems setting rates in accordance with costs and demand to optimize profits. It would operate through but not in local areas and would pay federal taxes only. Its employees would be paid wages consistent with those prevailing in their home areas or as needed to provide for adequate service. It would use after-tax surpluses to improve or extend service by facility improvement at prices negotiated with the construction company or purchase of equipment from local corporations at prices resulting from competitive bids by local corporations.

The construction company would build all facilities including housing in accordance with specifications of the governments, the utility, or the local corporations and would price its activities to maximize its profits. It would employ workers locally as needed and would purchase network facilities and equipment from local corporations at the best available on-site prices. It would pay taxes to the federal government only.

The local corporation would operate all productive facilities in the local areas, including those engaged in agriculture, fishing, forestry, and mining and would also manage local distribution and service operations. It would be the primary employer of area people and virtually the sole support of the local government. Its decision problems would encompass most of the business and industrial decision areas of the economy. It would decide on products to be produced locally, arrange import of other items, arrange for external sale of local surplus production, set prices for all nonrationed items, and negotiate prices for imports or exports. It would set local wages to encourage productivity limited only by national or local minimum wage standards.

The trade-offs to be considered by the local corporation would range over all the alternatives open to an integrated multiproduct monopoly. From its internal accounting it could establish cost relationships or at least marginal costs. By price manipulation, it could establish local demand elasticity. From its negotiations with other local corporations and from the prevailing freight rates, as affected by its own negotiations, it could evaluate the advantages of local production compared with those of

importing on an item-by-item basis and select favorable products for entry into export markets.

The investment policy of the local corporation would be more involved. Candidate projects could be listed for analysis, selected from such possibilities as possible decontamination or repair of damaged facilities located in the local area; new facilities for the production of items currently imported or unavailable; modifications of or expansions to existing facilities to meet local or export demand or to achieve significant cost reductions; and, finally, additions or repairs to or improvements in available housing. Among products to be considered would be construction materials and gasoline refineries to supply the transport industry, and industrial equipment for use locally, for export to other areas, or for sale to the national corporations. The evaluation of such alternative projects should include consideration of trends in construction, power, and freight costs, as well as possible saturation of consumer or producers demand. The most critical estimates for such calculations would relate to the probable duration of the crisis in transportation and the rate at which productive capacity could be made available.

The decisions about facility projects would, as envisaged, require review and coordination by the federal government after review and approval by the relevant local government and agreement with the construction company on estimated costs and completion schedules. In the case of the federal government, consideration would be given to anticipated profitability; secondary effects on other areas; consonance with national aims, policies, and plans; and the general welfare.

The trade-offs to be considered would include alternative uses of available investment funds in the hands of local corporations and the impact of alternative proposals on depressed areas and on the less successful local corporations. The federal government would also consider the relative impact on the transportation system and its fuel situation. Finally, the government would monitor the activities, policies, and plans of the national corporations. Limiting the utilities to investments in utility facilities or equipment and the construction corporation's to investment in construction equipment would tend to remove incentives for undesirably excessive profits or taking other improper advantages of monopoly position, but regulatory authority over the rate of return might be desirable.

The decisions of the national corporations would be more operational with pricing based on costs, allocation of equipment to areas based on demand, and refusals of service subject to approval from the federal government. The initial investment in facilities by the utility corporation would probably consist primarily in decontamination and repair plus some

construction of links to bypass heavily damaged nodes in the basic networks.

This imaginary description of a rather feudalistic organization of the postattack economy serves to indicate the probable roles of local compared with federal responsibilities and authority. In place of the integrated, monopolistic local corporations would be the individual management of surviving local plants and businesses. The decisions that these managements would have to make and the degree of cooperation that would be required for such decision-making in the local area would present trade-off opportunities and would result in information requirements similar to those needed for an integrated monolithic corporation.

The restrictions on interarea movement because of the high real cost of transportation would tend to replace competition within an area with competition among areas and force some integration of or cooperation among competitive enterprises within an area. Moreover, it would tend to force a distinction between local and national markets, with some differences in the kinds of information needed for response to each.

The simplified model ignores the role of the state government and assigns state functions to the local governments. In the postattack situation, the economic role of many of the state governments would be somewhat reduced except for dealing with the federal government and for relief and welfare functions. Finally, the existing corporations engaged in heavy construction or in interstate utility operations, although subject to some federal regulation now, would come under much closer scrutiny while being permitted if not encouraged to operate in a more cooperative, less competitive mode.

The decision alternatives, the trade-offs, and the information requirements associated with them would thus resemble closely those attributed to the decision centers considered in the simplified model. This will be brought out further in Chapter IV, which considers the information requirements for trade-off analysis on a continuing basis.

IV CONTINUING EVALUATION OF COSTS AND TRADE-OFFS

Updating of Evaluations

Chapters II and III discuss the problems of developing adequate estimates of real costs suitable for quantification of trade-off relationships. The highly transient natures of shortages and requirements in the early postattack period would make the quantifications achieved rather short lived. The relevant evaluations therefore would have to be updated frequently. This does not mean that investment programs and end-product pricing would need to be revised drastically or erratically however, because some of the variations in values and costs could be anticipated from the recovery plans themselves and from observed developments. Only the departures from such anticipations would need to be considered. Some of the departures might be associated with unforseeable events or circumstances but the complex economic dynamics of the immediate postattack period might prove difficult to interpret and might lead to fairly unreliable projections. Postattack recovery management would have to have access to some coordinated data reflecting current and projected values and some body of organized analyses updating the cost and trade-off relationships supporting decision-making.

Conceptually, the requirement for continuous updating would present no new problems and, if anything, the accumulation of data and analyses should permit progressive improvement in the quality and definitiveness of the relevant data. The principal problem would merely be that of organization: establishing a structure for collecting, editing, analyzing, and promulgating the information available; enforcing its use; and coordinating the data flows and data banks with the decision-making processes. This kind of coordination seems natural for an agency such as ODR. Data sources, however, would probably prove too scattered, too parochial, and too numerous for direct ODR contact. Intermediary organizations would seem to be necessary.

In Chapter III, the evaluation of costs and trade-offs was discussed in terms of an imaginary organization of the economy into semiautonomous local units and a federal coordinating function. This experiment tended to bring out the distinction between decision alternatives that would be reserved for federal or national consideration and those requiring too much of an understanding of the local situation to be safely removed from local control. In general, alternative uses of local facilities and

alternative product mixes are questions for local management. Operating costs would vary from area to area and by product so that the task of maintaining up-to-date information on costs for such trade-off evaluations would necessarily be a local function. However, the federal government and all national coordinating agencies would be concerned with questions of interarea trade.

The various national utility networks and the interstate truck carriers would be subject to at least as much regulation as in the preattack period except that some cooperative actions might be permitted with government sanction through waiver of specific provisions of antitrust legislation and through granting immunity from damage suits based on such cooperation. Rates would require considerable revision to adjust to postattack values and to recognize postattack costs. In particular, freight rates would need to be restructured, with provision made for frequent revision downward with minimal governmental review. Completely free rates geared to relative costs and traffic might be most effective in realistic allocation of transportation to the greatest needs. Confiscatory excess profit taxes or other measures to discourage or mitigate excessive average rates (e.g., a requirement to invest proceeds in facility improvements and repair) could suffice to protect the public interest. Since the alternatives available to the public carriers and the other utility services would largely be confined to allocation of equipment and manpower to various links or parts of their service zones or to allocation of investment funds to repairing facilities, construction of bypass links, or purchase of equipment, the costs would be relatively easy to estimate and to keep up to date. Similarly, although traffic demand would be unusually great right after the attack and might diminish for awhile before beginning to grow with recovery, it might be easier to predict than that in the preattack period if a flexible price policy is permitted and is used to monitor price elasticity. A general and continuing shortage of transport capacity would motivate efficient geographical distribution of equipment. Differences among areas in rate of recovery could be estimated rather easily from differences in car and truck loadings, and these would provide useful indicators of recovery for use in national planning.

Trade-Off Analyses

The kinds of trade-off analyses to be made are shown in Table 10, and the kinds of cost information required are indicated. Trade-offs are grouped in accordance with primary responsibility for ultimate decisions.

Costs associated with manufacturing and other industry, except for construction and the interstate utilities, would need to be determined locally. Costs associated with proposed additions to the current product

Table 10

TYPES OF TRADE-OFF ANALYSIS NEEDED AND COST DATA REQUIRED

Trade-Off Analysis (A Against B)			Cost Data Required
Product A	← →	Product B	Marginal costs of A and B; marginal costs of alternative plants
Product mix A	← →	Product mix B	Marginal costs of all As and Bs for given plants and competitive plants
Network repair	← →	Complete bypass route	Cost of repairs, bypass construction, and operating costs each way
Diesel fuel by method A	← →	Diesel fuel by method B	Capital costs A and B; operating costs A and B; market price comparable to diesel fuel
Reducing diesel fuel consumption	← →	New nondiesel engines	Cost of reducing fuel consumption, cost of alternative fuels, cost of developing and building other engines
Increase area self-sufficiency	← →	Increase specialization	Costs of scale, costs of transportation, and costs of dispersal
Commute service	← →	Relocate workers	Cost of commute services, costs of temporary barracks, and costs of billeting
Decontaminate plant A	← →	Repair other plant B	Cost of decontamination A; costs of labor, materials, and equipment for plant B; and transportation differentials

Table 10 (concluded)

Trade-Off Analysis (A Against B)			Cost Data Required
Convert plant A	← →	Repair other plant B	Cost of repairs as above; cost of labor, materials, and equipment for converting plant A; and transportation differentials
Build new plant A	← →	Repair other plant B	Cost of repairs for B; cost of labor, materials, and equipment for constructing plant A; transportation and production labor differential; cost of aiding depressed areas; and cost of building A elsewhere
Revitalize area A	← →	Relocate people from A	Costs of minimal repairs, new construction and new housing, and new service facilities at A; cost of relocation of people, and cost of relocation of facilities routes and functions
Revitalize state A	← →	Shift people and industry from damaged areas to states B, C, and D	Costs of minimal changes in state A; costs of shifts of people and industry elsewhere; and costs of maintaining self-sufficiency in surrounding parts of A

mix would have to be estimated from available cost factors or rules of thumb. If the proposed new product is not new to a geographical area, but is new to a particular plant, proprietary interests might withhold information that could be relevant. The national and local interest in avoiding costly errors in judgment might lead to some pressure for full disclosure of operating information, possibly via disclosure of processes and costs to a local review authority established to monitor product diversification and to screen proposed facility expansion before submission to appropriate federal agencies. Elaborate schemes for mandatory licensing agreements among defense contractors have been evolved in time of war and might be generally appropriate in the early postattack period.

Continuing appraisal of costs would entail investigation of price elasticity of demand. Elasticity information for final demand items consumed locally would be relatively easy to obtain and would enter into decisions about appropriate levels of production. For consumer items with a potential national market (i.e., suitable for shipment outside the area of origin) the elasticity of demand would be harder to obtain and would need to be supplemented by information on changing capacity of competitive sources of supply.

Price elasticities and price projections for producers goods manufactured locally would also be easy to obtain, which would be almost as true for the user as for the manufacturer. Items obtained from or sold on the national market would be more difficult to monitor. Again the possibility of sudden jumps in capacity either of the industry producing the item in question or that of industries using it would produce considerable uncertainty in national markets.

The need to avoid duplication of effort in responding to high initial demand would build pressures for intervention by the federal government in all capacity expansion decisions and for widespread dissemination of projected schedules for expansion plans. This is an important argument for involving ODR or other appropriate delegate agencies in review, coordination, and final approval of all expansion plans or at least all those having significant impacts on national markets.

If the federal government were to assume responsibility for coordinating or approving all expansion planning, or at least for all projects of sizable dollar amounts or having significance for national markets, it would have automatic access to information on the timing of critical events in the recovery process. The dissemination of such information to the state and local governments and preferably to industry at large, would obviate wasteful duplication or misdirection of planning effort by industrial management. The dissemination of such information would facilitate preliminary screening by local authorities of proposed local projects and reduce the load on federal agencies.

The almost certain shortage of housing at the beginning of the post-attack period would present a special problem. Relief of this shortage may rate high on the preference schedules of the general populace, but nonresidential construction, particularly of refineries and critically needed industrial or utility facilities, would be more in the long term national interest. Cost/benefit analysis suitable for comparison of housing projects with other construction would be difficult to carry out because of the transient nature of housing requirements and the complex interrelationship between demand for housing and other industrial production. Initially, this might be handled by prohibiting all housing construction except that which could be shown to be noncompetitive with industrial construction. In practice, this might result in restriction of efforts directed toward additional housing and to cleanup and minor repair of damaged residences requiring only locally available materials in adequate supply (or possibly materials salvageable from debris clearance) and amateur, unskilled, or off-hour labor not employable in heavy or specialized construction. Later in the recovery period, however, the demand for housing should be permitted to take its place, at least in competition with other consumer items. At an appropriate time, therefore, the construction of residential housing could be recognized again as an acceptable activity and left to normal control of market mechanisms and the profit motives of construction contractors.

If the final authority for all investment decisions were the federal government, the critical trade-off analyses would be made or at least reviewed centrally. Presumably proposals for specific projects would be generated by businessmen in particular areas (or by national utilities) and would be prescreened by local authority. Local endorsement might take place at state government level, or, if not, supplementary endorsement and support from state authorities might be appended. The supporting documentation could reasonably be required to include data on costs; critical material requirements; break-out lists covering major units of equipment; anticipated output; demand; break-even points; and a proposed schedule for construction, equipment placement, and production startup. Review of such submissions could perhaps start with a check on the accuracy of the information provided by comparing it with information on file in central data banks and by testing for consistency. If costs and prices appear reasonable and if analysis of rate of return based on a realistic demand projection makes the investment look particularly attractive, the project should be considered desirable. A final check, however, would be required to ensure that operating requirements placed no undue burden on industries supplying materials, components, or equipment in great demand or in long backlog positions. The anticipated rate of return would be attractive if it were above those projected for other projects including similar projects at other locations. All this analysis would correspond to its counterparts in current investment selection. Channeling all project proposals

through one control agency would make available to the central agency a great amount of data about the state of the economy. Other relevant data would presumably be available from tax files, existing preattack data files, and standard statistical reports normally prepared and periodically updated by other government agencies.

The federal government now has available extensive data files, at OEP's National Resources Evaluation Center and at other agencies and sites, containing information about the structure of the preattack economy. Computer programs exist for using aggregates of such data to experiment with alternative postattack aggregate final demand vectors and to attempt to meet such stipulated schedules of requirements from surviving aggregate capacity. Such programs could be used, with preattack technoeconomic data and the parameters of the attack, to test the probable feasibility of meeting alternative schedules of stipulated final demand requirements. Such analysis can be and is being undertaken to identify bottlenecks and possible schedules for expanding capacity in the postattack period to overcome these.

The basic data available are not as current as desirable, and they are highly aggregated over broad economic sectors and relate only to the nation as a whole. Moreover, they might not be realistic for the postattack economy even after adjustment for actual attack damage. However, the use of such simulations in both the preattack and postattack periods could identify broad economic sectors of major criticality and could provide a yardstick for weighting or ranking different industries. Individual projects could be analyzed against the findings of such research, and rough priority classes could be derived from such analysis.

Because of the aggregative nature of the models employed, not much credence could be given to the results obtained unless they could be explained or interpreted in some independent way. To the extent that they could be so explained, it is likely that the results could be anticipated and demonstrated some other way. Experimentation with such models, however, could provide considerable insight into the structure of the economy and a fair appreciation of the changes caused by the attack. Such experimentation could provide information that would be useful in reviewing project proposals (and subsequent developments) because it would place individual projects in a proper perspective with respect to their relationships to the economy as a whole. Other possible methods for doing this are suggested by consideration of the indirect consequences of the review process. These methods are not amenable to experimental test in the preattack period since they would depend on data provided with the facility construction proposals. This is unfortunate because the postattack economy would engender a tremendous number of possibly attractive proposals for expanding production and central review could become impossible.

The best available response to this problem would appear to be some preattack simulation of project review to estimate the review effort entailed and possibly to develop practical criteria for separating projects requiring central review from those better left to state or local authorities. It is thus useful to consider further what the central review process might entail and the data likely to be required for or generated by it.

Ranking of Proposals

The accumulation of project proposals, including those rejected or deferred as well as those approved, would provide a master list of investment alternatives. Each proposal on the list would have been prescreened and found to be sound, attractive, important, and to have multiarea (probably interstate) implications. Ranking these proposals in accordance with rate of return or with payout period from date of inception would not be bad ways to establish priorities after eliminating duplications, overlaps, or proposals rejected for other specific causes. If central review were reserved for proposals of more than $1 million in preattack construction costs and if the ratio of proposals to projects were conservatively two to one, possibly a thousand proposals per week could be considered. This estimate is based on an assumed investment rate of one-fifth of postattack GNP and an assumed postattack GNP of one-fifth of the current one. Since at least half of the total investment would possibly be related to local projects or projects of less than $1 million, the figure of a thousand proposals per week is probably too high by a factor of two. Even a hundred proposals per week would present a staggering work load for ODR. The $1 million criterion might well be too low.

The trade-off analysis appropriate for the federal review agency would primarily concern comparisons among alternative uses of investment funds where the funds would merely reflect or measure the productive capacity and construction effort that could be diverted from current consumer items to projects of longer run value to the economy. For the proposals under review, there would be a wide range of gestation periods before an appreciable flow of products or services could be realized. A key trade-off problem would concern selecting a basic interest rate for discounting the future. Certain proposals could require specific dates or milestone events in other developments for determination of their useful service life. Proposals might be justified because they meet particular crises in the near future; e.g., runout dates for surviving inventories of critical materials or products. Gasoline refineries, vegetable oil refineries, fertilizer plants, steel mills, and metal forming facilities might provide examples of such time-related projects. Other projects responding to an immediate but transitory crisis might be worthless

if not completed in time to meet this situation before it passes. Low-standard temporary housing, many drugs or medical supplies, and products needed for initial agricultural operations might provide examples of projects serving as temporary expedients of short service life. All such projects associated with known times or time spans would be evaluated against alternatives that meet the same objectives but with primary consideration given to effective dates rather than rates of return. All such projects would thus be reviewed by considering the feasibility of meeting appropriate schedules. Those approved would require a scheduled commitment of materials and effort that would have to be subtracted from investment potential available for allocation among remaining projects.

The existence of such projects would thus force a scheduling mode of thinking on the deliberations of the review authorities. This might be less true of the federal agency than of local project coordinators because of the probable size of many expedient measures. The federal agency would at least have to take cognizance of the aggregate effects of many such projects on the investment potential of the country as a whole. This might take the form of requiring periodic reports of current estimates of uncommitted investment funds projected over an appropriate planning horizon. Such projections aggregated over all areas would place a sort of cash flow limitation on the process of project review at the federal level. As time passes plans would get out of date because of discrepancies between schedule dates and actual progress and differences between estimates of costs or production levels and the actual expenditures or outputs. Periodic or continuing revision of schedules and trade-off analyses would be mandatory.

Review of major projects at federal, state, and local levels would require a continuing effort for trade-off evaluation and for monitoring deviations from schedules. It would also require continued updating of basic information about the state of the economy, both regionally and nationally. It would require information on costs, prices, and price movements as well as on general levels of production and significant changes in apparent demand. Finally, it would require information on developing bottlenecks or shortages. These and other types of data relevant to planning and control will be considered in further detail in Chapter V. There would be a requirement for updating trade-off calculations on a continuing basis for comparative evaluation of alternative projects and project schedules. The information needed as inputs to this process would have to be identified and somehow provided. Data sources and alternative organization of data collection and data flows would also have to be considered.

V INFORMATION REQUIRED FOR ANALYSIS AND CONTROL

Background

The recovery management effort and the associated decision-making would require a considerable amount of information normally not needed for corporate or government planning and it would have to proceed without various types of information that are readily available in the preattack period. Other changes in information requirements and availabilities would have to be reckoned with. Information about the physical condition of inventories, facilities, equipment, and people would perhaps be the first and most important data requirement in the postattack period. In the preattack period, most such data are already available to those who need to know, and general interest or summary information is available from government and trade association sources. Cost and price data are widely reported, and gradual changes are easy to follow and even to project. A postattack wage, price, and rent freeze could hold price data at known levels but such prices would be artificial and would, if not revised drastically, be inappropriate for trade-off calculations. Meaningful and consistent price data would not be available for many months.

The thesis underlying the discussion of the preceding chapters is that federal involvement could best be directed to major project review. As indicated, even this would generate and necessitate collection of a tremendous amount of information about the U.S. economy. This requirement must be examined in further detail. Little has been said, thus far, about the information needed by plant managements and local review authorities. Moreover, the nature of the local trade-off considerations has been barely indicated.

Information Requirements for Local Coordination

Without considering here the exact organization of the local coordination effort (functionally similar to a composite of the local government and management of the imaginary local corporate monopoly) or its possible legal basis, let us examine some of the information requirements for coordination at the local level.

Three types of problems would concern local authorities: (1) debris clearance, rationing, control of surviving inventories, and other questions

of immediate public welfare; (2) questions about use of local facilities and their optimal product mix; and (3) questions about local or minor projects for repair, conversion, and expansion of or additions to local capacity. The first group could probably be turned over to one local working activity using unskilled or irregular workers, crude or makeshift tools, with little material expenditure and with tasks to be carried out as expedient on a flexible and somewhat leisurely schedule. Efficiency would be improved by using heavy duty equipment when available but slow progress would usually be acceptable after the highest priority tasks were accomplished. The second type of question is one to be left as much as possible to plant management, but some community-wide organization would be desirable for dealing with interarea trade on a coordinated basis. The disruption of normal trade channels and national markets would require some reorientation of manufacturers' representatives, as well as the purchasing, marketing, and traffic departments of individual companies. A centralized activity serving the community as a whole and the individual companies might be the most efficient way to economize on transport and interarea communications, consolidate orders and shipments, screen requirements for possible local procurement, and encourage production of items most in demand among the accessible export markets. The general shortage of retail items and the probable elimination of effective chain store operations would force some reorganization of trade to achieve economies but centralized purchase of products moving in from other areas would also be advantageous. The third type of activity could, however, become the most important and the most difficult task for central authority, since it would concern investment activity and would entail most of the proposal review tasks of the federal government but only as related to minor or purely local projects.

Public Welfare Questions

The information requirements for the type of questions related to the public welfare would be the roster of available workers, the list of conceivable projects (classed by priority into urgent and other), a rough schedule of availability of heavy equipment, and a list and schedule of material requirements. Although these data resemble those for the more complex construction tasks, the accuracy requirements would be much less. The urgent tasks could be sequenced in part by identifying some as necessary prerequisites of others. The rest could be sequenced by judgment based on an appraisal of the nature and degree of urgency. Equipment schedules would be chiefly limitational and would depend on the occurrence of slack periods in the utilization of such equipment (largely cranes, trucks and earth movers) elsewhere. The nonurgent welfare tasks could be sequenced for the most part in random or arbitrary order to suit convenience and work load. Wages and other expenditures would accumulate as budget items for local governments.

Product Mix Questions

The information needed for product mix questions would include variable costs, requirements for critical materials or components, requirements for imports into the area, local and nationwide demand, general feasibility of production, alternative uses of facilities or work centers, labor skill requirements, and import prices for products considered including freight costs. Of these, costs and requirements could be estimated by plant engineers; local demand could be estimated as postattack usage developed; and nationwide demand and competitive prices would have to be estimated from any quotations or requests for bids coming in from outside or from federal reports. Feasibility, alternative uses of facilities, and labor requirements could all be estimated by plant management. Relevant freight rates would be known to local authorities.

Capacity Modification or Development Questions

The information needed for capacity modification or development projects would include cost estimates, equipment requirements, a schedule recognizing any relevant time criticality, the proposed products along with all relevant product data as in the case of product mix evaluations, prospective profit margins, payout period, break-even points and any pertinent information on possible secondary impacts on the local economy and its balance of payment position with other areas. Funding requirements and sources of funds would also be desirable. All these data would be available from internal plant or company records, analysis by company management, or information received or collected by the local coordinating authority. The local authority could review each proposal, first checking against criteria for federal jurisdiction and then ranking it among alternatives under consideration.

General

These data requirements are summarized in Table 11. Data sources are indicated as are data users.

At the federal level data requirements would include all the material needed locally for project documentation and review. Since the federal review would concern projects of larger dollar value and greater interarea implications, the required data submission would be more voluminous. Moreover, the review process at the federal level would require considerably greater information about the economy. This would primarily entail more precise and more detailed projections of demand and output from

Table 11

DATA REQUIREMENTS FOR ANALYSIS AND CONTROL AT THE LOCAL LEVEL

Data Content	Data Source	Data User
Inventories of consumers goods	Trade, plant, consumer	LARB
Inventories of producers goods at users	Plants	Plants, LARA
Inventories of producers goods at suppliers	Plants	Plants, LARA
Recent preattack prices	Seller	LAPB
Essentiality code for rating local products	LAPB/LARA	Plants
Estimated demand for area imports	Plants, trade	LAITA
Estimated demand for area exports	Plants, LAITA	LAITA, plants
Prices of all end products	Sellers	LAPB
Costs for fixed-price items	Plants	LAPB
Fixed costs, G & A expenses	Plants	LAPRA
Local construction costs	Plants, construction contractors	LAPRA
Unemployment, employment	Employees, LAEO, unions	LAEO, LAPRA
Local wage rates	Employees, LAEO, unions	LAEO, LAPRA
Area GNP or income	LAPB, LAITA	LAPRA
Production rates, rationed items	Plants	LARB
Production rates, area export items	Plants	LAITA
Available housing	LAPB	LARA, LAEO
Demand for commuter service	LARA, LAEO	LAEO, LARA, LAPRA

Legend: LARA = Local area resource agency
LAPB = Local area price board
LARB = Local area ration board
LAITA = Local area interarea trade agency
LAPRA = Local area project review agency
LAEO = Local area employment office

alternative projects. Because the federally relevant projects would all represent significant commitment of limited investment capital, all projects under consideration would be in competition with one another.

The data made available to or generated by the federal review agency would contain much information that would be useful to local authorities and individual plant management. This would be particularly true of data on nationwide demand, the location of exportable surpluses, prices, and schedules for completion of new facilities. Input requirements for operating any new facility and prospective outputs would also be of interest. Table 12 lists basic data requirements for use by ODR or any other federal review agency. It also indicates data sources and interested data users.

The data requirements at all echelons of management and control appear easy to meet. However, problems would arise in organizing and displaying basic data for decision-making or appropriate dissemination. The quality of the source data as well as that of information desirable from analyses of it is less easily assured. The main uncertainty arises from questions as to the adequacy of the price data and the accuracy of all projections of demand based on observed relationships between sales and prices. The simple device of reporting all deviations of actual values from forecasts would provide data for improving projections and for revising any calculations based on anticipated data.

Postattack trade-off calculations would depend on some kinds of prices or price substitutes. Rationing and price fixing, both separately and in concert, would take away the appropriateness of the prices directly affected and, indirectly, that of certain others. This would thus remove part of the usefulness of such prices in trade-off calculations. Even such artificial prices would still measure the amount of money or other exchange moving from hand to hand as products move but would not measure the value of the products to the users. The lack of uniform national markets precludes the simple projection of prices from one area to another. Finally, the confined nature of the local markets would tend to make them more significant as indicators of value than the surviving national markets. More prices would be quoted in local markets or in any case more products would be traded. The terms of trade for such local transactions should eventually establish an areawide local price. Such prices would be suitable for trade-off comparisons locally.

Individual products traded nationally (after allowance for freight differentials) would in the aggregate provide the only means for establishing interarea price differentials appropriate for nationwide trade-off calculations. Until some interarea movements occurred, interarea comparisons of alternatives would be meaningless. Continued re-evaluation of

Table 12

DATA REQUIREMENTS FOR ANALYSIS AND CONTROL
AT THE FEDERAL LEVEL

Data Content	Data Source	Data User
Estimated inventories of essential items	LARAs via states	ODR
Preattack prices	LARAs, states	OES
Estimated surpluses or shortages by states	LAITAs, states	ODR, OET
Prices and price indexes	LAPBs, states	OES
Construction costs	LAPRAs, states, GSA	ODR, Commerce
Manpower by skills, trades, and occupations	LAEOs, states	USDL
Unemployment	LAEOs, USES	USDL
Wages	LAEOs, USES	USDL, ODR
Area and state income and gross products	LAPRAs, states	ODR
Production rates and indexes	LAITAs, states	ODR
Housing statistics	LAPRAs, states	ODR, Commerce
Specifics on major facility construction including PERT schedules, cost data, and anticipated production	LAPRAs, states	ODR
Attack damage estimates and claims	Claimants	AVEC

Legend:
LARA = Local area resource agency
LAPB = Local area price board
LAITA = Local area project review agency
LAEO = Local area employment office
USES = U.S. Employment Service
USDL = U.S. Department of Labor
AVEC = Assist Validation and Equilization Corporation
ODR = Office of Defense Resources
OES = Office of Economic Stabilization
OET = Office of Emergency Transportation
GSA = General Services Administration

trade-offs would thus depend on changes within local market structures, [illegible] rates, and interarea average price differentials.

The poor quality of the initial price estimates during the early post-attack period would invalidate many evaluations of trade-off. In practice, this might prove to be less troublesome than expected, because many of the things to be accomplished would be so urgent that there would be no real alternatives. Relevant trade-offs in this period are most likely to be concerned with comparison of different ways of carrying out specific tasks. The efficiency that could be gained or lost by good or bad choices of method would probably be small when compared with the losses from poor utilization of manpower resulting from initial administration problems in getting organized.

Registration for rationing cards, registration of skills (particularly those of displaced or unemployed persons), arrangements for living quarters, and other clerical administrative activities will consume many man-hours, including the time of administrators, assigned clerical staffs, and the general population. If provision could be made in the preattack period for carrying out these registrations to the extent possible while people were still in shelters, this loss of man-hours of useful work might be minimized.

In any case, the effectiveness of the local pricing system would improve greatly as time passed. Continuing re-evaluation of alternatives not irrevocably decided on would thus remain an important activity for plant management and local coordinating authorities. It would be even more essential to any national planning and coordinating agency. The gradual reduction in the number of rationed items or those under price control would also reduce the arbitrariness or subjectivity of trade-off calculations and would justify revisions when these could still be timely.

Within the local area, it should be possible to maintain a free market for some items, primarily semiluxury or discretionary items not essential for survival. Essential items in adequate supply nationally could also be left to seek natural prices in a free market even though rationed to ensure equitable distribution. Essential items in short supply might easily be priced beyond reach if prices were not fixed by duly constituted authority. These would not contribute any useful information about real relative prices. To make some items available at all, the local authority would either need powers to price production and sale at set prices (which might place an unfair burden on particular manufacturers if pricing were not set high enough to permit an average rate of profit) or to arrange production or purchase on its own account for direct sale to eligible consumers. The legal basis might differ between these two alternatives but the economic effects would essentially be the same. In either case, the local authority

would have to have sufficient access to plant accounts and actual cost data to set fair prices. Some essential items might be less expensive when brought in from producing areas than they would cost to produce locally. The pricing of such imports would be subject to review by the federal government for the purpose of limiting profit margins to reasonable levels.

In general, any free market prices that permit excessively high profit margins provide investment funds that could be in the public welfare. However, the high prices of such items might contribute to a general inflationary spiral. Rather than attacking the problem by attempting to fix the prices in question, it would be preferable to reduce demand by reducing purchasing power. This could be done either by fixing wages or preferably by forced savings or high withholding taxes. Because the price structure would be dynamic in the early postattack period, withholding rates could be adjusted weekly to restrict available cash long before fiscal needs of the federal, state, and local governments were established. The great need for funds in this early period would suggest that excessively high withholding taxes would be in the general welfare provided that average after-tax income were not depressed so much that the resulting privation constituted a threat to health. Universal withholding taxes would be applied to collect income taxes, but the power to set withholding rates above state and federal averages could be a useful device for controlling inflation locally. This would require delegation of such collections to local authority or some equivalent devices for permitting local differentials.

VI MINIMAL REQUIREMENTS FOR A RECOVERY MANAGEMENT INFORMATION SYSTEM

Interactions of Various Government Levels

A distinction has been made between the federal level of action and locally controlled decision areas. The line of demarcation between these is imprecise but it depends primarily on the impact of specific decision alternatives on areas of the country outside the locality directly affected. Any management information system must serve an organization, and knowledge of the organization served must figure in the design of the system. In the most advantageous cases, the organization can be designed together with the information system jointly to meet minimal functional requirements most efficiently.

Because existing plans for postattack organization are rather tentative and incomplete, some latitude exists for realistic consideration of functional requirements in the abstract. To the extent that this is possible, this consideration will be undertaken in this chapter to provide a logical structure for consideration of organizational and, to a certain extent, functional alternatives.

The number of echelons of management and control best suited to the nature of the probable postattack environment has not been determined but the complexity of recovery management, even after the lightest attacks conceivable, appears to preclude the possibility of detailed coordination exclusively concentrated in a single central agency even if the latter is capably supported by a widely dispersed field service. This has not been positively established but it is difficult to conceive of a central organization capable of making decisions for dispersed local areas about product mix, billeting, commuter movement, and other important aspects of local life. The present discussion is therefore based on the notion that the actual system would include at least two echelons. The introduction of intermediate levels, e.g., at state and regional offices, could be accommodated if found to have political or administrative convenience.

The extent to which ODR or any other centralized agency should or could become concerned with decisions about product mix or other details of plant operations has not been established. The discussions in a preceding chapters make any serious central involvement with such matters appear to be extremely impracticable. As a matter of fact, such decisions are

only marginally of interest to local authorities since their initial concern with product mix selection would be to close out unessential production of consumer luxury items and any parts or components used in such consumer items. Pressures to enhance local self-sufficiency and to gain full utilization of available facilities would also be relevant but would correlate so closely with profitability that little occasion should arise to exert any additional restraints on plant management. Some surveillance of product mix decisions might be desirable, and some analysis by the area authorities of the balance of the local economy would be desirable as a basis for guidance and coordination.

The information flow from the individual enterprises to the local agency preferably would be rather detailed and very frequent immediately after the attack. Once most of the initial decisions had been made, a less demanding system of periodic reports would suffice for all coordination necessary. At the outset, full discussion of all decision alternatives could be desirable. After the first month, some schemes for monthly reporting of progress and status information would suffice, provided that major changes were discussed in advance on an individual basis. The kinds of information appropriate would include all the data items listed in Table 11, including production levels by product, expected prices, past sales, major purchases of materials and components, and all items moving into or from interarea trade.

An earlier discussion of essential information flows* envisaged the problem of coordination as one of master scheduling entailing a direct flow of information on expected production as well as proposed facility construction between a central authority and four or five hundred local administrative areas that collectively covered all parts of the country. The preceding chapters reflect a change of thought concerning the feasibility of central consideration of production schedules, except passively in appraising the effects of production levels on completion of or need for facility construction. Also entailed is a recognition of the inevitability of some degree of coordinating and decision-making authority at the local level. The present discussion is thus based on the notion that federal control of critical materials and major investment decisions is both necessary and sufficient for recovery management and for promulgation of national policy.

Two other factors have affected this change of emphasis: the realization that the first couple of months of the postattack period are likely

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* See F. W. Dresch, Resource Management for Economic Recovery Following Thermonuclear Attack, Part I: "A System for Synthesis and Feedback of Essential Information," Contract No. CDM-SR-61-106.

to be the most critical for decision-making--a period too short for detailed federal intervention in local affairs--and the observation that free markets could be established locally and relied on to influence the direction of recovery by providing the core price data for costing alternatives and evaluating trade-off possibilities. The interaction between business decisions and the public works or public welfare activities of local governments, however, appears to require some explicit efforts at coordination on the local level. Some local authority is also required to approve and actively encourage the level of interbusiness cooperation that would be desirable in an emergency (even if in conflict with normal rules of business competition).

These simplifications of the concept of the central agency (which close the gap between this concept and that currently proposed for the ODR) would leave the paths of information flow relatively unchanged but would greatly affect the nature of the data flowing and their volume. Local business would communicate with local authorities about operating plans and proposals for facility modification or construction. Local authorities would communicate with federal agencies only about major facility projects and special problems or would provide source data for use in preparation of statistical summaries of economic indicators. Scheduling information to or from federal and local levels would be needed only for new projects or for especially critical production or bottleneck problems. The reduced load on the ODR would enable it to deal with a larger number of localities than appeared practical with the more detailed mission concept. As discussed in Chapter VII, interjecting state agencies might further lighten this load and permit somewhat greater flexibility in the organization of surviving industry into meaningful local complexes.

Information for the Local Level

The only information flows of interest relate to those between local business and the immediate local agency concerned or with those between the federal government and the local agencies. The general nature of the information was indicated in Tables 11 and 12. This is further expanded into a list of essential elements of information in Tables 13 and 14 and supplemented by indications of reporting frequency and rough estimates of data volume per reporting unit. Estimates of the range in number of reporting units and the average number provide a basis for estimating total data volumes.

The lists in Tables 13 and 14 do not include certain additional data required initially to load relevant data banks. These would include, for the local area, the location of all plants and other important facilities;

Table 13

ESSENTIAL ELEMENTS OF INFORMATION FOR THE LOCAL LEVEL

Essential Element of Information	Frequency	Annual Volume* per Reporting Unit Expressed as Log_{10} (number of digits)
On-hand inventory of selected items	Monthly	7
Preattack price history for selected items	Once	7†
Estimated demand for area imports	Monthly	7
Estimated sales for area exports	Monthly	7
Price changes on all end products	Monthly	6
Elements of cost for price fixed items	Monthly	7
Elements of overhead costs	Monthly	6
Elements of construction costs	Monthly	6
Employment by skill	Weekly changes	3
Unemployment by skill	Weekly	2
Wage rates	Weekly changes	3
Wages paid by worker	Weekly	9
Production rates selected items	Weekly	6
Available housing	Weekly changes	4
Requests for commuter service	Weekly	2

* Annual volume data are based on rough estimates of number of items or persons to be reported on from the average plant or other reporting unit times the number of significant digits needed times the reporting frequency. Weekly wage data would make up the bulk of the reporting load locally.

† First year only.

Table 14

ESSENTIAL ELEMENTS OF INFORMATION FOR THE FEDERAL LEVEL

Essential Element of Information	Frequency	Annual Volume* per Reporting Unit Expressed as Log_{10} (number of digits)
Estimated inventory of selected items	Monthly	6
Preattack price history on selected items	Once	6†
Estimated shortages or surpluses, selected items	Weekly	7
Prices of selected items	Monthly	6
Price indexes of selected item group	Monthly	6
Construction cost indexes	Monthly	4
Manpower by skills, trades, occupation, and area	Monthly	6
Unemployment by skills, trades, and occupation	Monthly	6
Average wage rates by occupation and area	Monthly	6
Area, state, income and gross product	Monthly	2
Production of selected items	Monthly	7
Production indexes of selected item groups	Monthly	6
Housing units occupied by type of housing and by area	Monthly	4
Housing area per occupant by type of housing and by urban area	Monthly	4

Table 14 (concluded)

Essential Element of Information	Frequency	Annual Volume* per Reporting Unit Expressed as Log_{10} (number of digits)
Project data including Expected cost breakdown Equipment breakout with costs and specification Pert schedule information Expected output Operating cost data	Intermittently	9
Attack damage claims	Once	9†

* Annual volume data are based on rough estimates of the number of items reported on from the average state or other reporting unit times the number of significant digits needed times the reporting frequency. The bulk of the reporting load would come from the facility project submissions. Total volume would be less than 100 billion digits.

† First year only.

their current condition; and certain characteristics including identification of specialized equipment or processes, normal products, repairs possible or needed, and normal (material, labor, and component) requirements. It would also include a list of all significant inventories together with locations and present condition. Finally, it would include a register of survivors showing age, sex, current residence, skills, profession, or occupation, and any potentially relevant data on education, work experience, significant hobbies or expertise, and current health. It would also include at least aggregate data on the available housing. These might consist merely of the data needed to update tax assessment rolls but preferably would be supplemented with information on condition, needed repairs, size, and current occupancy. The current status of public buildings and city- or county-operated facilities (such as water purification plants) would be included among the reported facilities.

Information for the Federal Level

The federal government would require summary data with similar coverage. Except for updating its files on large plants and other facilities or resources, it would have no need for the kind of detail to be compiled locally. Aggregate data on housing, people, inventories, and surviving plant capacity would be essential. Such information could at first be estimated from weapons effects information and later from local surveys. It could be refined as soon as possible by extraction from data collected by local authorities.

Local agencies would need some information on the national situation. This could come from the federal government, at first as spot situation reports, then gradually in more complete and reliable forms as central data processing facilities completed their initial compilations after data flowed in from local sources. Continued dissemination of general information would be an important job for ODR and other federal agencies. Such information would be needed locally as background information or as inputs to and guidance for local planning.

VII ORGANIZATIONAL ALTERNATIVES

State Agencies

The discussions of information flows in the preceding chapters have neglected the possible effects of a politically attractive expedient of interposing a state agency to mediate between the federal government and local authorities. Moreover, the exact political nature of the local authorities has been left unspecified. The impracticality of interjecting the federal government into operating decisions of individual establishments appears entirely applicable to the possible role of any state agency. A state agency could, however, be properly concerned with investment decisions related to proposed projects to be located within its boundaries and could be given final review authority over a class of decisions intermediate in scope between those of explicit concern to the federal government and those relegated exclusively to local consideration. Criteria for determining jurisdiction could be based on the extent of interstate involvement for determining federal interest and interarea involvement for determining state interest. The size of projects could be retained as a supplementary determinant. Depending on the exact levels adopted for the magnitude criterion, the load on the federal government and the authority of local agencies could both be reduced. State agencies could also facilitate the compilation of significant statistical data on the condition of their internal economies, maintain up-to-date prognoses on project completion schedules, and monitor and report progress.

The primary disadvantages associated with the interjection of the state into the project review process would be the additional delay incurred when the proposal documentation passed through the extra handling. Some compensating gains could arise when the proposal was approved finally at state level. Because of the relative proximity of the state agency in cases where the federal review was required, the state endorsement with appropriate analyses might expedite federal action. The principal advantages would lie in reducing the total load on the federal agency, providing a review agency with better knowledge of the state (and local) economy, permitting a reduction of the number of cases left entirely to local decision, and making use of the offices of the state government to provide special assistance.

Regional Agencies

A second possible alternative would be to interpose a review at some regional level between state and federal echelons. The lack of any governmental or political entity so placed would make this purely an administrative convenience for the federal agency. The chances for establishing an adequately staffed and properly equipped set of review activities at regional offices of OEP or OCD appears to be remote. Such intermediaries would lack facilities for coordination within relevant branches of the federal government and in particular would fail to provide for action by resource and claimancy agencies, as would appear to be integral to the present ODR concept. It does not appear practical to use regional activities even for partial processing of statistical or economic data.

District Agencies

A third possibility would be the introduction of district agencies between the designated local areas and the state. If this is taken to mean the addition of an extra review point, the administrative delays would probably outweigh possible advantages. Most of the conceivable gains would come from an opportunity to distribute work loads more evenly among activities at all echelons. Such gains would be achieved more easily by adopting flexible definitions of the local area. These could include SMSAs, cities, or urban places, as well as county governments, but with jurisdiction assigned to one or another of these. Local areas could be delimited in a way that tends to equalize the size, geographically as well as economically, of the individual areas. These might thus include individual counties except for special areas around important cities with the latter organized separately. Some small or sparsely populated counties would be combined for the purpose of recovery management and administered collectively. The interrelations among housing, employment, and industrial development suggest that local areas be defined to be large enough to permit meaningful consideration of all aspects of the economy. Separation of industrial parts of cities or counties from the associated residential areas appears undesirable for integrated planning.

SEA Agencies

A fourth possibility was suggested in the reference cited on page 56. It was tied to a proposed administrative, fact-collecting, and schedule-reporting activity to be created at each of about 500 State Economic Areas (SEAs). The boundaries of these SEAs were contiguous with county boundaries, and each SEA thus consisted of one or more counties. There was to

be one SEA scheduling office (SEASO) for each SMSA. The composition of the other SEAs was envisaged to correspond roughly to the OCD/OEP reporting districts or areas that form the basis for classification of locations for certain damage assessment printouts and other statistical tabulations. Regrettably, the assignment of counties to OCD/OEP areas happens to differ slightly from a similar scheme used independently by the USDA for collecting and reporting agricultural data. One advantage of each of these schemes was that they appeared to provide nearly optimal coverage of CONUS as demonstrated by a heuristic argument. A disadvantage is the lack of any pre-established political authorities associated with the individual SEAs. If state agencies are to play a role in recovery management, the need to reduce the SEASOs to as few as 500 in number is less decisive, and counties would provide readymade political entities. Two disadvantages to the notion of using a county agency as a basic unit are the wide range in size (economically and geographically) of counties and the desirability of treating well-established economic units (e.g., the SMSAs) as single entities. Present modes of organization for civil defense, economic stabilization, and similar activities have tended to leave questions of internal organization to the individual states and to concentrate on working out state-federal relationships. For the immediate picture, it would appear that the specification of reporting substructure will be left to the individual states and that local areas will in practice be defined usually as counties with some grouping of counties into metropolitan areas or other convenient planning or redevelopment districts. The lack of uniformity associated with leaving organizational structure to the states is undesirable but could certainly be lived with.

Responsibilities of Various Levels

In view of the political and other considerations cited in discussing the four alternatives, it appears that a federal-state-local structure is most likely with the states, making their own definitions of local units. Such a development appears likely to generate other variations, particularly in specifying the functions of the area authority. It would probably suffice for laying down criteria for jurisdiction to involve ODR in all projects having interstate implications or exceeding an assigned dollar limit in total funding required. The states would then have final review authority for all other projects unless they delegated this to local authorities for certain types of projects according to criteria of their own design. It would appear desirable at least that the states actively involve themselves in review of projects having implications for two or more of their designated local areas. Differences among states might exist with respect to review of operating decisions (e.g., product-mix at individual plants) but it appears to be as inappropriate for the states to consider these as it is for the federal government. Except for

especially critical problems, any such review would appear to be best confined to local authorities or to plant management. Since operating decisions are somewhat related to price freezes or price fixing, the authority responsible for detailed price decisions (i.e., for allowing adjustments to compensate for problems created by uniform national freeze order policies) should be involved to some extent in review of operating decisions at least to the extent of becoming familiar with operating problems.

The role of corporate management in the postattack period has not been mentioned since it is rather uncertain. To the extent to which the country would be seriously immobilized, the possible role of nonresident corporate management in local decisions would be greatly reduced. To the extent that funding would follow from government and from local profit accumulations, the usual role of corporate management in investment decisions would be somewhat redundant and ineffectual. Finally, the participation of the corporate headquarters in nationwide pricing policy, advertising and promotion, or distribution would be so complicated by local restrictions, governmental involvement at other levels, and environmental emphasis on production rather than sales that the corporate function might be reduced to advisory services to local plant management. As the recovery progressed and as fuel became generally available (possibly two years after the attack) this situation would change, but for the decisive period immediately following an attack, the role of corporate management could prove to be rather negligible.

The effects of alternative organizational structures on information flows relate primarily to volume of data and less to distances and speed of transmission. The transmission times in question are those from initiation of proposals for action to receipt of final authorizations. Such time intervals are made up primarily of review processing times. Physical transmission of data, even by a heavily damaged land transport system carrying first class mail, would make up only a small fraction of the total delay time. The effects of organization on both aspects of the information system could be compensated for to any extent desired by readjustment of review criteria; average response times and average data volumes could be made to come out about the same, regardless of the organization, by appropriate redistribution of work load. The selection among alternative organizations would have to be based on considerations other than information transmission efficiency. Questions of possible organization of data banks and the associated data use and data retrieval are more significant.

At present, only the federal government has made any serious plans for establishing data banks that would contain information on the location, condition, and other characteristics of economic resources. Local authorities at county level could satisfy their data requirements by contacting

directly the business managements in their areas and could probably improvise adequate systems for relevant file maintenance. Ready access to plant records and locally available data processing capacity would facilitate local analysis of alternatives, but in many areas manual files would be all that could be expected. The small amount of economic activity in many areas would make manual records entirely adequate. The situation at state levels would be quite different, however, and if the states were to be included in the organization for recovery management, attention would have to be devoted to establishing data banks at least as elaborate as those under present federal efforts. Few states have at present very much of a capability for independently collecting and analyzing internal economic data, and none are known to have made any provision for collecting or receiving detailed information on the nature of their economic resources and requirements. It is conceivable that the federal government could, after attack, provide the individual states with organized data files on resources updated to reflect attack losses, but the national files contain census confidential and other privileged data that could be released only after congressional action to waive current restrictions. The early postattack period would, however, be a very poor time for the states to start familiarizing themselves with extensive compilations of economic data of variable quality.

Given that some sort of organizations would exist at federal, state, and local levels that would be concerned with aspects of recovery management, there are still many questions that need to be resolved with respect to the organizations' structure and their relationships to other branches of their associated governments. At the local level, whether this corresponds to a city, a county, an SMSA, or some other grouping of counties, the agency should be delegated powers appropriate to its functions but should include cognizance, for planning purposes, of local boards for rationing, price control, wage control, rent control, and possibly selective service if in existence. In the enforcement of its actions and regulations, it would need the support of the sheriff's office or local police. Among its relations with government agencies should be included those with the county supervisors or with the mayor and city councils in office within the geographical limits of the local area.

At the state level, the involvement would be more complex entailing relationships with the governor's office, the executive departments such as highways and public works, finance, the insurance and public utilities commissions, the taxing agency, the department of labor and education, the legislature, and local organizations within the state. In most states, the structure of government would permit the introduction of the concepts of resources and claimancy agencies that could be expected to reflect the interests of particular segments of the public and the industries of the

state. The review of investment projects would undoubtedly entail endorsements from all such agencies. Economic stabilization activities as well as resource allocation decisions would also be made after consultation with such departments, boards, and agencies.

At the federal level, the possible organizational alternatives are numerous, and current plans for ODR represent a reasonable compromise among many such alternatives. Historically (e.g., during World War II and the Korean conflict) the U.S. government responded conservatively to emergencies since the Congress tended to limit the degree to which federal agencies interfered with the normal workings of the U.S. economy. However, rationing, price, wage, and rent controls; material allocations; production limitation orders; tax incentives (primarily rapid amortization allowances on defense plant construction under approved certificates of necessity); and allocations of critical materials to high priority industries have all been employed under wartime agencies such as OPA, WPB, and ODM. The relationships between these central coordinating agencies and the departments and independent agencies of the executive branch of government have varied. In general, decisions were made as a result of interactions between agencies having special requirements (e.g., the armed forces or DOD), referred to as claimancy agencies, and agencies having cognizance of particular resources (e.g., USDA, FCC, FAA, OET, OOG). Many agencies have traditionally had dual roles: USDA has claimancy status with respect to such items as fertilizers, tractor parts and fuel, and pesticides, but resource status with respect to agricultural products. Transportation as a service is represented by OET in its resource role, but the fuel, manpower, and equipment needs of the transport industries would involve OET as a claimant. This delegate agency concept has been basic to the organization of OEP and would be carried over into ODR, the wartime successor to OEP. A second concept shaping both OEP and ODR is their status as coordinating agencies. Much of the decision-making, both for routine decisions and important policy formation, would still be made by the delegate agency subject to review by ODR. A more powerfully structured ODR might have been assigned full authority and responsibility for all federal decisions in recovery management and economic stabilization. This has not been done, and even economic stabilization has been assigned to OES, a partially subordinate agency. Whether these concessions to checks and balances and to the power of the executive departments would persist throughout the critical part of the early postattack period is conjectural but it is unlikely to change before a major emergency.

Peripheral agencies such as the proposed AVEC (Asset Validation and Equalization Corporation) loss equalization administration could be introduced into the family of recovery management agencies in various ways.

Again this could change but present plans make AVEC responsive to OES, ODR, the Treasury Department, and to a lesser extent the FRB.

In general, the main organizational alternatives at the federal level are a centralized, well-staffed agency with broad powers or a carefully counterbalanced group of active agencies including all the established departments, bureaus, and offices with economic responsibilities. The latter is more in keeping with U.S. distributive philosophy of government and has prevailed.

VIII CURRENT PLANNING FOR THE OFFICE OF DEFENSE RESOURCES

In some respects, ODR is an emergency operating agency slated to absorb and essentially replace OEP in time of war. The staff and facilities of OEP would be available to it and would supply the nucleus of a greatly expanded agency. In particular, the OEP regional offices would become regional offices of ODR and the computational facilities and economic expertise of the National Resources Analysis Center (NRAC) would be made available to maintain an appropriate data bank. This would be based on data now maintained by NREC (the National Resources Evaluation Center) an organic part of NRAC. ODR would be responsible for coordinating the resource-claimancy process and for providing managerial support and policy guidance for the federal action agencies and the state and local governments. Sister organizations such as OES, OET, OOG, and BDSA would all assume emergency powers for control of appropriate aspects of the economy. The regional offices of ODR would maintain liaison with the governors of the states in their region and would represent and act to implement the policies of ODR and the federal government.

Basic resource data are available at NREC, and computer programs have been designed to carry out damage prediction or damage assessment computations. These would be used in the postattack period to estimate and to evaluate on a continuing basis the extent of damage to industry and to test the feasibility of meeting the requirements of survival and alternative rates of recovery with the surviving economy. From the insights obtained through these and other trial computations, a program for recovery would be adopted and implemented. No plans exist as yet for placing such computer facilities and software in reach of the regional offices, although a few alternative computer sites have been established.

The operating philosophy of ODR to date has envisaged a system of incentives and controls to be selected from those tried in previous emergencies. The important questions of controls over the manufacturing sectors is based on the concepts developed by BDSA for its Defense Materials System, although precedents exist for the application of limitation orders (suspending or limiting production of specific items) and direct allocation not only of stockpile items and other critical materials under the DMS system but also of components. In case of heavy attack, the DMS system would probably require supplementary and more direct controls than

might be characterized by limitation orders and priority determined allocations. For general mobilization, limited war, or very light attacks, the DMS system of indirect controls by selective allocation of critical materials would be expected to suffice.

State involvement in planning to date has been achieved through the OEP Comprehensive Plan, which has the form of a prototype state plan. This plan is being considered by the individual states, modified and adapted to meet the particular legal, political, and economic situations extant within their boundaries and developed into an official state plan to be tested and implemented. The key concept in this plan is the notion that state action would be needed in an immediate postattack period until the federal government could be reconstituted and assume full control. Economic stabilization activity by the states, for example, would thus consist primarily of promulgating freeze orders fixing prices, wages, and rents at average levels experienced during specified preattack periods and taking other actions intended to hold the line on prices, conserve inventories, and initiate rationing. These measures would remain in force until federal controls were established. The exact nature of federal controls and the structure of the controlling organization would depend on circumstances and need, but boards and agencies established by the states might be absorbed into the federal plan.

The economists of NRAC and the program analysts of NREC have long been concerned with the problem of comparing total supply or capacity with probable requirements to identify imbalances and find methods of correcting them. The fact that industries are interdependent and that it may be impossible to utilize surviving capacity fully because of shortages of material inputs has always complicated supply-requirements analysis. Allowances for required indirect production needed to supply inputs to individual economic sectors has usually been made by use of an input-output or some similar model. Such analysis has been experimented with as a method to determine capacity requirements and to direct capacity into sectors of greatest need.

Since it has always proved impossible to consider the economy in detail, this has been done by aggregative models that lump products and capacities into industrial groupings, invariably based on the classification system of the Standard Industrial Code (SIC). Restriction to a reasonable number of sectors has necessitated a high degree of aggregation. In addition to complications in data collection and data transformation, the aggregative nature of the models restrict answers to statements about broad sectors and leave unspecified the precise nature of the principal capacity required. Moreover, they treat the various products in a sector as though they could be freely substituted for one another. To the extent that capacities associated with one sector could be substituted for

each other, the aggregative results may not be inaccurate, but they only suggest some industrial sectors as being most in need of additional capacity, and supplementary analysis would be needed to identify the kinds of capacity specifically desired.

Supplementary analysis would also be required to decide the best location for new facilities. The input-output analyses are essential for preattack analysis of possible contingencies and will provide general guidance postattack. The postattack period, however, would give much more direct and specific evidence of facility requirements as they develop. The most difficult part of ODR's mission would probably be to monitor changes in the apparent need for new capacity and to project such changes into the future for appropriate ranking. Under present plans this would be done primarily by industry experts using their knowledge of a particular industry and whatever operating statistics that might be available.

The analysis conducted by or for ODR would not generate new capacity, but it would provide a means for weighing alternative capacity needs. The methods by which this weighing will influence capacity generation would be by using it in assigning priorities, making material allocations, and encouraging appropriate investment. In World War II and the Korean conflict, much of this investment came from government funding and was associated with government contracts for productive output either needed to supply the armed forces or to supply defense contractors with material inputs or components. Some of the investment did come from private sources and was elicited by tax advantages in the form of corporate income tax reductions through rapid amortization allowances granted under certification of the necessity of the new facilities to the defense production effort.

Whether or not there would exist an ongoing military action, the government in the postattack period would be an important purchaser of goods and services for its public works and welfare programs. Government purchases, when combined with high priorities, assistance in financing, and tax incentives, could again be important factors in influencing the direction of capacity expansion.

The plans for and expected mode of operation of the Office of Economic Stabilization (OES) appear to be somewhat tentative. Rationing and direct economic controls (of prices, wages, and rents) are provided for but the principles under which departures from initial prices (as specified by the terms of the general freeze order) are to be authorized have not been stated. Price and rent boards are being provided for at state and local levels in the state plans and are expected to be taken over into the federal organization when appropriate. No delegation of price adjustment authority has been made to the states as yet. Such an adjustment process

is contemplated for the federal system. No detailed guidelines for the adjustment process are available, but general policy permits adjustments in response to the requirements of defense production or general ODR policy goals. Discussion of limited debt moratoria have been included in earlier OEP planning, but nothing has been officially established other than a general policy of planning government credit when needed to prevent financial difficulties from interfering with essential production. Final development of the AVEC plan would presumably clarify such points. Wage controls, ceiling allocations, and other controls on manpower would be managed by the field services of the U.S. Department of Labor and specifically by the Federal-State Employment Service System.

The enforcement of the general price freeze order as well as of any subsequent OES or ODR regulations or directives has not been provided for in most of the state plans, if any; thus, penalties for violation and other enforcement action are the responsibility of the federal authorities. The authority for state action in general is based on the emergency powers of the governor as may be specified in the state constitutions, existing laws, or that indicated in contingent or standby legislation. The legal situation will thus vary from state to state corresponding to differences in powers granted the governor and the content and current status of standby legislation.

IX FEDERAL, STATE, AND LOCAL INVOLVEMENT

Introduction

The OEP Comprehensive Plan represents the first attempt to delegate to the states some specific areas of responsibility in the management of recovery from nuclear attack. As indicated in the preceding chapter, this assignment thus far is essentially of an interim character. In developing their specific plans, the states are in various ways further delegating specific assignments to their political subdivisions and to standby local boards and agencies. The involvement in recovery management is thus diffusing to local government. Although civil defense planning has involved state and local governments very heavily in identifying, marking, and developing shelter spaces; planning for shelter assignment; developing and exercising emergency operations centers; and in other activities related to passive defense, plans for economic readiness and for recovery management have remained largely a federal undertaking. This is to be expected when one recognizes that preparations for postattack recovery management have thus far been concerned almost exclusively with policy making and organizational planning.

State and local governments lack the data base, the staffs, the budgets, and the motivation for active participation in such planning. Their role is primarily on the operational side of recovery management. Preparations for any operational role have appeared premature in the light of the present state of federal planning. The operational role suggested for states and local areas in the preceding chapters is one that would not be fully defined until the postattack period. Recognition of at least a limited role is necessary for any serious preparation and for the development of even paper organizations and readiness exercises.

In the case of an extremely light attack and general mobilization, the basic industrial operational decisions would be best left to private business under limited federal controls contemplated under the DMS system. In the case of an extremely heavy attack, however, the problems could require a high level of collective action at the local level as discussed above. The virtual impossibility of doing everything required at the federal level necessitates the creation of some basis for action by local leadership and the delimitation of appropriate missions.

Local Involvement

The susceptibility of local agencies to strong local pressures, the lack of information and background on national problems, and the lack of staff, budget, and motivation for decision-making related to national welfare would always limit the extent to which local officials could transcend local interests. The significance of many operational questions, however, is predominantly local and only if they combine to threaten the viability of the area do they become of concern to the state or the country at large.

Under normal conditions, a similar statement would apply to corporate management, which, except possibly for some of the giant multi-industry companies, could not be expected to be motivated by national interests. However, the free enterprise system tends to orient corporate interests along lines that contribute to the national welfare. Immobilization could shift this responsiveness to profit motives away from nonresident corporate management to local plant officials. The homogeneity and community of interests of all types of management in an area would become greater in the postattack period than that of dispersed corporate divisions. Local survival would become a more vital issue than optimal corporate diversification policy. Some entity would thus be needed for focusing local efforts toward local public welfare represented primarily by a favorable balance of trade with other areas and an acceptable degree of local self-sufficiency. Such problems, motivation, and leadership could only come from the local area.

The parochial point of view of local agencies could be tied to the national interest by permitting investment opportunity and better living conditions to flow to the most productive areas. This could be facilitated by the actions of federal, regional, and state agencies (which would remain the important sources of investment funds, if not directly at the outset then indirectly as secondary sources) and review authorities. In the heavy attack case, the control of the economy through allocations of critical materials would become less effective than control through location of new facilities, simply because material shortages would be felt less than facility shortages. It is the lack of sufficient emphasis on this fact that seems to need correction in present plans for ODR and in supplementing the DMS system. Further study leading to such a correction would facilitate defining a more appropriate role for the local agencies.

A variation to this line of discussion could be based on the observation that the competition between large national corporations is responsible for operating efficiency and for motivating and rewarding effective expansion planning. In the postattack society, the wide variability in

area circumstances would occasion a partial shift of competition from that among national corporations to that among areas. High freight rates would provide much of the motivation for such interarea competition, but existing institutions do not provide a public agency for leadership of the local effort. More thought and preparation should be given to organizing the area governmental structure to accommodate such a development.

State Involvement

At the state level, some organizational framework and precedent exists for economic surveillance, emergency or disaster assistance, and a competitive approach to interstate commerce. In normal times, the regulatory activities of the state and its activities in promoting its internal economy are rather limited, but banking, insurance, savings associations, utilities, trade, and professional licensing are covered by existing state agencies and many advisory boards exist to aid state industries. Public projects involving more than one country or local governmental authority normally come under state agencies or special districts. State involvement in project review should not prove too novel, and precedent exists for multiple state public projects such as water development. The extension of such negotiating to private undertakings of importance would be possible but the tensions of the postattack period and clear need to avoid flagrant use of political power rather than economic principles in interstate involvements would call for federal mediation.

Major projects, wherever they are located, are likely to require support from areas or states other than where they are located and to benefit other areas or states. Size alone implies a greater need to involve higher authority than suggested by immediate geography. Very high value projects become the concern of the federal government; high value projects become the concern of at least one state government and, if of direct concern to more than one state, then the concern of the federal government. Only minor projects of exclusively local concern could appropriately be left to local agencies.

Federal Involvement

The federal government would be involved in recovery in other ways than review of major or interstate projects. Its continuing analysis of the national economic system would indicate states and areas of greatest need, economic sectors that were lagging and slowing recovery, specific bottlenecks, inflationary or other undesirable trends, and other guides or suggestions for action at federal, state, local, or private levels. These

analyses would provide a background for project review, project initiation, tax or monetary policy, and fiscal management. Much of this information would be useful at state or local levels and should be presented in appropriate periodic reports.

The lack of free markets and other pricing difficulties might be alleviated if the federal government were to complete and publish lists of observed, inferred, or imputed prices as available. This would be particularly useful for elements of construction costs, and these should be readily available from project review. As previously mentioned, public reports on project schedules and progress would be useful for other scheduling. Finally, ODR--probably with the support of the Department of Commerce--would be in a good position to compile statistics on production trends, with some regional or state breakdown, and other economic time series. These services or functions would be continuations of current activities but could usefully include extensions of such programs to increase detail, frequency, and coverage of data.

Among the emergency tasks of the federal government would fall all the relief and welfare problems of depressed or devastated areas, mass relocations of people, organized salvage operations, and other activities for the public welfare and of national scope and influence. Support and guidance for national retraining programs could fall in this category. In continuation of present policies with respect to highway construction, antipoverty activities, and other such welfare programs, the federal support in the postattack period would presumably be done through and in aid of individual states.

X MAJOR GAPS IN PLANNING TO DATE

Introduction

Planning related to the management of postattack recovery, to the degree that it can be conducted in a normal preattack period, is concerned with actions that can be taken before an attack to facilitate postattack management. Such planning can be devoted to developing and training organizations; stockpiling information, materials, and products including equipment or even productive capacity; or anticipating postattack problems or situations and pretesting alternative methods of handling them. The Comprehensive Plan and the plans for ODR and OES have thus far related primarily to organizational questions. Federal stockpiling has related primarily to purchase and preservation of critical materials supplemented by grain and other basic food materials accumulated under CCC legislation. Postattack research has related primarily to anticipating problems and pretesting alternative countermeasures by computer simulations or other analysis. The organization planning has been followed up with some elementary tests of the organizations contemplated and has included some training of state and other relevant agencies. Every aspect of planning has thus been touched on, yet those concerned are very aware that much more must be done.

Organizational planning is most complete with respect to agencies of the federal government in their central headquarters. Only minor use has been made of existing field service staffs of federal agencies as yet in current plans, and even less use has been made of state or local agencies. The problem of providing for adequate information flow from local areas through the states to federal central agencies has scarcely been considered. Neither the content of the information desired nor the origin and destinations of the data have been outlined. Training and published instructions have related more to questions of organizations and preliminary tests of tentative organizational alternatives than to preparing officials for their decision-making responsibilities.

Interaction Gap

Chapters V and VI have indicated general information requirements. These were developed independently of assumptions about the organization

of recovery management but were based on a concept of mission that is rather different from that apparently implied by existing organizational plans. Although the immediate effects of an attack would be loss of lives and facilities, present plans place primary emphasis on material shortages engendered by facility destruction rather than on capacity regeneration. Rationing of consumer goods and careful allocation of producers goods (including scarce materials, if any) would be an important activity in the very early postattack period. However, long before these shortage problems were solved--if they ever were to be solved--the primary attention of management would have to be given to proper channeling of investment activity and to maximizing the level and effectiveness of savings. The sequence of priorities would probably start with decontamination and repair of light damage; through repair of heavier damage, conversion, and expansion; to construction of new facilities. The first stages of this sequence at least would require extensive first-hand appraisal of particular situations that would require the presence of capable members of the management organizations (or specialists reporting to it) on the sites in question. The interaction among local plant management, other experts, and the various echelons of government has not been worked out as yet and is the primary gap in present planning.

Alternative Analysis Gap

Chapters III and IV have given attention to the problem of realistic costing in the analysis of alternatives in highly disturbed and heavily regulated economy. This has been of concern to many other research personnel and to planners. The primary reflection of this concern in current plans is the recognition that a general freeze order is a stop-gap device and that price adjustments will be necessary to encourage appropriate production and discourage diversion of capacity to socially inappropriate ends. The principles to be followed in reviewing requests for adjustments and the mechanism for weighting social ends have yet to be specified, constituting a second general gap in present planning. This gap does not arise because of lack of attention (although greater attention to it might be helpful) but because it is by no means clear just what should or could be done to close it. Chapter IV has discussed a partial approach, but better solutions may be possible.

Cost Data Gap

The costing problem is complicated by the lack of an adequate, generally acceptable methodological approach and by the lack of factual data about the present economy. The information inadequacy gap can never be

closed entirely, but the data banks maintained at NREC might well be supplemented by data on prices or costs and other intangible or value-related economic variables. The growing emphasis on limited war, triggered by the Vietnam crisis, has turned OEP to consideration of current economic problems. Some of the information needed for the analyses of alternatives in the present situation would also be of value in the postattack case. The indications are that the present lack of economic data will be partially remedied in the near future. The continued involvement of BDSA in limited mobilization will also be beneficial. If the states are to be asked to participate in recovery management, some provision is needed for continued exchange between the federal government and the individual states of pertinent data on the states' internal economies. Any steps to assign the states an added role in the limited mobilization case would probably force some exchange but the political climate makes this seem unlikely.

Stockpiling Gap

Stockpiling efforts of the federal government have concerned raw materials. Thought has been given to stockpiling intermediate or fabricated forms of some materials, but the variety of forms of potential interest has been discouraging. Stockpiling standby equipment and even productive capacity seems entirely out of question. Thorough cost-effectiveness analysis of particularly attractive possibilities has never been attempted but could appropriately be considered in comparison with the cost-effectiveness calculations for alternative active defenses.

The dominant importance that transportation would have in the postattack world makes the problem of fuel for motive power of considerable significance. Development of alternative engines capable of operating on fuels other than diesel oil or alternative diesel fuel sources have been suggested, but the present economics of their use is unfavorable. Relative costs in the postattack period might prove more favorable. Stockpiling a significant number of all electric engines, Stirling cycle engines, or crude oil burners with diesel starters would all be out of the question, but further analysis of preparations that might be made to facilitate postattack improvisation could be worthwhile. In general, an effort to stockpile potentially useful technological information could be invaluable.

Another form of information stockpiling would be extensive and systematic documentation of the results of preattack analysis of anticipated postattack alternatives. OEP has, as indicated, developed or supported the development of computer simulations intended to permit experimental investigation of what might be produced from damaged economies. Only limited trials have been made with the largest of these models, the PARM (Program

Analysis for Resource Management) model, because of the great amount of computer time required, but a simpler model based on an updated version of the OBE input-output table for 1957 will be exercised more extensively. Little work has been done on other types of possible postattack problems, for example, investigation of the effects of: tax policy, price ceilings, minor adjustments in very high freight rates, changes in the interest rates, or alternative methods of government financing all in an assumed postattack setting. The postattack period itself would provide little time for consideration of such questions but it should be feasible to update prior studies to reflect actual postattack conditions as they might develop.

Reporting Procedure Gap

Another gap in current planning is the lack of specific procedures for reporting actual conditions in states and local areas to higher echelon data analysis points or for reporting back significant summary statements regarding the overall situation or unusual circumstances related to particular products, economic sectors, states, or local areas. Two-way reporting of radiation dosage has been provided for in OCD plans. Other damage reports are also provided for but the mechanism for exchange of economic information has not been specified. The kinds of information needed have not been indicated nor has any doctrine for reporting frequency, coverage, and degree of detail been established. Assignment of responsibility for reporting is yet to be made except for general situation reports coming from OEP (or ODR) regional offices. Reporting forms are largely designed for general reports or incidental irregular comments. Message priorities, routing doctrine, and mode of transmission have not been considered. Many of these details would require postattack adjustment to human and technical capabilities but some attempt to anticipate problems and establish tentative procedures would appear possible and valuable.

Table 15 lists these gaps in planning somewhat in the order in which attention is most desirable. This sequence was based on a combination of importance and feasibility of significant work being done on them during the preattack periods. The ratings assigned to both importance and feasibility of useful action are indicated. Most of these gaps exist because of the need for appropriate research. These research gaps are discussed further in the next chapter, and possible research approaches are indicated.

Many of the gaps exist because of uncertainties about the postattack situation and the difficulties (noted previously) of dealing with all possible situations. However, case studies and even tentative analyses would facilitate postattack analyses. Study effort could constitute a favorable way of investing in methods to improve readiness.

Table 15

GAPS IN CURRENT PLANNING

Planning Gaps--Lack of	Importance	Feasibility of Closing
Uniform local organization	Very great	Partially feasible--political problems
Assignment of clear local role	Very great	Partially feasible--political problems
Local and regional price data	Moderate	Tedious
Basis for price adjustments	Great	Needs research
Basis for real cost data	Great	Research helpful
Policy for debt adjudication	Moderate	Policy agreement needed
Policy on loss sharing	Moderate	Policy agreement needed
Information system for local, state, and federal data exchange	Great	Needs design and implementation plan
Countermeasure to gasoline and transport vulnerability	Very great	Doubtful
Countermeasure to vegetable oil refinery vulnerability	Great	Should be more feasible than countermeasure immediately above
Responsibility for product mix decisions	Moderate	Related to assignment of clear local role
Basis for product mix decisions	Great	Research needed
Basis for capital investment decisions	Very great	Research needed to find substitutes for usual profit motive

XI RELEVANT GAPS IN POSTATTACK RESEARCH

Introduction

The gaps in planning noted in the preceding chapter are not difficult to explain but are difficult to close. The degree of organization, training, and readiness that might be desirable cannot be achieved when one is preparing a response to an utterly unprecedented disaster of the type that could follow massive attack. Some of the gaps mentioned related to a lack of data about the U.S. economy and to a lack of analyses of the relative economic advantages of alternative policies. Unsolved methodological problems present obstacles to useful work on some of these questions but budget constraints have held back effort on others. Both types of research needs are related here to the informational requirements of postattack agencies at all levels.

Data on U.S. Economy

The difficulties with adequate costing have been mentioned at length. Input-output models and other simulations have been used in conjunction with damage assessment computations to explore the shortages that might result from attack. Some work has been done with a model that incorporates pricing features. The effects of rationing and price fixing are not well-known, but they could be the subject for direct economic research of theoretical character and without reference to quantitative facts about the economy. This would avoid confusion about the effects of aggregation that plague all simulations.

The difficulties in recovery management would be important primarily in the case of significant immobilization of the economy. The latter could arise through loss of diesel fuel production and through heavy damage to critical points or nodes in the highway and rail systems, including rail marshaling yards, and to concentrations of truck and rolling stock. Such difficulties could be greatly alleviated if bypass opportunities were analyzed and listed in advance, if motive equipment could be developed that could operate without diesel fuel (e.g., crude oil burners with proper starters, Stirling engines, or all-electric cars) even at increased cost, if standby diesel production capacity were constructed in widely dispersed or hardened locations (e.g., from topping plants), or if careful study of current transportation demand were conducted to identify ways of reducing total freight movements. Research on both hardware development and on network analysis could be extremely helpful.

The current redundancy in communications places an unnecessary demand on the communications nets but provides a very inexpensive luxury in normal times. In the postattack period, with abnormal loads and damaged networks, this luxury could become expensive. Preattack research based on information theory could improve the efficiency of communications and alleviate this problem.

Research Task Categories

In general, these research questions relate to hardware development; the economics of the postattack environment; or systems, including information systems, decision systems, or vital network systems. The hardware questions are possibly the most intractable since they include developments that might prove technically impossible or economically infeasible. The economics questions relate to problems that have received attention in economic theory but not specifically for the circumstances likely in the postattack period. The systems questions have all been considered for analysis of direct and indirect physical effects of attack on the corresponding physical counterparts of the systems cited. What has not been considered are the economic aspects of the damage, its secondary economic effects, and the comparative cost-effectiveness ratios among alternative methods of responding to the problems that would be presented.

Table 16 provides an expanded list of research questions in each of these categories with some suggestions for alternative methods of approach and rough judgments on relative likelihood of success.

Before discussing these questions in detail, it is useful to indicate where such research has been carried out in the past or might be in the future. Active agencies have included DOD (OSD/I&L, OCD, DDR&E, and the individual services), BDSA, OEP, USDA, OET, and OOG. OEP, with limited funds available, but with general responsibility for coordinating all research on postattack economic problems, has been forced to rely on its data bank, computers, and staff at NREC for much of its internal effort and its coordinating committee activities to encourage other work at associated or delegate agencies. Support has come from such agencies in the form of data compilation for the data bank (primarily from the Bureau of the Census, OBE, BDSA, and other parts of the Department of Commerce as well as from HEW, USDA, and the Departments of Labor and Interior). Special studies related to the normal functions of the Departments of Commerce, Labor, Interior, Agriculture, and HEW have been modified to be relevant to postattack issues.

Although OEP's PARM model was developed by the National Planning Association, OEP is developing the simpler STRENGTH model (to be used for

Table 16

POSSIBLE APPROACHES TO RESEARCH TASKS

Task	Approach	Feasibility	Prime Agency
Countermeasures			
Low capital cost refining	Feasibility study of topping plants	Study easy, partial implementation possible	OOG
New refinery hardening	Feasibility study underground construction	Study easy, implementation expensive	OOG
Stirling cycle engines	Feasibility study only	Study easy, implementation doubtful	Commerce
All-electric cars	Applicability study	Study easy, implementation deferable	Commerce
Crude oil burning engines	State-of-the-art study on diesels	Study possible, costs uncertain	OET
Low capital cost vegetable oil refineries	Feasibility study of low efficiency plants for foods and other essential refining	Study possible, implementation costs needed	USDA
Dispersal of new vegetable oil refineries	Feasibility study of costs of dispersal	Study possible, implementation costs needed	USDA
Dispersal or hardening of drug and pharmaceutical facilities	Feasibility study of costs of dispersal versus hardening	Study possible, implementation costs needed	HEW

Table 16 (continued)

Task	Approach	Feasibility	Prime Agency
Economics			
Price history	Generate local price histories on selected products or materials	Study possible but costly, state data might be feasible	OES
Pricing or price imputing models	Shadow prices from linear programming models	Theoretical study possible	OEP
Analysis of area imports and exports	Determination of area or regional trade from ICC waybill samples by SIC code	State data perhaps sufficient	OET or ETA
Incidence and secondary economic effects of tax policies	Aggregative models	Some models exist, refinement and test feasible	Treasury
Effects of federal fiscal policies	Economic analysis	Analysis feasible, quantitative data limited	Treasury, FRB
Effects of rationing and price fixing	Economic analysis	Analysis feasible, quantitative data limited	OES
Economic effects of loss sharing policies	Economic analysis and simulation	Analysis feasible, data for simulation could be hypothetical	FRB, Treasury
Systems			
Minimizing communications	Information theory analysis of various mixtures of mail and radio-telephone transmission	Theoretical study feasibility, data hard to develop	FCC

Table 16 (concluded)

Task	Approach	Feasibility	Prime Agency
Systems (continued)			
Damaged network operations	Rail and highway trucking models or simulations	OET has started, experimentation desirable	OET
Information requirements for alternative recovery management systems	Expand lists of essential elements of information and analyze volumes under alternative organizations	Feasible. Could be pushed far enough to eliminate certain organizational alternatives	OEP
Centers for relocation of cities	Case studies	Case studies and general principles feasible	OEP/HUD
Plant conversion criteria	Case studies	Case studies and general principles feasible	OEP, Commerce

limited war analysis) in-house with assistance from OBE in updating the basic input-output coefficients. The recent reorganization of OEP to consolidate much of its research staff in NDAC, bringing resource specialists and other economists in close contact with NREC (now an integral part of NDAC), should facilitate such in-house research activity. The last columns of Table 16 thus suggests where primary interest might be found for the research question listed.

Mention has been made of the possible necessity for abandoning whole cities or urban complexes. Little thought has been given to how this might be done most efficiently or even to identifying the most feasible alternatives. A few case studies could help greatly in identifying the basic problems and developing a tentative approach to such problems. A full set of contingency plans would be out of the question because of the vast number of possible alternatives. If a few cases were carefully selected to represent type situations, useful planning procedures or guides could be developed. These would at least provide more precise statements of informational requirements than now possible.

The most serious shortages of productive capacity could be identified from damage assessment calculations. The facilities required to relieve such shortages would have to be obtained initially by decontamination or repair of the original plants if possible or by conversion of other plants. Selection of the most favorable types of plants for conversion could be made in the preattack period, and some appraisal of the requirements for repair or conversion could be established. This has been done in part by industry groups in preparing (for PARM) relevant factors for estimating material and labor requirements for such tasks; however, it would be useful to have this done in some detail for specific conversion operations applied to particular types of plants or other facilities.

Hardware Category

Turning back to Table 16, it is clear that the hardware-type research under the Countermeasure category could be extended to include similar dispersal, hardening, partial facility stockpiling, and lead time reduction comparisons associated with other types of critical facilities. Dispersal and hardening are undoubtedly uneconomical except as related to new facilities; these countermeasures would require some sort of subsidy to be attractive to private investors in normal times. It is possible that approaches to lead time reduction (for facility construction) could be found that had peacetime profit opportunities associated with them (if only by way of improvements in the state of the art) but some subsidies or other inducements would probably be necessary to encourage such developments.

Stockpiling any long lead time equipment or other integral parts of a standby facility would be extremely expensive unless it could be associated with some alternative use. Introduction of marginally effective (e.g., less than optimal size) facilities in connection with defense, public power, or other federal industrial operations might prove to be the least costly method of buying some measure of readiness in critical industrial sectors. Multiple purpose or readily convertible facilities might present attractive opportunities.

Economic Category

Most of the Economic category of questions could be approached in a fixed sequence of phases: (1) qualitatively in the mode of formal economic analysis, (2) by simulation or similar quasi-econometric models, or (3) by more realistic models or simulations using past time series with plausible adjustments to reflect probable postattack circumstances. Such research could produce valuable by-products in the form of models applicable to the analysis of peacetime economic problems such as economic development for depressed areas or emerging countries, inflation and business cycle control, taxing policy, mobilization for limited war, and national fiscal policy. By-products of research pushed through Phase 3 would include the effects of advances in statistical data collection on the U.S. economy.

Systems

The Systems category questions can also be approached to various degrees of depth by (1) qualitative or theoretical analysis, (2) case studies, (3) simulations based on assumed typical data for sensitivity analysis, or (4) more realistic simulations or analytical models based on best available estimates of characteristic data. Such research could also produce a better understanding of the networks that would be useful in cases of natural disasters or overloadings caused by mobilization and would apply to the informational and organizational interactions for government in general.

XII POSSIBLE PREATTACK ACTION

Introduction

Previous chapters have discussed gaps in planning for postattack recovery management and in research and have indicated some actions that might be taken in the preattack period to improve this situation. Other preattack actions are conceivable that might have an effect on the postattack situation that would make it easier to cope with or might otherwise facilitate solving management problems. Although some of the possible measures relate more to damage limitation than to postattack management, the one clearly has relevance for the other. Included among things to be considered would be a more sophisticated stockpile program related to equipment, such as trucks powered with something besides diesel fuel, or even specialized plants, such as relatively inefficient but low cost gasoline topping plants. A number of such possibilities are discussed here but not evaluated. The intent is to illustrate a type of action that has received little attention.

Some of these possibilities, such as hardening, dispersal, and duplication of critical facilities, have been considered and largely abandoned because of the high cost of implementation. Cost-effectiveness analysis of such possibilities in comparison with active defense has been only briefly treated. If the nature of the postattack management problem were clearly understood and the most critical problems adequately identified, the possible countermeasures to these might include possible preattack actions with adequate benefit/cost ratios when pursued just far enough to provide some insurance against the most critical hazards. These would include responses to the possibility of concentrated attacks against vital sectors, such as gasoline refineries, vegetable oil refineries, or important nodes in the major transportation, communication, or electric power networks.

Alternative Actions

Questions of dispersal or hardening of facilities have been raised primarily with respect to government agency headquarters, communications centers, and headquarters offices of corporations or important divisions. A few private attempts at underground construction have resulted from

earlier enthusiasm about civil defense (e.g., an underground dairy operation) but little attention has been devoted to serious hardening of facilities noted as critical or strategic. Dispersal of an activity to a number of different SMSAs provides some insurance against loss from light attacks but little safety in case of a major attack against all SMSAs. Dispersal to rural areas immediately increase the cost of operations, raises problems in acquiring a work force, and deprives the facility of all transport and service advantages of an industrial complex. Lesser degrees of protection (e.g., fallout shelters, antiblast revetments, solid wall construction) are not practical for refineries and may not be much help for any plants or facilities that are sufficiently critical to be targeted individually.

The time required to construct a new refinery is 18 months to two years, and the time for almost any plant is more than one year. If it is accepted that standby facilities are prohibitively costly and that locating facilities underground or in remote areas is not economically feasible, consideration could be given to actions that might permit significant reduction in the time required to prepare new facilities to replace capacity that would be lost in an attack. These might consist of construction of long lead time portions of a refinery or other facility or partial construction of low efficiency substitute capacity, e.g., petroleum topping plants. No striking suggestions for economical approaches to such problems have been made as yet, but little work has been done on estimating the costs of alternative approaches within the present state of the art. Such studies might indicate feasible compromises between standby capabilities and long waiting periods necessary without prior preparation.

Such hardware developments and any related feasibility studies are outside the scope of the present discussion. Any progress on such methods of improving readiness or other ways of preserving national mobility would greatly reduce the problems of recovery management and the associated information requirements. If transportation were not a critical problem, even a heavy damage situation would respond to conventional controls with minimal disturbance of the free enterprise system.

Present plans and organizational arrangements are rather general. Uncertainties related to the postattack environment, as previously indicated, make it unwise to attempt further to specify postattack organizations and decision-making procedures. Although firm arrangements are not desirable, contingency plans could be useful. Whether or not any such plans were adopted in the postattack period, the preparation of such plans would force a classification of postattack environments to some orderly structure that could be associated with planning and organizational alternatives. This would at least ensure that the management organization

developed in the postattack period could be compared with preattack recognition of vital issues and that some of the advantages and disadvantages of the structure adopted had received prior consideration. This is a type of study that reasonably falls under OEP's responsibilities.

Past work has been conducted under assumptions that reflect current assignments of responsibilities and political arrangements. This is a realistic approach to developing any plan likely to gain acceptance and be capable of being pilot tested on paper and in training exercises. Selective consideration of ways of adapting the general plan to alternative circumstances would still be desirable, however, and to date such consideration has not been given much priority. Chapter XIII discusses, in a very preliminary way, some of the adaptations that could prove necessary. A more complete and systematic analysis of such possibilities could be conducted and tested experimentally.

Two important gaps in existing plans deserve special comment. These relate to consideration of the probable role of centralized corporate management on the one hand and that of state and local governments on the other. It has been suggested throughout this report that corporate headquarters might be relatively ineffective in early postattack decision-making and that local governments might be pressed into unusual responsibilities. These suggestions require further examination, and if they are found to represent likely courses of evolution, they would deserve the analysis necessary to prepare proper organizational responses. Such possibilities are not reflected in current plans.

Existing material stockpiles are reasonably well-adjusted to budget realities. Stockpiling information has often been mentioned in the context of specific issues (e.g., engineering drawings and other technological data) but little has been done. A modest attempt to identify possible informational requirements and an effort to collect and disseminate such data to places of potential need would be quite inexpensive and would constitute a possible investment of preattack funds for a large payout in improved readiness.

Research followed as appropriate by some degree of implementation should be included within preattack action. Many of the research findings that could conceivably emerge from the topics listed in Table 16 would merely contribute to a better insight into postattack problems and possible countermeasures. The implementation appropriate in such cases would include incorporation of such findings into training programs; preparation of manuals for guidance of selected types of postattack decision-makers; recognition of facts established in developing contingency plans, organizational structures, or information systems to support them; and the inclusion of factual data in central and dispersed data banks.

The data bank at NREC contains data primarily on productive capacity (in the form of value added from manufacturing); the location of major facilities with indications of their individual size, output, or service characteristics; and demand vectors associated with preattack or anticipated postattack requirements. These include minimal per capita consumer demand, secondary demand imputed from input-output coefficients, and requirements for capacity augmentation through decontamination, repair, conversion, or reconstruction of facilities. Regional price data or at least price indexes covering all items to be included under the price freeze (at present all prices are included for uniformity, but price adjustments would presumably be allowed for some items after federal assumption of price regulation, and free prices could be permitted for others) should be noted and kept up to date. The pricing models that could be generated under the research program could also be exercised to provide a quantitative basis for granting price adjustments and for cost projections.

The research on incidence and deflationary effects of various taxes under likely postattack conditions could be used in the preattack period to prepare standby tax legislation on a contingency basis. Such research should attempt to anticipate some of the psychological effects of alternative sequences of tax announcements. Some announcements of tax policy, loss sharing concepts, and fiscal policy could possibly be more effective and more conducive to high morale if made in the preattack period.

XIII PROBABLE POSTATTACK MANAGEMENT DEVELOPMENT

General

A complete plan for postattack management, based on present knowledge of possible postattack situations and problems, would undoubtedly prove extremely naive. Plans for more familiar emergencies based on repetitive prior experience invariably require considerable adaptation to fit the exact circumstances of each new case. The existence of a plan capable of necessary adaptation is nevertheless of great advantage. In the case of planning for postattack recovery management, so many political, economic, and social anomalies could arise that a flexible skeleton plan is more likely to be useful than one with overly rigid commitments to detailed specification of selection among alternative actions. Viewed in this light, present plans for ODR, OES, OET, and associated agencies and the state agencies assembled under the Comprehensive Plan seem to be very well thought out and generally applicable.

Some of the gaps in planning, preparatory research, and implemented readiness preparations already noted will gradually be filled in; some will remain. These facts make it inevitable that management of recovery efforts would develop in unexpected ways. Any prediction of the nature of this evolution must necessarily be extremely conjectural and is likely to be in error as would be the detailed concepts of an overly ambitious plan. Some conjecture about the probable direction of further developments and the pressures that might be possible can be useful for further delineating the degree to which it may be desirable to plan in the preattack period and to provide reassurance to those who would be responsible for guiding this evolution throughout the postattack period.

Existing Plans and Their Relationship to Future Needs

Existing organizational plans have been concerned primarily with: the federal level and only rather tentatively with the state level; the central functions of the government and only slightly with consideration of field staffs; and materials supply management and only slightly with the management of investment in new facilities. Serious consideration of possible expansion of the roles of state and local governments must await the completion of a first round of state plans, if for no other reason than to identify and establish appropriate agencies as targets for mission

assignment. The fact that these would vary from state to state creates a problem for detailed prior organizational planning. The lack of any OEP field staff except that at the regional offices (totaling less than one person per state) has removed any strong possibility of or incentive to planning for some widely dispersed organization such as would be desirable for federal control of recovery management efforts in local areas.

The interjection of the government in facility investment decisions has historically been confined to facilities for its own use or for defense production. Extension of this interest to all major new facility acquisitions such as discussed in preceding chapters would raise many political questions and would be acceptable only in an actual emergency. In World War II and in the Korean conflict, material shortages and tax incentives tended to restrict expansions to war-supporting industries. In managing recovery wisely, a much wider range of investments would be necessary and only a central planning agency would be in a position to rank those proposed or to identify and publicize any need for others that were not generally recognized or suggested. The possible role of the federal government in review of expansion plans and in initiating projects would not be clarified fully until well in the postattack period. Some preparation for such a role and some preliminary planning appears to be likely and desirable.

The type of recovery management organization needed would depend on the severity and nature of the attack and the resulting economic environment. This fact alone justifies a conservative approach that would resist any attempt to overelaborate organizational plans in the preattack period. The actual organization that would exist at the end of the attack could thus be expected to change by design and by moves to correct or compensate for deficiencies. The many agencies with overlapping roles characterizing the evolution that occurred in World War II is not desirable but might be in part inevitable. A preview of alternative possibilities might eliminate much of the disorderly proliferation of agencies that could otherwise occur, but the ultimate history of the postattack period would also depend greatly on the organizational and political philosophy of those in political control.

The degree of control that would be acceptable to the general public, and feasible from the standpoint of political authorities would increase with the level of damage and with loss of mobility. Except in the case of a continuing or intermittent attack, the damage would presumably be established in the first two or three days. Failure to appraise the extent of damage correctly or to allow for secondary consequences could require changing the organizational structure and control procedures during the first few months of the postattack period. Significant changes after that

time would reflect bad or vacillating leadership or the variable fortunes of a power struggle. The period of organizational evolution that could be expected would be rather short.

If the current organizational plans and control philosophy were in effect at the time of the attack and little had been done to facilitate a change, pre-positioned instructions and directives would establish the general freeze order and call into effect ODR and the various state plans. Local boards would be called up and would deal with immediate problems, primarily announcing the price and rent freezes (labor field services would announce the wage freeze), retail outlets would be closed while inventories were recorded, and rationing evidences would be issued. Normal relief organizations such as the Red Cross, state disaster offices, and OCD would all function according to plan. ODR would start its expansion and begin to disseminate attack damage information, to analyze the apparent situation, and to make supply-requirements calculations.

During the first week after emergence from shelter, local units would establish a rationing and distribution plan covering all essential items. Ration quantities would be set so that surviving stocks supplemented by surviving production would last a reasonable period, say several months or until new capacity could reasonably be expected. Banks would extend credit to operating plants, if necessary, to meet payrolls and to pay for materials. Work forces associated with plants normally engaged in nonessential production would either be diverted to other industries or would start on plant conversion. Decisions to convert could only be made by plant managements but could be forced on management by limitation orders and by shutting off any flow of materials needed for nonessential production. The limitation orders and the interruption of material flows would come from BDSA after coordination by ODR. Many other conversions should be initiated to expedite increase of capacity for important products.

Decisions about such products would probably take weeks to adjudicate or process and implement if they were made centrally on an industry-wide basis. Some of the decisions should be made on the basis of specific circumstances relating to the environment of the particular location. Either the field organization of ODR would have to be empowered to take action or alternative agencies would fill the gap--probably state or local groups. Undoubtedly, both ODR field personnel and local units would be involved but hopefully one would have authority and responsibility and the other would have an advisory status or would serve as a communications link. In any case, some clarification of the division of authority among federal, state, and local representatives would be required. The most probable line of demarcation is that suggested in Chapters II, III, and IV, with operating and local questions resolved locally, interarea-intrastate questions resolved at state level, and interstate questions referred for final action to the federal level.

At the federal level, a similar pressure for change could arise. The resource-claimancy polarity that has worked well enough for allocation of critical materials (in past emergencies) could result in a time consuming process if extended to review of facility plans. However, investmant decisions or policies and regulations affecting investments by private corporations and individuals would be the most important actions of ODR and the delegate agencies. The critical issues are not the careful allocation of construction materials and effort but the lapsed time to startup of new productive capacity. Thus, what is really to be allocated are alternative economies in lapsed time. Time lost in the decision process could not be tolerated and no government could withstand the criticism that would develop on evidence of bureaucratic procrastination. Decisions would be made quickly, and to make them quickly and rationally, a very integrated review organization would be required. The traditional jurisdictions of delegate agencies, including departments and old line bureaus might have to be subordinated to a very strong central agency.

Thus, the major probable changes would be strengthening the central federal control agency and strengthening and integrating local authority. The course of this evolution would be less disturbing if preattack planning had anticipated the eventuality and laid the groundwork for smooth response to postattack pressures.

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13. ABSTRACT

This study is concerned primarily with information needed for monitoring the effects of actions taken by governmental bodies at federal, state, and local levels in a postulated postattack period and for providing business management with the overall information it needs for making business decisions in the absence of undistorted indicators of economic developments.

The break in traditional economic time series and the need for drastic reorientation of industrial efforts in the postattack period would greatly restrict the amount of information available and expand the amount needed. The imposition of controls; the need for well-directed investment by government, business, and private individuals; and the dominating economic significance of government public works expenditures for projects in the general interest would all complicate the decision process. These factors would all be highly relevant to information requirements for policy determination and for day-to-day operations in the first several months of the postattack period. Information requirements have thus been studied with such factors in mind and in the light of available information on plans for emergency agencies such as ODR (Office of Defense Resources); OES (Office of Economic Stabilization); and other relevant government agencies at federal, state, and local levels

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