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IMPLICATIONS OF THE NUCLEAR THREAT  
and  
PLANNING GUIDANCE

April 1971

*Canada Emergency  
Measures Organization*

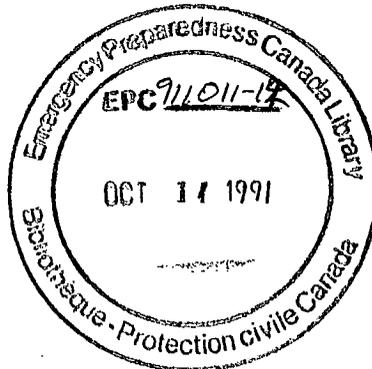


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*Organisation des  
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CANADA EMERGENCY MEASURES ORGANIZATION  
DEPARTMENT OF NATIONAL DEFENCE  
OTTAWA

IMPLICATIONS OF THE NUCLEAR THREAT AND  
PLANNING GUIDANCE

1. Following the publication of the paper "The Nuclear Threat to Canada" dated December 1970, there is a need to provide guidance to all civil emergency planning staffs on the implications of this threat. This paper contains an examination of the implications of the nuclear threat and related guidance on civil emergency planning respecting it. The paper is divided into three parts:

- a. general implications of the threat;
- b. planning for various types of risk areas;
- c. planning for sub-programs.

2. The geographic, demographic and socio-economic aspects of each area at risk are subject to provincial review and continuing consultation with Canada EMO with regard to matters of mutual concern. Factors to be considered are:

- a. targeting as derived from the threat;
- b. weapon yields;
- c. weapons effects;

related to existing administrative boundaries.

3. It should be borne in mind that enemy capabilities for attack could be increased in the future. This could occur in two ways - either by an increase in weapon yield and/or more accurate delivery systems or the addition of more locations to the target list.

4. There is an inherent danger in attempting to delineate the size of areas at risk in too much detail since there may be a tendency to use them rigidly, whereas, planning must be flexible enough to meet a post attack situation which cannot be accurately forecast. On the other hand, some definition of the area at risk is needed to provide both comparisons and a basis for contingency planning.

PART I - GENERAL IMPLICATIONS OF THE THREAT

5. Planning should consider all the direct and residual effects on Group 1, 2 and 3 areas at risk and on related areas at risk in the USA.

6. Because of the widespread nature of attack effects, planning for a particular location must always take account of probable effects from elsewhere. First of all, damage in one area, for example the disruption of hydro-electric power, may well be felt in another otherwise unaffected area; in the same way as fallout from a target area will affect many other areas. Second, because a target area is normally a focus of social and economic systems, disruption there will cast a shadow on activities over a much wider area than the target itself.

7. The division of areas at risk into groups provides an estimation only of the probability of attack and, therefore, an order of priority in determining short term objectives and in the implementation of program activities. It cannot be inferred, however, that priority action must always take place in the areas at high risk. Sometimes it will be necessary to take priority action elsewhere but in support of the location at risk. For example, the development of reception planning in a rural area where surplus shelter exists or where the probability of a free environment is high, may be a high priority supporting activity for a target area.

8. In the context of post attack planning, operational civil emergency measures in a community are not necessarily related to the target listing nor to any peacetime importance of the community. The important issue is the potential benefit of that community to post attack operations. Priority should, therefore, go to implementing measures in those communities which show the greatest potential benefit to post attack survival. Canada EMO will assist in resolving this type of planning problem.
9. Group 4 locations which are in the low risk category should be excluded as reception areas in any pre-attack dispersal plans or as locations for important emergency facilities except on an interim basis until safer alternative arrangements can be made. These locations can of course be considered in contingency planning for post attack operations.
10. Guidance on weapons effects is included in Annex B to the threat paper and the information is included in EMO Manual No. 3 "Nuclear Weapons Effects".

#### Warning Times

11. It is impossible to determine how much warning time of an attack will be available.
12. There may be some tactical warning. Thus operational planning must always have a capability for rapid implementation using existing capabilities, for example, temporary overcrowding in available shelters or deployment of essential services and personnel to interim "locations".
13. Arrangements should be made to speed up program activities on the receipt of strategic warning in order to provide an increased emergency capability using the greater resources which can be made available.

Planning Considerations

14. Emergency Planners should be aware of how far their readiness capability can be advanced in various time periods, e.g., 30 days, 7 days, 24 hours and 15 minutes.

15. The study of lead times and methods for completion of activity goals will assist in determining what actions must be taken within each time period. This should result in a minimum number of items for stockpiling and then only of those resources which are not readily available in the 30 day time frame.

16. Organizational and flexible operational plans should be developed for the most likely post attack situations using the "Concept of Emergency Operations - Life Saving Period" as a guide.

17. Study of the above time periods may introduce new concepts for operational dispersal planning. In the meantime, for each area at risk, plans should be developed both for the people, making best use of existing shelter, and for the essential systems which support them.

Levels of Protection

18. In determining adequate levels of protection for EGHQs, EOCs and shelters for the public, a number of factors have to be considered:

- a. the magnitude of the hazard;
- b. the probability of the hazard;
- c. where the hazard may occur.

Even then there are plausible figures available for each of these factors as for example in "The Nuclear Threat to Canada", the sensitivity of these figures to changes in enemy intentions, meteorological conditions, etc., must

also be taken into account. The nuclear threat paper indicates those areas where the radiation hazard will be equal to or less than indicated for 90% of the time. In addition, the attack patterns do not make any allowance for the random detonation of erratic weapons, which may well occur.

19. Similar, but by no means identical variations may occur in areas at risk to direct weapon effects. For example, doubling the weapon yield does not double the aggregation of effects.

20. Because these variations are indeterminate, and in the absence of an attack will remain so, it must be decided:

- a. how they will be taken into account in planning;
- b. what the risk map which accompanies the threat paper may logically be used for.

21. How to take the indeterminate variations in hazard into account must be a matter of judgement, and should be based upon such factors as:

- a. how high, within reason, the hazard could rise;
- b. an adequate level of protection to meet this hazard at reasonable cost, bearing in mind that 100% survival can never be guaranteed;
- c. the area over which various hazards may be felt.

22. Consideration of these factors has led Canada EMO to recommend elsewhere specific protection levels as the desirable goals for fallout shelters (EMO Manual No. 1 (Ref) Chapter 7, para. 7.01); and for EGHQs (Chapter XX para 9.10.11 and Annex C to the Municipal Planning Guide).

23. The risk map which accompanies "The Nuclear Threat to Canada", provides quite a different type of information. It provides:

- a. a method of comparing the relative risk of one area against those of another;
- b. an indication of which areas should receive program priority in the development of protective measures;
- c. a method of determining the appropriate levels of protection to meet contingency plans pending full development of the required protection;
- d. information which can be used in conjunction with the Radiation Penalty Table to estimate potential casualties resulting from the use of shelters at various protection levels;
- e. a basis for studies and exercise planning.

PART II - PLANNING FOR VARIOUS TYPES OF RISK AREAS

24. The Nuclear Threat to Canada indicates that for planning purposes the country can be divided into three types of areas; namely,

- a. areas at risk to the direct effects of nuclear explosions, this includes EMP effects;
- b. areas at varying degrees at risk from fallout;
- c. the remainder of the country.

Irrespective of the level of government which is involved or the degree of risk to which communities are exposed, there are many common activities in all civil emergency planning programs. In an ideal state of affairs each and every geographic area could have a comprehensive program covering all contingencies arising out of an attack. Nevertheless, because of limited resources, the possibility of reaching the ideal is unlikely. Therefore, emergency planners must direct their attention toward completing or giving priority to those

affairs and events which are considered to be most likely without completely ignoring the less likely. The type of planning which should be carried out is briefly described in the following paragraphs.

Planning for Risk Areas Associated with Groups 1, 2, 3 -  
Nuclear Threat to Canada

25. Pre-attack voluntary evacuation plans should be prepared for each area. Even though, at this time, it is impossible to predict that sufficient time will be available, there might well be many factors which could lead governments, at the time of crisis, to suggest such a movement.

26. Although such plans are usually interpreted as being concerned with only the general public, arrangements should be made for government, business, industry and institutions to disperse key records, plans and specifications, readily moveable physical assets and resources including those which are critical to an essential function to safe locations away from the above risk areas.

27. Under certain conditions, pre-attack evacuation might involve solely the movement of people from a "core" area to basements or other suitable accommodation in the fringe areas. Although such a movement would not be as effective in life-saving as evacuation to more distant destinations, it could achieve a more desirable distribution of population, thus reducing its potential vulnerability. It may be necessary to have two types of dispersal plans:

- a. to remove everyone to another community;
- b. to withdraw all the people from the core of an area at risk to provide a reasonable degree of safety, but to allow essential workers to return daily to their employment; in the event of attack, essential workers would either:

- (1) try to evacuate to the locations of their families; or
- (2) protect themselves in available shelter close to their work locations.

28. Because it is possible that these areas would receive tactical warning of attack only, an adequate public information and education program should be implemented in peacetime. Such a program would direct the public's attention to finding the safest location for protection against the primary effects of detonations, how to improve it. Such a program would provide post-attack survival information.

29. For business, industry and institutions, an information program should include advice on improving the protection of vital records, plans and specifications and on physical protective measures which would reduce the vulnerability of buildings, critical machinery, equipment, etc.

Planning for Risk Areas Associated with Group 4 -  
Nuclear Threat to Canada

30. It is considered at this time that these areas are sufficiently low in the attack order of priority so as to make their likelihood of attack low although it remains possible. Therefore, planning for such areas should be based on a "stay put" policy except where in a post attack situation remedial evacuation might have to be implemented.

31. Although it would be prudent to "ignore" such areas for reception planning purposes they may have to be used on an interim basis because of serious shortages of fallout protected accommodation in other communities.

Planning for Areas at Risk From Fallout

32. These areas should base their planning on:

- a. a public protection program not including dispersal; where such areas are within 30 miles of a likely ground zero, a program of informing the population, industry, business institutions on how to meet the primary effects as well as fallout effects;
- b. the reception of pre-attack and post-attack evacuees from target areas. Where there is only one target complex to be considered, priority attention should be directed to providing reception arrangements in areas "upwind" of such targets. However, this must be balanced with the capability of road systems to cope adequately with anticipated traffic loads, and the capacity of reception communities to receive evacuees and provide fallout protection for them. Where there are a number of likely targets, all locations away from the areas likely to be affected by primary effects must be used for reception. It is true that there is a likelihood of exposing evacuees to a significant radiation hazard but this must be balanced against the risk of these people being subjected to all the primary effects if they are not dispersed.
- c. post-attack emergency operations;
- d. post-attack remedial evacuation.

The Electromagnetic Pulse (EMP) Threat

33. The most effective technique for minimizing damage to sensitive electrical components involves isolating them electrically and/or magnetically

from the EMP environment. In many cases, satisfactory isolation can be achieved by temporarily disconnecting the equipment from power sources, antennas or other input/output leads that enter the equipment enclosure.

34. Emergency plans should include various options for either partial or complete isolation of essential communications facilities during the threat period. In developing these plans, consideration must be given to the effect that complete communications isolation (either voluntarily or involuntarily imposed) will have on emergency command and control needs. On a calculated risk basis, resources may be balanced against emergency communications needs by the reservation of some facilities to replace systems in use in the event of their failure.

35. In cases where a facility is to be completely shut down during the transattack period, the following actions should be taken for power isolation:

- a. Master power switch to be opened at electrical service entrance;
- b. All circuit breakers opened or fuses removed at distribution boxes;
- c. All critical equipment to be further isolated by turnoff at control boxes or by disconnecting line cords.

36. When service is to be restored during the postattack period, it would be advisable to pretest all electrical lines (to ensure that no breakdowns or arc-overs have occurred) prior to reconnecting commercial power.

37. In addition to protecting sensitive electrical/electronic equipment against the direct effects of EMP, provision should also be made to guard against what can be termed the secondary effects of the pulse. At any given location, these might include some disruption of commercial power or telephone service, city water service, etc.

38. Since it is possible that commercial power may be interrupted for protracted periods in some locations, it may be desirable to provide selected facilities with independent emergency power sources, each with a suitable supply of fuel. These sources may be needed for operation of communications gear, lighting, and life support equipment. Emergency power wiring preferably should be routed in conduit, with the conduit sections joined by welding or threaded joints.

39. The EMP energy collected by long overhead cables, such as overhead telephone or power lines, may be hazardous; therefore, personnel should be kept well away from such cables insofar as possible during threat periods. Spare communication units may be desirable to replace those that might be damaged by occurrence of an EMP during operation. In general, battery-operated transistorized EBS (i.e., broadcast-band) receivers with built-in antennas are physically too small to pick up a significant amount of EMP energy, and thus need no protection.

40. There are other more sophisticated protective measures, which must be considered on the basis of systems design. It is not proposed to list these here, but authorities wishing to develop such protection should consult Canada EMO.

#### Summary

41. A simple table summarizing the above planning considerations is as follows:

Recommended plans for	Risk Areas 1, 2, 3	Risk Areas 4	Fallout Areas	All Others Areas
Pre-attack Evacuation	yes	no	no	no
Pre-attack Reception	no	no	yes	yes

(but under some circumstances)

yes

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Recommended plans for:	Risk Areas 1, 2, 3	Risk Areas 4	Fallout Areas	All Other Areas
Protection against Primary Effects	yes	yes	yes (for areas within 30 miles of TAs 1,2,3) no (for others)	No
Protection against EMP Effects	yes	yes	yes	yes
Protection against Fallout Effects	yes	yes	yes	yes
STAYPUT	no	yes	yes	yes
Post-attack Emergency Ops.	yes	yes	yes	yes
Remedial Evacuation	yes	yes	yes	yes

PART III - PLANNING FOR SUB-PROGRAMS

42. This part of the paper presents planning guidance for major activities within each sub-program. It should be noted that this does not include reference to the cost factors which must be considered in determining a complete program policy.

PUBLIC PROTECTION

43. The implication of the Threat for most geographic areas, is that, the public could be exposed to one or more hazards. The degree of protection required will vary according to the risk to which people are likely to be exposed. Some of the implications on the activities which would comprise the program of Public Protection are included in subsequent paragraphs.

### Fallout Protection

44. The long term goal is to provide a fallout protection factor (PF) of 100 for all persons likely to be exposed to the fallout radiation hazard.

45. The short term minimum fallout protection should be based on the degree of risk from radiation doses, the number of people to be sheltered and the shelters available. It must be recognized, however, that there could be serious consequences should the radiation doses exceed the limits contained in Circular No. PLAN-70-C-1 File 1900-3 dated January 12, 1970 "The Effects of Exposure to Ionizing Radiation".

### Blast Protection

46. Although a national policy has not been adopted for the provision of blast protection, the desirable long term planning goal should be to provide a degree of protection in the order of up to 30 psi in areas considered to be likely targets. Such protection would also provide adequate protection against all other effects, except those close to ground zeros. Until a policy is adopted and resources made available, planners should direct their attention to exploiting the inherent protection afforded by existing buildings.

### Dispersal

47. Casualties could be reduced through dispersal from potential target areas. Studies should, therefore, be undertaken to examine the feasibility of affording protection by this method. These studies should consider the following factors which are likely to have a bearing on the degree of success of dispersal planning:

- a. time available for implementation;
- b. federal, provincial and municipal government response to worldwide events;
- c. public response to dispersal planning;
- d. feasibility of dispersal, e.g., traffic congestion, refueling facilities, etc.;
- e. arrangements for reception;
- f. fallout protection available.

48. The opportunity to carry out voluntary evacuation should be available to residents of all potential target areas. This would include advice as to the best routes to follow, what to take, and the necessary arrangements for reception and billeting in safe areas.

#### Individual Protection

49. Individuals should be encouraged to make their own preparations to reduce their vulnerability in a manner commensurate with the risk area in which they reside.

#### Radiological Defence

50. Fallout monitoring posts should be given the same degree of fallout protection as that provided for the public. As a matter of priority, monitoring posts should be established in likely areas of fallout as indicated on the threat map in descending order of risk, then in target areas and finally in areas which indicate little or no radiation hazard. Monitoring posts may be located in communal fallout shelters where they could carry out the dual functions of advice to shelter managers and radiation monitoring.

PUBLIC INFORMATION

51. In addition to the normal task of conducting informational programs, peacetime information services must develop prearranged informational and educational programs for implementation through the various media. Prepared information should be focussed directly onto the likely problems or hazards to which the public will be exposed. It should be stored and reviewed annually to ensure its continuing appropriateness.

52. In most cases, the prepared programs would be disseminated through existing services at existing locations. In an attack, these services will be exposed to the same hazards as the public. Therefore, plans and preparations will have to be made to operate these services from alternative protected locations. Broadcasting stations or other facilities which are required to continue in operation must be tied by communications to local emergency government headquarters from which guidance to the public is to be prepared.

CONTINUITY OF GOVERNMENT

53. Emergency government headquarters and other forms of EOCs must be protected against the primary and/or secondary effects of nuclear detonations. When located adjacent to likely target areas these headquarters should have sufficient strength to resist overpressures of 30 psi. If less protection is afforded then a combination of strength and distance as well as fallout protection will be the governing factors. From the point of view of directing and controlling post-attack emergency operations, the headquarters should be located as close as possible to the target area consistent with the weapon effects and the protection provided by the structure. Canada EMO is prepared to assist in determining what constitutes suitable protection in these areas.

54. Headquarters of municipalities outside target areas should be located in buildings with the maximum PF available. Where construction of MEGHQs is considered, PFs of 500 should be provided.

55. Because headquarters for target areas, zones and regions are located in places other than the place of normal work, plans should be developed to phase the manning of such headquarters during periods of increasing international tension.

56. Key facilities and installations should be treated as a form of EOC referred to above.

57. Communications should be safe-routed around areas at risk from direct attack so as to reduce their vulnerability.

#### ESSENTIAL SOCIETAL SERVICES

##### Health

58. The following threat implications should be considered:
- a. Hospital facilities now in Group 1, 2 and 3 areas should not be relied on for any major contribution to the health services requirements.
  - b. Hospitals located in Group 4 areas may be included in plans provided there are adequate shelter facilities against the radiation hazard expected in the area. Some relocation of patients within the hospital building may be required.
  - c. Emergency hospitals, emergency clinics and blood shadow depot should not be located in Groups 1, 2 and 3 areas. It may become necessary to locate Advanced Treatment Centres adjacent to target areas in which case the sites

selected should be close to the predicted outer limits of the area. An Emergency Health Unit should always be established in accommodation with the maximum protection available.

#### Welfare

59. Emergency Welfare Services facilities should be located in an area relatively free of radiation using the same criteria as has been decided on for reception areas or for dispersal areas on the periphery of cities at risk from direct attack.

#### ESSENTIAL UTILITIES AND SPECIAL SERVICES

##### Fire

60. The major part of all firefighting equipment and personnel should be dispersed from Groups 1, 2 and 3 areas prior to the attack. Firefighting resources within 50 to 75 miles of risk areas (i.e., those that might be brought to bear to deal with the 24 hour firefighting problem) should be included in the contingency operational planning for such areas. Fire defence planning should also include, during a crisis period, some escalation in training of the population in activities which reduce vulnerability to fire. Plans must take into account possible interruption of normal means of obtaining water.

##### Rescue

61. Rescue organizations, some of which should be associated with Casualty Clearing Units, should be established in all Group 1, 2 and 3 areas, (and arrangements made for their pre-attack dispersal or protection) and in the municipalities adjacent to such areas, e.g., within 50 miles. Owing to the radiation hazard, both firefighting and rescue operations may be curtailed until the radiation levels have decayed to acceptable limits.

Utilities

62. These include water, hydro, and gas installations and plants. Plans should include alternative arrangements for continuation of essential services to the surviving population.

ECONOMIC PLANNING AND RESOURCE CONTROL

63. The nuclear threat places a requirement on planners to examine resources located in Group 1, 2 and 3 areas to determine those resources which may be denied by loss of facility and those resources which may be denied for given periods of time because of fallout. Plans should be prepared taking into account relocating, protecting, re-routing or the re-building of resources for the different manufacturing processes or services. Wartime control units for all resource systems should be located in areas where the hazard is negligible or where the hazard can be minimized by the protection available.

REDUCTION OF VULNERABILITY OF SYSTEMS

64. The vulnerability of many essential systems such as communications systems, transportation systems, food production systems, etc., is related to their component facilities. It is determined by analysis the resistance of facilities to direct weapon effects and the potential exposure of essential personnel to radiation. Such an analysis must be carried out at each link of each system to obtain accurate knowledge of potential weaknesses of the system. Plans should then be prepared to raise the overall level of resistance or to provide replacement items, as far as is practicable in peacetime and during periods of increasing international tension.

PART IV - OBSERVATIONS

65. The guidance provided in this paper should be considered in the light of analysis of all pertinent factors related to civil emergency planning.

It is not suggested that the guidance will meet the requirement for all departments, agencies and levels of government for all situations. There may be situations where the threat may require emphasis in planning to be related to a single option rather than a mix-option of the measures suggested.

66. There is need to ensure that full use is made of whatever warning time is available. Plans should pay emphasis on the quick and effective response to the threat which can be achieved by the prior assignment of emergency responsibilities to organizations in being.

67. It follows that the development of training cadres and the education of senior officials at all levels of government and industry should be included in the development of contingency plans.

68. Canada EMO is prepared at all times to discuss any course, or courses of action with civil emergency planners in order that a consensus may be achieved and to provide advice regarding all technical, organizational, operational or training matters related thereto.



