Magnus Clarke: “The Nuclear Destruction of Britain”, 1982, pp.214-237

The Physical and Social Effects of Attack

It was the conclusion of Chapter 5 that the most likely pattern of Soviet attack on the UK would be a nuclear strike of approximately 167 MT delivered against approximately 188 targets. Although primary military, those targets include, by virtue of the demography the British Isles, all the major conurbations and a great many other centres of population. As the result of ground-bursting, the nation as a whole will be heavily irradiated and few areas can expect to escape completely the direct and indirect effects of attack and the consequent social and economic disorganisation.

Civil Defence Estimate Compared (pp.197-202)

In chapter 4 it was noted that little is known of the 'official' Home Office estimate of most likely attack, but it is probable that that of the Civil Defence organisation is reasonably similar. This assessment holds considerable similarities to that of this study and begins from the assumptions that:

1. the UK is most likely to be attacked in the course of an East-West war (agreed);
2. however it begins, it will become nuclear and will be nuclear as far as the domestic security of the UK is concerned (agreed);
3. ‘The enemy's aim will be to put this country out of the reckoning by destroying our ability to influence the course of events, militarily, politically and economically' [l] -- an objective of 'destruction' (agreed).

As regards targets the Civil Defence assessment states, 'we foresee ... a disabling attack targeted on our strike bases, certain other military facilities and centres of government, of population and of industry including some of our seaports'. (agreed). The paper offers 80 targets in all, which seems low given the number of essential military targets alone (see Appendix C) and compared with 188 in this survey. Nevertheless, on the basis that warheads would be delivered mostly by high-payload SS4 and SSS missiles, this target total of 80 does result in a similar delivered megatonnage of 180. The report states ‘anything less than this weight of attack might not achieve his object and anything more would represent wasteful overkill which his nuclear armoury could not support', which appears correct where megatonnage is concerned, but is not the case in delivery vehicles since, given the accessibility of the UK to fixed-wing aircraft and increasing numbers of available Soviet IRBMs and MRBMs, the USSR can certainly afford to attack more than 80 targets. All targets, the paper goes on, will be attacked within 48 hours (agreed), all bursts at ground-zero (agreed) and invasion is unlikely to follow in the short term (agreed) which, the report observes, is just as well, since 'we have to recognize that

once occur war reserves at the appropriate stage of alert there will be very little army our war reserves of men and equipment have moved to the Continent strength left in the UK for any defence purpose'.

Effects of 'Civil Defence' Attack (p.198)

This 'Civil Defence' attack estimate concentrates its 80 targets in the centres of population : the Greater London area holds 32 targets; an axis of Bristol-Portsmouth 7, Swansea-Cardiff 3, Birmingham 8, Manchester 6, Liverpool 4, Leeds-Bradford 8, Edinburgh 4, Glasgow 9 and Aberdeen 2. These urban areas, attacked directly or by proximity to military-strategic targets, in the NATO sense, account for some 21 million people, or about 38 per cent of the total population'. The paper states, 'an attack with weapons of low megatonnage would lay waste the city complexes by blast and fire [but} it would leave undamaged the greater part of the country, including most of the smaller towns'. For the majority of the population the 'main danger will lie in the radiation effects'.

Overall Deaths (Civil Defence Estimate) (pp.198-199)

However, such an attack still has serious consequences: 'Nationwide, up to 80 per cent of our industrial productive capacity might be destroyed [while] … overall some 3-4 million people might be killed by direct effects and another 5-9 million seriously injured.' Beyond this, 'many more will die from their injuries, from the effects of radiation, from exposure, starvation and disease in the months that follow'. After one year, 'perhaps two-thirds of the population will have survived'. In other words, at twelve months after attack there will be between 20 and 25 million dead and 30-35 million 'able-bodied' survivors. This, the report concludes, 'is very different from the popular view that nuclear war would see the end of all life in this country.'

However, there are two basic errors in the calculation (whose detail is not stated) of the likely ratio of deaths to survivors. First, he cumulative societal effects of the large 180 MT attack are ignored (although ‘exposure, starvation and disease’ are mentioned), and this may prove a most important aspect (see later), while, second and most important, *these survival rates depend on preparation being ready at the time of attack.* The paper admits that they rest on 'sound plans having been put into effect before attack [and] if they weren’t then the number of survivors might be cut in half’.

Given the low state of UK’s civil preparations for war and the British institutional requirement of a period of mounting tension in which to bring the country to a proper level of readiness to meet the attack, which, in view of the Soviet emphasis on surprise and pre-emption, is unlikely to be long enough, then this latter survival level seams the more likely. That is at twelve months after attack there will be 15-17 million survivors and 38-40 million dead. In this study, given the considerable similarities between the 'most likely patterns” and the Civil Defence attack pattern, particularly in

target type (though not numbers), megatonnage and nature of burst, it will be assumed (at least begin with) that these latter figures represent a realistic estimation of likely survival rates. On this basis the situation at one month (A + 1) and twelve months (A + 12) after attack are

	Dead ($x10^6$)	Seriously injured ($x10^6$)	Able-bodied ($x10^6$)
A+1	6-8	10-16	31-39
A+12	38-40	-	15-17

(Assuming population to be 55 million.)

Casualty Estimation Problems (pp.199-201)

No further attempt will be made here to arrive at a more precise and independent estimate of the immediate casualties resulting from the most likely attack pattern. Although immediate casualties might be calculated more precisely, this would be a lengthy task, is not without problems and might be misleading. First, as Ira Lowry stated in *The Post Attack Population of the United States*, 'The human race has no experience remotely comparable to full scale nuclear warfare … the most relevant experience of human vulnerability on which.we can draw relates to disasters of much smaller scale.' All we can do is to extrapolate these small-scale disasters in to big ones, although the nature of the 'bio-social' stresses which would be generated in such circumstances are likely to give an entirely different result. Beyond that 'much of available case material relates to societies other than our own whose members may well respond somewhat differently to a given stress'. [2]

Second, our experience of the effect of nuclear weapons is, as Kahn observes, limited: 'There is no adequate experience; no one has fought and survived more than comparatively small and one sided nuclear war.' [3] Our only *direct* knowledge results from the bombing of Hiroshima and Nagasaki which were carried out using *tiny* nuclear weapons (20 KT) – scarcely included in the British attack and at which casualties were from essentially *non-nuclear causes*. As Cmnd 9780 reported, 'Blast and Fire caused most of the casualties but about 15-20 percent were caused by … radiations emitted during the explosions.' [4] In other words, only 15-20 per cent of the casualties were of a specifically nuclear nature and radiation was relatively unimportant. It cannot be assumed that 80-85 per cent of casualties in the UK would result from blast and fire — Hiroshima and Nagasaki were •cities largely constructed of wood and paper and •both bombs were air-burst, whereas UK detonations, it has been decided, are likely to be ground-burst.

Third, the Japanese bombings terminated the Second World War and thus, as Ikle states, 'provided little information concerning their effect on a continued war effort's and, it can be added, of unaided social recovery. Fourth, we have no knowledge whatsoever of what Lowry refers to as the 'synergistic consequences of multiple detonations over a short time'.6 For example, the physical effects of the 5 x

5 MT salvo on Greater London may be very different from a mere arithmetical calculation of the effects of one plus the effects of each other.

Fifth, as regards the indirect effects: we do not know precisely what will start 'firestorm' and what will not; weather conditions affect fall-out and drift; the exposure of population to weapon effects varies with time of day and location; human beings themselves are not equally vulnerable (they are not 'homogeneous); the protection factors of buildings differ greatly, and finally, until we know the initial radiation level we do not know how long it will last.

Consequently, in the aspect of society-wide effects of both casualties and physical destruction the only course is to employ the experiences of other wars -- predominantly the Second World War — but again this can be of only limited utility. For the UK the war of 1939-45 •provides minimal guidance in that it produced less than one million British casualties from all causes and these spread over six years. [7] Certainly, this study must, and will, refer to the experiences of the Second World War but, in the main, they will not be *British* experiences and societal differences downgrade their relevance. In any case, Second World War bombing did not kill on a large scales: for example, although Hamburg lost 48 per cent of its dwellings and Frankfurt 33 per cent, the mortality rates were a mere 3/3 per cent 1 per cent respectively. As Ikle points out, 'Death tolls from conventional bombing were *not as high as the normal peace time rates*', [8] and despite the potential power of nuclear and thermonuclear weapons a similarly 'unsatisfactory' result might also prove to be the case (see concluding chapter).

Mortality not a Central Issue (p.201)

Therefore, whilst it is relatively easy to generate a most likely attack pattern, it is impossibly difficult, on present experience, to accurately determine what its effects will be in terms of fatalities, and the rough figures of the Civil Defence estimate, whilst (for these reasons) in all probability wrong, will be allowed to stand. In any case, as was concluded in Chapter 1, the ratio of survivors to deaths is not of primary importance in the determination of societal survival – a society may collapse with apparently superficial 'wounds'. What is more important are the targets attacked and the 'elements' of society which are consequently destroyed, be physical, economic, social, or psychological. The counting of bodies is, in many respects, peripheral; what matters is the overall societal 'shock' caused by attack, compared against the ability to adjust and develop in the new situation.

`Civil Defence' Effects (pp.201-202)

The Civil Defence paper makes some attempt to consider Britain in this way. The effects of its 180 MT attack are that, 'Many of the decentralised centres of government would have been destroyed . . . Communications will be seriously disrupted in many areas with roads and railways blocked and

telephone lines, exchanges and radio masts destroyed or otherwise put out of action.' There will be a dearth of 'intelligence about people . . . essential services and . . . all other resources vital to on crisis management . . . the flow of information will depend so much word-of-mouth contact … that it will often be unreliable', devastated areas cannot expect outside help, and 'food and energy will be very short in the most part of the country'. As regards the national psychology in the post attack environment, the report is pessimistic and implies that the population will be *more include to give up than to work for recovery*:' All these extremes of hardship, strain, discomfort and want will be hitting a battered, shocked and hungry people; people who have grown up in all the ease and comfort and benefit and orderliness of life in a modern advanced industrial society. 'For those areas of the nation that have not been directly attacked there will still be near-insurmountable problems, 'those of fall-out … a massive influx of refugees, of surviving without external supplies of food, energy, raw materials, finished products and other resources'. It concludes that, despite this, revival and reconstruction must begin immediately or areas 'will tend to go rapidly towards collapse … [and] if the attack leaves many survivors but destroys most of what is needed sustain life, competition among survivors could set off a cycle of deterioration … conflict … would lead to a misdirected and inefficient use of what was available'

Effects of Thermonuclear Weapons (pp.202-204)

The physical effects of the ground-burst nuclear and thermonuclear weapons referred to in Appendix C (those employed in the most likely attack) may be as shown in Table 7.1.

What is notable about these 'direct' effects is not any enormity of destructive power but rather their extremely limited and localised nature, except where down-wind contamination, fall-out, is concerned. In British cities few structures would be demolished by less than 5 overpressure, with the result that, for a 20 KT attack on Dover, property destruction would be confined within 34' mile of ground zero, Dover itself, and for a 5 MT attack on Birmingham or Edinburgh, with-in Smiles of, say, the city centre. Lesser effects, of partial demolition would extend to much wider areas but the lethal immediate radiation effects are equally or even more confined — to 3/4 mile and 2 miles respectively. Only where fall-out is concerned is there significant diffusion for example, that of the 5 MT detonation over 1,050 square miles) indicating that, except in the 188 target areas themselves, the 'national' problem will be to survive and to cope with the effects of radiation rather than the more publicised blast and heat elements. Only in the case of Greater London (5 x 5 MT salvo) will the effects be truly cataclysmic and, probably, unmanageable. Blast and heat effect can be magnified by multiplying warheads whilst decreasing their yield (for example, 10 x 1 MT MIR V in place of a single 5 MT device) but it has been concluded that this is unlikely in the case of Soviet attack, since these 'advanced' delivery systems are better reserved for war with the USA.

Table 7.1: Physical Effects of Nuclear Weapons

Year	Crater lip radius (in feet)	Blast range of overpressure (in miles)		Range of immediate radiation effects in roentgens [a] (Miles)		Likely downwind contamination of 100 roentgens per hour after 7 hour in square miles
		25 psi	5 psi	450 R	75 R	
20 KT	600	0.31	0.75	0.75	1.00	1.3
0.5 MT	1700	0.95	2.18	1.25	1.50	105.0
1 MT	2200	1.20	2.72	1.50	1.75	210.0
5 MT	3400	2.06	4.68	2.00	2.50	1050.0

Note: a: Where 450 R 50% survival probability (LD 50) and 75 R = no appreciable effects.
Source: Neville Brown, *Nuclear war* (Pall Mall Press, London, 1964), pp. 13-14

In many respects the immediate effects of the attack, where targets are concerned, may not greatly exceed those of the saturation b raids of the Second World War where, as has been stated, casualties were relatively low, except that (i) the total effect will be 'instant' rather than take place over a period of days or hours, (ii) 'whole' cities will be destroyed rather than portions, and (iii) total destruction in areas of 5 psi or more, together with effects of blast will mean minimal chance of survival for those in these locations, high level of radiation killing most who survive blast and heat.

This evidence again indicates that in terms of analysing British survival it is more important to consider targets and the removal of the social elements they represent than to count bodies: at the 167 MT level the UK %ill not be destroyed as an entity by the immediate effects alone The objective here, therefore, is consider the secondary effects of the attack whose essential elements are, once more, that it is (i) nuclear, (ii) relatively massive, (iii) nationally distributed, (iv) produces a great deal of radiation. (v) it comes as a 'surprise' (preparations have not been made or are not complete), and (vi) major cities are targets, as are also (vii) ports. power and fuel sources. To this end a temporal model is adopted where possible.

Warning Period (pp.204-207)

It is possible that `disintegration' may begin even before receipt of the Soviet strike. In that the attack will come largely as a surprise, so there will be only a brief period available in which to make personal adjustment to the advent of danger and to absorb and act upon the avalanche of government advice which it is planned to release in the period of mounting tension.[9] In contrast to other European

societies (especially the Swiss, Swedes and Soviets) the British population is uniquely un-prepared to meet the eventuality of nuclear war, its major education having been the civil defence handbook, Advising the householder on protection against nuclear attack (1 963), which had only limited sales and of which few copies now exist.

Instruction abruptly commenced before attack and truncated by the attack itself is unlikely to have much effect. Either 'the inconvenience of taking protective action will inhibit people from engaging in such action on a large scale', [10] or, worse still, the warning sirens themselves will be ignored, consequent on the imperceptibility of the impending danger. Without a period of mounting tension of some weeks duration and of steadily increasing threat, and especially for a case of an attack out-of-a-blue-sky, it is unlikely that the majority of the population will make the necessary life-saving precautions or heed warning, which must greatly increase fatalities, even if panic is thereby certainly avoided. Sirens sounded at Oakland (USA) in May 1955 and 'simultaneously all radio stations went off the air. No test had been announced … and the warning ought to have been interpreted as … legitimate [but] the people of Oakland on the whole went about their business and disregarded the signals.' [11] H.B. Williams observes on this issue of warnings which is not *crystal clear and expected* will be misinterpreted or not believed: 'people would rather believe they are safe than in danger'. [12] Where nuclear attack on the UK is concerned, it would be very difficult for British decision-makers to issue any warning that was *not* ambiguous (that is 'the attack *will* come at x hour', rather than 'there *may* be an attack in the next few days') and it must be assumed that, in the circumstances, a large proportion of the British population would fail to respond. As we noted, ES 2/1975 observes that 'a proper balance would need to be maintained between explaining what would be expected of if war should come, and reassuring the people of the Government's determination to continue its efforts to avert war on acceptable terms', [13] that is that it will not come. Williams concludes that, given the human factor, 'the burden of proof seems to be on the warning system', [14] yet it is unlikely to be sufficiently convincing in the British case, given both this evidence of prepared ambiguity and the experience of 1962, when, despite a growing public conviction that the Cuban missile crisis could end in war, no information programme was undertaken. It must be concluded that in 'the' event the education programme will be begun too late and the warnings will go unheeded.

Panic before Attack? (pp.205-207)

However, in certain circumstances, the very absence of such a programme might result in panic, most likely consequent on public realisation of the lack of effective protective measures in the period when attack begins to seem a real probability or on receipt of warnings. For example, no one is going to tell Londoners that they will not be evacuated, will not have rescue, medical or fire services (see below) and, generally, have the lowest survival probability in the UK but, sooner or later, their situation will become clear or, as ES 2/1975 puts it: 'In the pre-attack period some people would inevitably become

increasingly apprehensive at the prospect of war.' [15] Essentially three reactions are possible: (i) activity – measures of self-protection. Shelter-building, seeking mutual assistance and obedience to instruction, (ii) passivity – prayer or fatalistic inaction; and (iii) panic – riot, looting, rape and assault on officials. Ikle believes the third case to be least likely, observing that 'there is no evidence from … World 'War II bombings that widespread panic occurred anywhere', [16] and Charles Loomis has also taken this position:

'Even during … the worst disasters recorded, experiences of status roles held.' [17] (Policemen continued to act as policemen and bus drivers as bus drivers). The supreme British example is perhaps that of the ship's band on the *Titanic* where 'as the bow plunged deeper and the stem rose higher the strains of "Autumn" were buried in a jumble of falling musicians and instruments', [18] most to become part of the 1,502 fatalities. Nordlie takes the view that the first choice is the most likely – protective activity — observing that 'with the acceptance of the likely imminence of an attack, people would tend to act so as to provide protection for themselves and their families' [19] *provided* that: (a) warning had been received and believed; (b) they knew what to do; and (c) were able to locate family members whose discovery would be the priority task (cf. above). The 'eyewitness' of Nagasaki, Takashi Nagai, records that, despite US leaflets dropped with the message 'Back in April Nagasaki was all flowers; August in Nagasaki, there'll be flameshowers' and rumours of the atomic bomb at Hiroshima, yet there was no panic and no spontaneous evacuation, although the majority of the population tried to find excuses to spend as much time in the surrounding countryside as possible'. [20] Nevertheless, despite this evidence to the contrary, there remains the possibility of panic: at Nagasaki the population had achieved war orientation over a period of years and in this case the necessary factors of *believed* warning and education may well be absent. It is more probable that panic will *not* occur in the pre-attack period than that it will, but the issue must remain undecided. For one thing, the experience will be unprecedented and the unknown is much more likely to produce spectacular reaction. Thus in June 1915 when one Zeppelin raided Hull, killing 24 and injuring 40, , panic ' of a sort, did result. As Peter Laurie records, 'The extraordinary moment provoked an extra-ordinary reaction . . . rioting broke out. Shops with suspected German affiliations were sacked and order had to be restored by troops.' [21] Here the action itself was a side issue — later raids produced far higher casualties without civil disturbance --- compared with the shock of new experience and the sudden transition to war. The imminence of war after more than 35 years of peace in Britain might have similar effect. For the British population in, or just before, the Third World War the factor which seems most likely to result in disorder will be the realisation of the absence of preparations, most important and immediately visible of which will be the almost complete lack of shelters, the construction of which, even on a limited scale, has never been UK policy in the nuclear age. In such a situation of utter defencelessness and especially considering the consistent and uncorrected social opinion since 1945 that there is no protection against nuclear weapons, 'hopelessness' or some form of panic, riot or disorder may needlessly occur in the UK, even if it does not occur elsewhere.

Pre-Attack Spontaneous Evacuation (p.207)

However, even if – rather than panic – there were only large-scale spontaneous evacuation from the cities (and, given 'social factors', if it begins at all it will be contagious) the social consequences of such a mass migration would be serious. Vital sectors of the economy and communications would be left unmanned, city suburbs would be susceptible to firestorm (because the personnel necessary to put out small but numerous fires would be absent) and great strain would be placed on resources at refugee destinations besides putting population in the open immediately prior to attack. No preparations are known to exist to direct such spontaneous evacuation. Paradoxically, false alarm or a series of false alarms would be of advantage here: Ikle states, 'Under the threat of nuclear bombing, city dwellers might rush out of the city once, twice or even three times. But [if no attack materialised the deprivation and troubles of evacuation would soon appear worse than the potential danger.'[22] Spontaneous evacuation was not a problem in the UK in 1939, although in addition to the 11/2 minion official evacuees there were 2 million unofficial evacuees (which caused billeting problems for those that were official) since the process was incremental: even by February 1939 over 1,100,000 billets had already been privately reserved, but in this situation public realisation that flight was the only protection might well put half to two-thirds of the population of London (for example) on the road simultaneously – say 7 million people.

Attack in the Cities (pp.207-214)

With the arrival of the nuclear salvo all buildings in cities and other 0.20 miles for 1 MI) and most demolished within the 5 psi radius target areas can be expected demolished within the 25 p.si radius (2.72 miles for 1 MI). The fireball of a 1 MT bomb at ten seconds after detonation is 7,200 ft across (nearly 11/2 miles) and besides concluding the destruction of property within its area, can cause third-degree burns to unprotected individuals at a range of 13 miles from ground-zero [23] and has an ignition range for 'fire kindling' of 6 miles. [24] Burns will be responsible for the death of many survivors of other immediate effects, as at Nagasaki where Makoto Nagai records the exodus from the city as 'a parade of roast chickens'. [25] It is not likely that those injured in cities – from this or other causes – will receive adequate medical attention: as the White Paper on defence of 1956 admitted, under condition of nuclear attack the medical situation would be hopeless, openly stating, 'The casualties resulting from a nuclear attack on this country would be likely to surpass in numbers anything with which the ordinary hospital services, however expanded and diluted could expect to deal', [26] and placed emphasis instead on 'treatment in the home'. A 1977 Department of Health circular reaffirm this and concludes that, in the first forty-eight hours after attack the population could expect no medical care *whatsoever* since radiation levels would make the movement of rescue

and medical staff impossible. [27] In any case, most medical facilities are located in or near city centres and will themselves be demolished – with their staff, if they remain. At Nagasaki, 'over 80 percent of the hospital beds were completely destroyed', [28] and at Hamburg 66 per cent were lost compared with only 45 per cent of dwellings. With modern hospital design the rate of destruction should approach totality – glass-walled structures are extremely vulnerable to blast – and the few surviving hospitals will rapidly become hopelessly overcrowded and their condition present further dangers to the wounded. At the one remaining hospital in Nagasaki, after just a few hours, 'regular streams of filth were pouring down the stairs … [those] on the point of death … had no control over their functions … the whole place was one foul pool'. [29] It is probable that when medical services are resumed their principal function will be the practice of euthanasia rather than any attempt at cure – burns are difficult to treat in ordinary circumstances and in the presence of radiation sickness (for which there is no cure), impossible. [30]

Firestorm (pp.208-209)

The thermal effects of nuclear weapons noted above *may* also result in firestorm. As with medical services, it is not envisaged that even normal fire service will be available in cities nor that it will be supplemented as in 1939-45 by the Auxiliary Fire Service (AFS) (abolished in 1968 with Civil Defence). Home Office circular ES 5/1974 stated that

> following nuclear attack, fire fighting would be undertaken only when the return was judged to be worthwhile and where the survival of organized fire service resources would not be prejudiced. Planning should …. Be directed towards the preservation of the fire-service for its role in the longer survival period. [31]

There is the strong implication here that city fires will not be fought and that firestorm in and around city centres will be *allowed* to develop. Further, there is indication that fire services will actually be withdrawn from cities in the period of mounting tension: '50 percent of peacetime manpower and appliances would be withdrawn from certain cover stations and deployed … in order to improve … survival prospects', [32] which is, in one sense, rational but, in another, irrational since: (i) given the nature of British buildings, serious fires are only likely to develop in the 'fringe' areas, if small fires are left unattended; (ii) the fire service may as well be used early as late; and (iii) the sight of fire engines *leaving* cities before the attack must have severe psychological effects on the population and may start the panic and/or spontaneous evacuation that might otherwise be avoided, Despite the problems of operating in a radioactive environment (for which protective measures could be provided for the numbers involved in the fire service), the operation of even the normal fire service in the zone between the 6 p.si contour and the outer limit of thermal effect could preserve a great deal of property and supplies, whose replacement will be extremely costly, and which might prove to be the difference

between ‘having enough’ for recovery and not ‘having enough’. The Soviets certainly believe in the importance of fire-fighting at this stage and plans (including town planning) include high-priority measures to reduce to a minimum fire damage in nuclear war. [33]

Firestorm is not an *inevitable* consequence of nuclear attack: as Kahn states, no technical issue ‘has given rise to more palpable nonsense …. Those who predict metropolitan area-wide firestorms are in all probability wrong and are certainly speaking without evidence or thought.’ Firestorm is only likely in ‘heavily built-up downtown areas and especially dense forests’. [34] In the case of the most likely attack on the UK such a fire is *probable* in London, given the determined 5 x 5 MT salvo, but in the lesser attacks elsewhere it could probably be prevented, were precautions taken and the fire service to remain within effective range. The experience of the Second World War was that *it is extremely difficult to cause firestorm in alert and populated cities* (here equating with their fringes) and the case of Tokyo on the night of 9 March 1945 where 279 US Air Force B29s in ‘Operation Meetinghouse’ dropped incendiaries to result in more than 100,000 deaths after 'over 250,000 buildings had crumpled under flames which had reached an intensity of over 2,000 degrees' [35] was the exception rather than the rule. Tokyo had wooden houses and nothing so spectacular was ever achieved in Europe, even in the part-medieval cities of Germany.[36] In the UK, Europe, despite repeated German attempts to destroy London by fire (such as the night of 15 November 1940 when 1,142 canisters of incendiaries were dropped, and that of 8 December 1940 when 3,188 were delivered), there was a marked lack of success and only the raid of 29 December 1940 produced firestorm, the result not of a heavy attack (a mere 613 canisters) but of an absence of fire-watchers and fire-fighters (it being the Sunday in Christmas week)."[37] This light raid resulted in 1,500 fires: ‘many of these joined up to produce two huge conflagrations' [38] one of 1/4 square mile and one of 1/2 square mile with their junction at St Paul’s did not catch fire; it had its usual complement of fire-watchers. In nuclear war, given present policy, firestorm can be expected in the outer areas of targeted cities, with the result of further property loss, but this would be an unnecessary destruction when even the Second World War measure of stirrup pumps would be an effective defence, especially when coupled with contemporary fire protection and fighting methods.

Exodus from City Fringe (pp.210-211)

In the areas where the direct effects of nuclear detonations have not resulted instant death, but were fire threatens, panic and mass flight — which did occur at Tokyo and Hiroshima under similar circumstances — he reliably expected. Lethal radiation will be an imperceptible danger and local survivors are unlikely to pay heed to media instructions to ‘stay put', which may, in any case, never hear. A rapid and completely uncontrollable exodus from city and other target fringes can be expected, but although this will cause immediate social problems at destinations, these will not he distant given the conditions of the refugees, not will they, given irradiation, have any if: expectancy beyond the

period of days or at the most, a few weeks. At an exposure results in 12,000 R death result in thirty-six hours from the collapse of the central nervous system, at 1,900 R in nine days from the loss of lining of the intestine, and at 600 R death occurs when the blood-forming system, in the bone marrow gives out after about twenty-six days. [39] In the absence of medical facilities and with exposure to bad weather consequent on time of year, effectively none of these refugees from the city suburbs will survive in the long term and their only further importance in the issue of national survival lies in the loss of their skills, the disposal of their bodies and the psychological diffusion of attack experience that their migration will have caused (see below).

Survivor Reaction (p.211)

The reaction to the 'bombing' of long-term survivors is more relevant to the issue of national survival. Unlike soldiers, civilians are not trained order, and the detail of government instruction in the situation may not be heeded. 'Individuals', states Ikle, 'evaluate deprivations … within the framework of their own experience or the experience of their friends.' [40] As noted, the issue of the reaction of survivors to irrelevant since, even having escaped all effects of blast, flash and firestorm, city-dwellers and those in proximity to other targets will find themselves in areas of lethal radiation where there will be no real choice be remaining to shelter under what cover is left, or of flight to the less radioactive peripheries, hut of necessity with near-certain fatal exposure en route. *Our concern here is the reaction of individuals and communities who have had direct experience of the attack but at a 'safe' distance* — say five miles from ground zero for the 1 MT detonations and of those located beyond perception of immediate effects.

In the first case the danger will have been directly perceived and will thus he 'real'. Again, there is little historical evidence to show that, at least beyond the outer limits of fire zones, riot and/or flight are certain to result and that the social structure will rapidly disintegrate, in direct contradiction to the now much-shown film by Peter Watkins, *The War Game*. Panic -- defined as 'individual or collective behaviour that is contrary to the interests and safety of the individuals or society'[41] -- was not generally evident amongst survivors of large-scale Second World War bombings as at I Hiroshima, Nagasaki, Hamburg, Frankfurt and Tokyo. Culture and habit are sufficient inhibitors even under great stress and, whilst physical chaos may offer opportunities for looting, law-abiding citizens do not suddenly become frenzied criminals. In the immediate post-attack period to other activities take precedence and although the preservation of personal possessions must be some influence, the acquisition of more is unlikely to be an attractive option in a situation where, literally, it will profit a man nothing to gain the whole world, but lose his life. [42]

Individual Reaction – 'Freezing' (p.211-212)

On the wider issue of overall reaction, existing opinion is divided; as deKadt states,

> some accounts present the survivors terror-stricken, fleeing in panic from the scene of destruction. Others assume an almost super-human capacity to take the blow, to ignore its most shattering consequences and to proceed with the carrying out of the pre-planned instructions of survival specialists. [43]

Reality is the generalisations cannot be made in this area – reaction will differ between individuals, with location and with stage of disaster. Charles Loomis in Social Systems is most Probably correct in stating that the most likely immediate reaction is complete inactivity, but with a purpose, in that 'the initial shock or "freezing" is often a period of adjustment and orientation to the suddenly new situation'. [44] Inactivity' here has social 'purpose' and is to long-term benefit (see below). The apparent despair is not permanent, and 'over half of in the bombed cities of Germany [here equating to those on the peripheries] experienced intense fear without a lowering of their morale ' [45] So, too, feelings of resentment and aggression — even towards the enemy — may be entirely lacking. Nevertheless, 'when a disaster strikes a community the most immediate social effect is the disruption of established community-wide behaviour patterns and a fragmentation of social activity '. [46] The problem is that the recovery of these important pat-terns and activities is almost invariably assured by the arrival of help from outside, which cannot be the case in a widely devastated UK.

deKadt states that, in the face of direct danger individual reaction is, predominantly, to have first concern for personal safety and then for that of 'immediate intimates', followed by retreat 'to a small private world of direct personal contact', from the 'familiar world [that] has completely collapsed'. [47] However, this behaviour pattern --including the 'freezing' effect noted by Loomis — is usually terminated by the arrival of help and only then does social solidarity begin to recover and reconstruction begin. With the inevitable absence of external assistance for the devastated areas after nuclear attack on Britain, this pattern may therefore persist to the detriment of long-term survival prospects.

At Hiroshima, comments Robert Lifton in his paper, 'Psychological Effects of the Atomic Bomb', 'The most striking psychological feature was [the] sense of a sudden and absolute shift from normal existence to an overwhelming encounter with death.' [48] First reaction was to search for information and explanation; to note, for example, 'young girls, not only with their clothes torn off but with their skin peeled off as well' (survivor report), but this was replaced *within minutes* by 'psychic closing off' – Loomis's 'freezing'. At Hiroshima this lasted 'sometimes for a few hours … sometimes for days or even months and merged into longer term feeling of depression or despair', [49] terminated

for most by the arrival of help but generally precluding detailed memory of the experience. 'Most survivors', states Lifton, 'focus upon an incident, one sight or one particular *ultimate horror* with which they strongly identify themselves.' [50] By definition, there can be no 'personal' experience for the long-term survivors in the UK, with which but these individuals may have seen the condition of city-suburb refugees and this will have similar effect, whilst the absence of effective civil defence, rescue and emergency medical service, to represent the arrival of help from 'outside', will make the disaster appear to be (as it will be) totally enveloping and essentially unending. This may prove decisive: Lester Grinspoon observes, 'The utter impotence which many survivors would feel under such circumstances may be compared with the helplessness of an abandoned infant … [this] is extremely threatening to the average adult', and although enormous hardship is endurable if it is limited or temporary, 'after a nuclear catastrophe there would in reality be no conceivable end to the kinds of suffering that survivors would have to endure'. The result would be 'overwhelming to many egos'. [51] For these survivors, fear begins the ordeal and suffering increases with time.

Distant Survivors (pp.213-214)

For those distant from the centres of devastation the impact of the catastrophe will be both reduced and delayed. Whilst they may lack exact information as to the situation in other areas, they will probably know that attack has taken place, although not where, to what extent and how much it 'hurt'. The basic preoccupation of these individuals will be that they may be the enemy's next victims. Radio is unlikely to be broadcasting details (since it probably will not have the information) and will be giving the single, repeated, firm instruction to 'stay put whatever' and to build shelters. This advice will probably now be taken, since (i) the danger will appear real, and (ii) there will be nowhere else to go and no incentive to go there. As Ikle observes on planned evacuations), •the real incentive to move is the destruction of one's home (or, one can add, real and immediate danger — such as the approach of fire), but if the home is intact the instinct is to stay in it. may conclude that those of the surviving population who are distant from targets will remain in their homes, will transform these as well as they can into shelters and will thereby greatly increase their overall chances of survival. These communities will remain intact, because there is no particular reason why they should not.

Mid-term UK Post Attack Environment (pp.214-224)

At the commencement of mid-term for the post-attack environment (say one month after attack), the immediate effects of the attack will have passed: the fires will be out. There will be approximately 180 centres of destruction in the UK which may, to all intents and purposes, no longer exist in the minds of the survivors. The cities of London. Birmingham, Edinburgh, Leeds-Bradford, Glasgow, Liverpool, Manchester, Newcastle-on-Tyne, Cardiff and Swansea will be in varying degrees of destruction and their facilities, together with those of many other towns (industrially targeted) and

major ports, lost to the survivors (see Appendices). There can be no attempt at the resuscitation of these centres at this stage.

Radiation and Fall-out (pp.214-215)

There will still be areas of lethal radiation: as ES 10/1974 observes, `there would be extensive and overlapping areas of heavy fallout in which the early radiation intensity . . . might be of the order of thousands rather than hundreds of roentgens per hour [52] (the lethal range beginning at about 225 R with 'LD 50' at 450 R — see above). At one month after attack certainly there is no prospect of sustained external activity in most areas and the situation will remain one of shelter or die, but radiation levels will fall progressively and by six months after attack are unlikely to present much impediment to activity. Even by one month after attack fall-out distribution from UK targets would be essentially complete but, although much would have been carried out to the North Sea and beyond by prevailing westerly winds, the residue would be a virulent ground hazard whilst the same westerly winds might be depositing further fall-out from other areas of conflict such as the USA). Cmnd 9780 records that dust clouds from Nevada tests passed directly over the UK on first or second circuit, usually at 5 and 35 days after the explosion: if central conflict between USA and USSR is delayed relative to the European war, then the UK's period under-wraps may well be extended by this second source of fall-out and by that of USSR origins) which, given the megatonnage likely to be employed and despite 'decay' in transit, is likely to be significant. In general, the longer the period of high radiation in the UK the more acute will become all problems of survival. Even government nuclear war establishments have a very limited sealed-up endurance: UKWMO (Royal Observer Corps) posts have only a two-week supply of provisions and water.

In these circumstances it seems inevitable that *the majority of the population will suffer to some extent from radiation sickness*. Although, for those who follow government advice and build fall-out shelters in their homes, the protective factor of these provisions will greatly decrease the dose, it is nevertheless unlikely that they will have the physical resources or the personal determination to remain in them for more than two weeks and, even if they do, shelter existence brings its own problems (see below).

Effects of Human Irradiation (pp.215-216)

Most will suffer all or some of the symptoms of radiation sickness which, as experienced at Hiroshima and Nagasaki (where fall-out was negligible), were:

1. 'a sensation of nausea developing suddenly', [53]

2. followed by vomiting and diarrhea,
3. in most cases marked recovery after 2 to 3 days;
4. but, in some individuals sickness persists and increases in intensity until 'exhaustion, fever and perhaps deliruim follow and death may occur a week or so after exposure'. [54]
5. For those who recover there is a second phase at 2-4 weeks, a situation of 'gradually increasing malaise', partial or complete loss of hair, small haemorrhages in the skin, a tendency to bruise easily and to bleed from the gums, ulcerations in the mouth and a renewal of diarrhea.
6. Worse, feeding by mouth becomes impossible, whilst healing wounds break down and become infected.
7. Overall, there is a decrease in the number of white blood cells which impairs 'the ability to combat infection . . . infections of all kinds were rife' [55] at Hiroshima and Nagasaki.
8. For those who do not die at this stage recovery is extremely slow and at a 500 R dose level at least half those affected die in the *long' term; at lower exposures fewer symptoms (and of less severity) develop, much depending on the individual concerned. ES 10/1974 notes on accumulated dose that, up to 220 R there is 'no mental or physical deterioration' ; between 220-320 individuals suffer radiation sickness but not death, between 320-420 deaths rise to 50 per cent and between 420-520 deaths approach 100 per cent. However, it concluded that 'It should not be inferred from [this] ... that 220 R could be safely accumulated in any period of time however short.' 220 R is a 'safe' dose only when accumulated over several days. [56]

Shelter Existence (pp.216-217)

It would be very difficult for those in shelter to remain there for long periods [57] and it will be proved equally difficult to instruct the shelterers when it is safe to emerge. Plans envisage the issue of instructions by radio broadcast but conditions will vary greatly even over comparatively short distances and there is only a small stock of detection equipment. ES 12/1974 admits that 'supplies of radiac instruments are limited and have been allocated to regional police commanders for issue as necessary ... Radiac instruments are expensive.' [58] Grinspoon observes on shelter existence that, whilst the body may be protected, the mind is under great stress. First, radiation is an unreal danger (since it is imperceptible) and there will appear to be no very good reason for enduring the hardships of confinement. Second, the 'real or fantasied threat of outsiders breaking into the shelter' [59] will demand a constant alertness in case of need to defend. Third, there is the probability of sickness — either from radiation; from general lowering of resistance to infection (see above), and/or possibly from follow-up use of chemical / /biological warfare agents (see Chapter 5). Even in adequate shelter, 'the likelihood of physical sickness in such a situation is quite high', [60] and its threat will be particularly felt when there is no possibility of medical aid. Fourth, shelter inhabitants will be prey to vague imaginings about the outside world; and fifth, adding to Grinspoon's list, there will exist for

the British a constant anxiety that available food and water stocks will be exhausted before the all-clear is declared.

Shelter inhabitants will be shocked, hungry and thirsty. They will be cramped together in dark, airless pockets within their homes. As time progresses they will be increasingly surrounded by the evidence of their confinement and the prevalence of diarrhea and vomiting as normal low-level symptoms of radiation sickness will demand mental and social adaptation that may well be beyond the capabilities of many individuals. Grinspoon observes that the psychological effects of this confinement must certainly be serious (especially when taken in conjunction with other psychological problems of the survivors -- see below) and states, 'people seem to take it for granted that if they can preserve their bodies intact their psyches will also remain undamaged'. [61]

Nevertheless, some shelter will be better than none -- for all its problems — (when the alternative is death) and it is relatively easy to construct some shelter against fall-out — providing it is done in time and individual 'freezing' permitting. Neville Brown in Nuclear War states 'even and uncovered foxhole can provide much protection ... A foxhole 3ft wide and 4ft deep may offer protection factor [62] of 40 ... [and] a 1,500 square foot brick bungalow ... a protection factor of three to somebody on the ground floor and of 16 if they were in the basement'. [63] Thus, even the unprepared bungalow ground-floor means exposure to only (1/2^3). 1/8 of the radiation outside. However, physical protection is but a part of the problem of individual survival and government statement on sheltering tend to over-optimism. Jerome Frank, in Sanity and Survival, admits that 'Conditions of life would be so unprecedented that no one can be sure how the shelter dwellers would fare. [64] Our only experience in the matter is that of Second World War bombing when shelter was for very limited periods and, 'no real life or experimental situation has ever remotely resembled this combination of stresses . . . Shelter living would open a Pandora's box of psychological stress.' [65] The worst aspect, beyond physical discomfort, would be a lack of knowledge as to how long the confinement need last, perhaps developing into an obsessional preoccupation with listening for the all-clear signal — if it is known ('a steady note on the sirens, or if no power were available, by other means' [66]). Home Office statements admit that confinement beyond two weeks will be very difficult for most, and ES 10/1974 observes that 'it is no part of the release procedures ... to force people to remain under cover or to regard them as law breakers if they emerge contrary to . . . controller's advice'. [67] In this, as in so many other respects, life in the post-attack environment has very much a character of 'every man for himself'.

Food and Water (pp.217-218)

Between the first and second month after attack the resupply of food and particularly water will become apriority for most survivors. Even for those who have taken government •advice — to build

'an emergency reserve of tinned or other non-perishable food needing little or no preparation to last the whole household and possibly one or two extra People, *for at least fourteen days,*' [68] and to fill all available containers with water before attack — there will come a time when supplies are exhausted. The indications are that a shelter confinement of more than one month will be necessary. If this is so then it is extremely improbable that mains water supply will have been restored, since those concerned will also need to be in shelter, even if the residual power supply after the destruction of most major power stations and at least parts of the national grid is sufficient to the needs of water pumping stations. At Hiroshima water supply was cut by 30 per cent and took *five months* to restore to normal, even with outside help. Ikle observes that 'a prolonged lack of water would render habitation of a city or an urban district impossible. Such a calamity did not occur in any city bombed during World War II.' [69] In this case restoration will be a vital necessity. Plans for emergency supply may exist, but given the problems involved, it has to be concluded that water will present a major problem for the survivors, who are likely to be forced by thirst from their shelters and will further suffer by drinking contaminated external supplies (see later). Even at an absolute minimum of 2 pints per head per day, water stored in the home is unlikely to prove sufficient for more than one month, at the outside.

Food Stocks (pp.218-220)

The provision of food after attack will be the responsibility of local authorities. The bodies were charged under the Civil Defence (Planning) Regulations of 1974 with 'Providing and maintaining a service in their area for the distribution, conservation and control of food including emergency feeding services and equipment', [70] although central or regional government retained responsibility for the overall supply and production of food. However, it is unlikely that more than outline plans have been prepared, given the low priority afforded to civil defence in the national consciousness, or that provisions are adequate to feeding the whole population of an area one or two months after the attack. There are some stockpiles of food maintained by the Ministry of Agriculture and Fishery for use in war, 'such basic items as flour, sugar, margarine, yeast and special biscuits' [71] but, on Home Office admission: (i) 'They do not constitute a balanced diet', and (ii) 'the quantities are insufficient to meet the needs of the surviving population over a protracted period'.

The purpose of this stockpile, states ES 4/1974, is to 'augment ... such food as would remain in domestic and commercial hands after an attack or developed from the surviving agricultural resources'. [72] This Horne Office circular declares that sufficient cooking equipment has been stockpiled, capable of supplying one subsistence-level meal per do to 20 million survivors, but although (if true) this appears realistic, the equipment is not nationally distributed (see below) and it is difficult to see how 20 million meals will be prepared and issued to survivors under tall-out

conditions. *Again, preparations to meet the eventuality depend on a lengthy and well-defined period of mounting tension* ES 4/1974 states, 'Before the outbreak of hostilities most of this equipment would be made available to County Councils'[73] and goes on, the immediate *post-attack* objective must be 'to salvage and mobilise food on the farms as a direct contribution to survival during the period following a nuclear attacks'. [74] It has to be concluded, since a period of mounting tension of the type envisaged is most unlikely, that (a) the cooking equipment will not be distributed, (b) the emergency supplies will be all there is, and (c) that without a Civil Defence Corps there will be no one to do the cooking and distributing. Existing plans envisage that cooking would be undertaken by the ladies of the school-meals service, but in the event these otherwise reliable citizens might prove difficult to locate and recruit. They are more likely to be concerned with the needs of their own families.

Consequently, some experience of starvation must be expected after domestic stocks (including those held in local shops) have been consumed, even excluding the long-term factors (considered below). The sheer scale of such an operation is likely to defeat it and, as with so many features of nuclear war, will be unprecedented. In the Second World War approximately 200,000 were fed by mobile kitchens after the first raid on Hamburg (the city had adequate stockpiles around its perimeter) but at Kobe the stockpiles were destroyed in the raid and survivors had to be evacuated. In the only relevant British case of Coventry (1940), gas, electricity and water supplies were all interrupted and the town could be fed only by bringing in supplies from Birmingham and Stoke-on-Trent. This also proved necessary at Nagasaki where *on the day of the explosion* 25,000 lunches were issued by these means whilst on the following 67,000 were on 'full-board'. However, whilst as Ikle states, 'this represents a remarkable feat of organisation that illustrates the great possibilities of mass feeding,' [75] it cannot be extrapolated to the British mid-term post-attack environment. First, radiation would make the necessary prolonged outdoor activity impossible. Second, feeding 20 million (the estimate in this study is actually 30 million or more survivors at one month after the attack) is a greatly different task from that of feeding 200,000. Third, there could be no importation from unaffected areas since those in need of feeding *will be in* the 'unaffected' areas. [76] Against this can only be set the factor that the British are normally well-fed and could display higher 'elasticity' of consumption than some other societies. Biologically, 'for a few days or week, the daily per capita consumption can fall substantially below the normal level without serious effects',[77] but the time period may be prolonged and neither accumulated fat nor local stockpiles last forever. Shelter rather than food is the first priority after nuclear attack, but shelter without food and water is not enough in the longer term.

Three Months after Attack (pp.220-224)

Once radiation levels begin to fall and daily emergence from shelter becomes possible (8 hours per day) — say, at between 60 and 90 days and dangers. Besides their need to locate, or to provide after attack -- the reduced numbers of survivors will face new problems provide, the basic necessities of

existence, as noted above, activities of social consolidation and/or reconstruction must be commenced.
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Disposal of the Dead (pp.220-221)

An immediate task will be the disposal of the dead. These will approach 20 million by this time (the injured having joined the victims of immediate effects), including many fatalities from radiation exposure, and although a large percentage of these fatalities will be in the abandoned city areas, there will still be great numbers in areas not directly targeted. It is again the responsibility of local authorities to dispose of the dead (ES 1/1974 'Civil Defence Act 1948' revisions) but there is no indication as to how this is to be carried out, the 1949 use of the word 'burial' having disappeared. Since it is proposed in this study that attack will take place in the winter months (see Chapter 5) then decomposition will not be as great a problem as it was for the Japanese in August 1945, [78] yet the susceptibility of survivors to infection and disease will make the disposal of corpses an urgent task. At Hamburg, 'some 30,000 bodies . . . were burned in a mass grave prepared in the municipal cemetery with construction machines',79 but it is unlikely that such organisation could be achieved nationally in the UK three months after attack. Several million corpses would require a lengthy period of disposal, particularly when the task would have to be carried out by the survivors, themselves weakened from the attack and its secondary effects. Even in winter there would still be some insect problem since these, of all animals, have an enormously high resistance to radiation and can be expected to multiply given the absence of mammal predators (see later). Furthermore, there would be understandable resistance to touching these dead. At Nagasaki mass cremation was ordered, and whilst the soldiers given the task appeared to suffer minimal psychological damage from the experience, yet those that were not involved and came across the burning accidentally had different reactions. One soldier 'suddenly became extremely frightened, fell, down on the ground and was unable to move'.[80] In the UK there will be no available outside help nor large bodies of troops, and all 'able-bodied' survivors will probably be required to assist. Despite the social advantages involved in this 'total' participation, normal and important social rites for the disposal of the dead (such as religious burial) will be absent and may result in the destruction of this social institution, the results of which are impossible to predict.

Disease (pp.221-222)

Even in the absence of this problem of 'decomposition', disease is probable on a large scale. Given the weakening of survivors by irradiation (when 'death may occur suddenly from an infection which in a ' healthy person would have only trivial results'), [81] the lack of food, the permanent state of tension, the increase in insect population (for example, fleas) and poor sanitation, then epidemics are extremely likely. In the continued absence of normal medical services there will be nothing to prevent the spread of disease at a time when the survivors will need to be working in close contact, even

without possible chemical / biological weapons as a follow-up by the USSR. Whether or not the UK has managed to remain a viable society up to this point, the issue of disease and epidemic may well terminate the struggle for national survival. Cmnd 7335, Medical Research in War, observed that 'out-breaks of infective disease have always been a special menace in war and, indeed, up to the time of the opening of the present century they had often been *a decisive factor*.' [82] Although after 1900 they were reduced, given the unprecedented conditions of this war, such out-breaks of disease are likely to be decisive once more. Aside from artificially introduced epidemics, the most probable causes of death will be as follows.

1. Tetanus — infection of wounds.
2. Typhus — spread by lice consequent on poor sanitation.
3. Hepatitis (epidemic jaundice), --which was widespread in the UK in 1944-5 and for which the only known method of control is extreme hygiene.
4. Tuberculosis, which in the Second World War resulted in greatly increased mortality in the UK, particularly among children.

These and other infections will most probably be spread by three agents: louse infestation (severe in the 1914-18 war), bed bugs (a problem of Second World War shelter existence), and by cross-infection of wounds, the simple touching of wounds by unsterilised human hands in makeshift hospitals. The known solutions, *which will not be available three months after attack,* are ultra-hygiene and the liberal use of insecticides. It is also entirely possible that 'more serious' epidemics will develop, not excluding plague spread by rats, whose existence in sewers (and beneath London in the 'Underground') will not be greatly disturbed by the attack itself but who will be offered an ample food source and ideal conditions in its aftermath. A report in 'the Guardian of 20 October 1976 stated that 'the entire Leicester Square area is infested with rodents. They are particularly fond of the Piccadilly Tube line, probably because of its warmth', whilst many buildings in this area are infested with mice. All over the UK sewers are populated with rats, whose droppings are the source of a form of viral jaundice and only lack of contact with humans prevents its spread. In the post-attack environment rats must be expected to become a major feature of existence, even outside cities. As ever, the ecological chain will do its best to restore the balance of nature and an increase in those scavenger populations resistant to, or protected from, radiation is inevitable.

Government in the Post-Attack Environment (pp.222-223)

Such environmental adaptation will not necessarily be to human advantage. An ever-tenuous control will be temporarily lost and only the efforts of the survivors can recover it. Whether or not they will make the necessary effort will depend on the efficacy of leadership and the psychological condition of the survivors. It was the conclusion of Chapter 5 that centres of command and control, including

government, will be targets in the Soviet attack and the substitute regional seats of government may also have succumbed in considerable numbers from a variety of the secondary effects noted above. Ikle has noted that disorganisation is itself destruction, and expects that 'disorganisation would spread over the undestroyed remainder of the country', [83] unless meticulous plans for control are made in advance. Government is a complex of 'very intricate processes even under normal peacetime conditions'[84] and in the post-attack environment it is more probable to collapse than to succeeds The Home Office has admitted the difficulties and in ES 7/1973 warned that 'post attack decisions … should not be compared with the more deliberate and often prolonged, peacetime planning and .decision-taking processes of government plans would be crude and simple. The urgent decisions of the County Controller would be arbitrary and, to some people, would appear harsh and inequitable,' [85] Although Ikle states that the experiences of the Second World War indicate public obedience to authority (where 'Habits, discipline the fear of punishment and the lack of alternative courses of action left the behavior of the civilian population unaffected', [86] this situation will be different. Although the public might demonstrate 'sheer inertia' (of some assistance in establishing order) they might also, given their' experiences since the day of attack, refuse to recognise the authority of regional controllers and their staff, who would have a dubious public legitimacy and who are not provided by plans with any form of coercion -- the troops will be absent and the only remaining disciplined and uninformed body --the police -- are not under their command. In recent years the duties of the police force relative to the nuclear-war situation have been gradually but steadily increased (for example, ES 12/1974 refers to 'increased responsibilities which would fall to the police in crisis and in war' secn 2) and it is probable that in the event they would — for the entirely natural reasons of public recognition, organisation and training — actually take over control, if control proves possible by any group. Whether this control would be surrendered at a later date is questionable: those who have acquired power do not willingly give it up.

Psychology of Population in Mid-term (pp.223-224)

The state of the public psyche in the mid-term post-attack environment is more difficult to determine. It is here that the enormity of the experience may have most effect and it is here that available evidence from past disasters can give minimal guide. This will be a most extraordinary human experience: the living will need to coexist with the dead and the dying, for week after week, with no visible prospect of change. Death will have become a fact of life; it will be the totality of recent experience from 'its turbulent onset at the moment the bomb fell, its shocking re-appearance in association with delayed radiation effects, and its prolonged expression in the group identity ... it is an interminable encounter. There is psychologically speaking, no end point, no resolution.' [87] Moreover, after periods of prolonged isolation in shelter, when individuals and families have been 'completely dependent upon their own resources and their own spontaneous modes of coping with the highly unusual situation' [88], the sick and hungry survivors will now need to co-operate and *organise*

an essentially new society without the resources they possessed before. For many, this mid-term after emergence from shelter will be the opportunity to realise the extent of the disaster and there may develop `fear complex', resulting in sleeplessness, headaches, nightmares, bed-wetting, depression and lethargy.

Kahn believes that the psychological effects have been exaggerated; 'for most people', he states, 'deep grief is alleviated by time … people go on living after tragedies . . . life does go on'. [89] But, as Lifton states, this would not be after tragedy but within it, its end totally imperceptible, and Frank, in *Sanity and Survival*, observes that *during* the Black Death of the fourteenth century there was 'general demoralization and social breakdown, a mood of misery, depression and anxiety'. [90] In any disaster, continues Frank, the degree of social dereliction is in direct relationship with 'the more rapid the disastrous force, the shorter the period of forewarning, the less familiar and less clearly perceived thee disaster agent, and the greater its physical destructiveness and duration'. [91] At Hiroshima and Nagasaki there were severe social effects even though outside help was received and the crisis relatively brief: those who survived became the 'Hibakusha' (meaning 'survivors') who could no longer relate to normal existence — they suffered guilt at having survived and for all those directly involved there was loss of psychological 'anchoring points' — the physical environment and customary lifestyles. Frank concludes that, in a nuclear war, even those who had escaped all physical injury would be 'emotionally ... ill-equipped to cope with the unpredictable stresses of the anarchic post war environment', [92] and hence unlikely to do so effectively. Ikle observes that there is evidence to show both great efforts at rescue/ reconstruction activity and complete apathy in the aftermath of bombing. It is impossible to conclude which will be the case in the UK. What seems to be crucial is the presence or absence of leadership but, given the extreme hardships to which the total population will have been exposed, it is unlikely that leadership of the required quality will be produced by the community in sufficient numbers. It is there-fore more likely that a dangerous apathy will prevail in the mid-term.

Long-term Effects (pp. 224-231)

Agriculture (pp.224-225)

If the UK has not begun effective reconstruction by six months after the attack then it is unlikely that it will ever do so and will consequently fail to survive. By six months stocks of food will be practically exhausted, and although there will be fewer mouths to feed, production of new supplies must be begun. In the Second World War, survivors of bombing could afford to take their time — given outside assistance —but this will not be the case for the UK. At Nagasaki production had not fully recovered even *four years* after the event and remained largely on the individual basis: the social fragmentation caused by the attack had not yet repaired. A winter attack on the UK will hold the possibility of following summer in which to restore food stocks but only if seeds can be planted at the right time

and in sufficient quantity -- otherwise a certain starvation will further decimate survivors in the next winter. In Hanunian's study of the USA, post-attack state of the farm sector that constitutes the greatest threat to national viability'. [93] Whilst the capital equipment of farming is dispersed and thus reasonably protected, agriculture will be deprived both of most of the inputs required for modern farming techniques and its customary controlled outlets. In the UK, the highly mechanised and 'scientific' nature of farm production will be disadvantage for the first time-- there will be, for example, only limited fuel for tractors and a new-found need for vast amounts of labour. Most livestock can be expected to be destroyed a similar LD 50 to man) and a major difficulty in the UK will (having be that, given high national levels of radiation and fall-out, much land be unusable or, as Hanunian puts it, 'its utility would . . . be impaired for substantial periods of time by the presence of radioactive contaminants'. [94] These would certainly still present a danger to farm workers at six months after the attack and result in a high strontium 90 content in food. The decontamination of land is an impossible task on a national scale since it requires an enormous amount of man power and many special tools, such as measuring instruments, bulldozers and water hosing equipment'. [95] When a US Air Force B52 armed with 2 H-bombs crashed at Palomares, Spain in January 1966, scattering radioactive material from a broken bomb over a wide area, the only solution that could be found was to put all the top soil into steel barrels and dump it in the sea. [96] It will clearly be necessary to either consume contaminated food at some stage or not eat fresh vegetables at all with the result of 'scurvy').

Contaminated Food (pp.225-227)

Whilst we have minimal experience of the consequences of contaminated food they must be considerable, although certainly delayed — Lowry stated,

> we cannot so easily dismiss the consequences of chronic irradiation for a population whose habitat has been blanketed by fallout particles, including many radionuclides with long lives ... the entire ecosystem is implicated, for such radionuclides enter food chains of which man is a member and certain ones accumulate in tissues … our population would face the hazard to internal emitters. [97]

Thus radiation-induced disease may actually *increase* over time and it will be a paradox of the post-attack environment that, as the danger from deposited radiation declines, the dangers from ingested radiation will increase. Neville Brown, in *Nuclear War,* states that if the product of a 6000 MT attack on the USA were nationally distributed there would be enough strontium 90 in the soil to 'contaminate with 30,000 units anybody regularly eating the produce thereof … 67 units is the maximum permissible dosage … somewhere above 10,000 units incidence of bone cancer increase perceptibly.' [98] Other long-term effects include atrophy and fibrosis of the skin, sudden breakdown of cartilage

and bone, leukemia and sterility. Leukemia may develop six to nine years after exposure whilst cancer 'incubation' may take up to twenty years.

However, this assumes that the survivors *will* be able to eat 'regularly' and may not prove the case. The Home Office anticipates that food 'control' will be necessary, and after emergency feeding is concluded, it commence its programme by salvaging possible food on farms, though it is not made clear who will do the salvaging or how soon after attack. The attitude of farmers may not assist this operation: it will be difficult to persuade them to salvage and to plant for next year when next year may 'never' come. Fanners did not co-operate at Nagasaki, where there were direct effects on yield, and in the year after attack 'nearly all crops dropped sharply; in sub-surface crops, like sweet potatoes, there was almost no yield at all.' [99] It is certain that there will be severe shortages. Overseas supplies will be abruptly cut off by the destruction of ports, whilst shipments at sea will turn around, their crews and owners neither wishing to become involved in nuclear war nor to deliver to an island where payment is most unlikely. Fresh produce will be at a premium, probably throughout the whole northern hemisphere. The UK cannot expect much in the way of external supplies tier at least a year and probably longer ---`never' if it is occupied by the USSR. Second World War food supply did not present a problem and `the diet of the nation as a whole was not only maintained at an adequate level ... but was planned more logically, distributed more equitably and contained a higher proportion of certain health-producing food substances than ever before.' [100] However, in 1939-45 there was time: the cut-off of outside supplies was gradual, never total, and home production could be steadily accelerated. In 1939 8.8 million acres (of 31 million total) were under crops but by 1994 this had risen to 14.8 million, whilst between these years production of wheat, barley and potatoes doubled and overall, 'the net output of human food … increased by at least 70 percent.' [101] In this nuclear war there would be no such period available for adjustment – the UK would be on its own *immediately and completely,* whilst efforts of the 1939-45 variety would simply not be possible in any reasonable time period. Under probable conditions it might take as long as twenty years to achieve the necessary degree of self-sufficiency and by that time, of course, it would be too late.

Food production, as we have noted, is the responsibility of the Ministry of Agriculture and Fishery which intends to solve the problem by controlling the movement of livestock and produce; securing maximum food production 'by giving advice'; and by distributing seed and fertilizer, 'etc.' Policy is 'in the longer term – to maximise essential food production in the recovery period', (how? by whom? with what? and where?) and by re-orientation 'towards subsistence agriculture, growing more food crops, particularly cereals.' [102] The intention is that the UK will become a vegetarian society.

Food as Incentive (pp.227-228

It is probable that by six months after the attack the supply of food will have become a major national

preoccupation. Indeed, it may become the very means of government and the incentive to reconstruction activity: food, rather than money, will.be the payment for effort. Its availability was 'an important factor in the remarkable recuperation of Hamburg,' [103] and its absence in the Japan of 1944-5 was a major cause of the collapse of the war effort. Food distribution policy will need to be harsh by peacetime standards: Lowry stated that,

> survivors . . . in their productive years [15 to 65] … would cleanly be the most valuable segment of the post-attack population. They would have to be kept in good health and encouraged to produce their utmost … providing them with bare subsistence … might not be enough to motivate them ... the labour force would be in a strong position to exact preferential treatment. [104]

In a situation of shortage, and given the problems still facing Britain at six months after attack, unproductive members of society -- for example, the old, the infirm and the insane — cannot expect to eat very much, if at all. At such a time they will represent an intolerable burden.

Housing (p.228)

But there will be, at least, enough houses, and homelessness is not likely to be a problem. Since no plans exist for pre-attack evacuation those whose homes had been demolished would have been inside or nearby at the time and, given the multiple effects of nuclear weapons, would at stand minimal chance of survival. Moving away from each ground-zero the incidence of demolition rapidly decreases, but radiation and fall-out would still claim victims. Most of those who had spontaneously evacuated target areas would have done so too late and have been caught in open country, and those few who survived all effects should represent no particular difficulty for re-housing. It is even possible that taking into account all the further causes of death considered above, there will be a housing surplus in the U.K six months after attack. It will be to the advantage of national survival that repair works can be concentrated in the productive sectors of industry and agriculture.

Austerity (p.228)

For similar reasons material austerity need not be a feature of the post-attack environment. Although the destruction of industrial capacity (80 per cent nationwide) will deny immediate replacement of destroyed goods and, more importantly, prevent the rapid replacement of capital goods for the indefinite future, yet the confined nature of areas of physical destruction and the noted surplus of property over surviving population indicates that there will be no appreciable shortages, perhaps for a period of years. Salvage operations (rather than looting) can easily supply need. The 'simple, leading rule that practically all consumer goods become scarce during a war and that scarcity increases with the length of war' [105] will not apply until long after the war is over, when either production will be

restored or the issue 'otherwise' decided. When the survivors recover their senses they will be surprised to find a land of 'plenty'. Food will be scarce but at least colour televisions and stereo sets will be in abundance.

Power Supply (pp.228-229)

So, too, by six months after attack supplies of electricity, which would theoretically be resuscitated as a priority, may be adequate despite the targeting of most major power stations. There will remain the ‘invulnerable' stocks of coal to provide fuel for at least some of the remaining conventional power stations and these, together with the hydroelectric power stations and some ‘juggling’ with the nation grid, should be able to provide power enough for essential domestic user in areas that still demand this service.

Power shortage will only be a serious problem in the immediate post-attack period and again in the extreme long term, with attempts at industrial reconstruction. Renewed Period and again in the term, of course oil, dependent on the North Sea or importation, are less likely without major reconstruction work on targeted terminals and ports.

Morale (pp.229-231)

However, at six months after attack national ‘morale’ will still be extremely low: many of the survivors will continue to suffer severe psychological disorders as a result of their experiences and the shortage of food will act as a further depressant when coupled with the necessity for herculean labours to ensure the long-term position. K. and G. Lang state that ‘the measure of morale is found in the exertion and effort that members of a collectivity reveal in pursuit of shared objectives when they encounter serious obstacles.' [106] Morale in the personal sense is identified as a 'state of optimism' and it is likely to be lacking in most individuals. This will be a disincentive to work and a major obstacle that the survivors of the long-term post-attack environment must over-come. For the Langs, morale is a self-reinforcing process (that is improvement in morale increases group solidarity and effectiveness, which further improves morale, and so on), in whose reduction there is a `progressive erosion of motivation until the norms and values of the group are no longer determining their behaviour'. [107] Work stops and society falls apart. They go on, 'an extreme state of demoralisation, in either the individual or the group cannot last long': in the individual the result is mental breakdown, and 'a group will literally go to pieces when private and particularistic goals gain ascendancy over values and goals necessary to its persistence'. [108] (Cf. Chapter 1 on the importance of 'values).

Unless effective leadership has emerged by this time Mush morale may well be approaching a point of no return and it will be a priority task of whatever government exists to improve national morale

by whatever means it can find. Promises of future well-being, in the circumstances, will be meaningless, and possibly the best way will be to direct efforts into projects which can show immediate and tangible results and increase social solidarity, however meaningless in themselves. A government order to hang out Union Jacks might have some success in this respect – always supposing, of course, that they can still be found. What seems to be required is the publication of *definite goals* and the proposal of *believable* futures, besides providing 'opportunities for the collective indulgence of emotion', [109] although events such as the restoration of electric power might have more impact. British society may well represent a bizarre spectacle in the phase and its possible activities, including scapegoating, religious cultism and psychic epidemics, would appear ridiculous in peacetime. However, as the Langs state, 'the collective paranoia of a nation in war time is considered irrational only after a nation has had a chance to "sober-up". [110] Paradoxically, there is evidence to show that while, in the immediate post-disaster phase, outside assistance is invaluable (perhaps essential) yet, in the long term, groups recover better if left to themselves. Provided reconstruction begins, its cumulative effect is to increase group solidarity long-term, by the 'very generally shared goal coupled with a satisfying internal interaction pattern', [111] which only fades when rehabilitation reaches higher levels and normality returns.

If morale does not decline past the point of no return then British society may rapidly recover as co-operative effort begins. However, one problem here is that Britain may no longer be *one* group by this time (if it ever was) and as 'group solidarity' increase the seeds of permanent fragmentation may be sown — an is return later.

It must be admitted that this is a particularly speculative and somewhat optimistic view of the UK, at six or more months after attack, and that the reality may well be different. [112] This would be a Britain in which 20 million or more had already died (which would indicate at least one fatality in most families), and where hunger had become a norm with no prospect of relief, although other hardships are notably absent. Society in such situations is unpredictable: as Nagai observes,

> from that time [the attack on Nagasaki] *to the end of the war,* everybody seemed to be going crazy ... people were very nervous and running around all the time and some were scared and wouldn't budge out of their shelter. Some would get angry for no reason. Some didn't do things they should have, like their job ... and some did lots of senseless things ... some people … were always dropping things from nervousness and some couldn't remember anything. [113]

At Nagasaki the social order did collapse for lengthy period and was only restored by outside intervention: Nagai remembers, 'we did wicked things like wolves and foxes to stay alive … this atom bomb, one thing it did was to make us unashamed of doing wrong, mean things.' [114] Above all. The 'death taboo' will be broken and the fundamental tenet of peacetime society – that human life cannot

be taken within the group without extreme penalty – will be lost. In the situation of starvation (and with no prospect of improvement) a 'survival of the strongest' ethic may develop, the prize being the food of others, with the result of violent, competitive society, rather than co-operation and sharing, which seems the more appropriate to societal survival.

Extreme Long-term (pp.231-234)

It is the Soviet view of nuclear war that, whilst hey can themselves survive, others will not, and entire societies may disappear from the surface of the earth. S. S. Lototsky, in *Armiya Sovetskaya,* encapsulates this opinion:

'A future war will be … most destructive in character this … the death of hundreds of millions of people with whole countries being turned into lifeless deserts.' [115] Whilst it is clear that nuclear war will not turn the UK into 'lifeless desert', yet there appears to be at all stages in the post-attack environment, multiple and interacting consequences of the attack which can singly, or in combination, result in the collapse of British society. Even at one year after attack, the issue of British survival will still not have been decided *in the positive*, although it may well have been decided in the negative. After a year radiation should have ceased to be a principal problem and the death rate will be in decline, although still enormous by comparison with that of pre-attack Britain, and many will continue to die from the effects of the attack in years to come.

Population Changes (pp.231-233)

More importantly, the birth rate will have collapsed immediately after attack. This will result in severe difficulties for society at recurring intervals for decades to come. In the same way that the Second 'World War was followed by a 'baby-bulge' so this nuclear war and its alter-math will result in baby-vacuums — an absence of new citizens. Many women pregnant at the time of attack will be dead and most of the irradiated survivors will have spontaneously aborted; in any case, the foetus is between twenty and sixty times more sensitive to radiation than the normal adult. Of these infants who survive to birth many will die thereafter from lack of medical attention, from their own irradiation, or malnutrition. Certainly, infant mortality can be expected to be huge – at least returning to early nineteenth-century rates. There will be no incentive for couples to 'begin' families and the birthrate must be expected to remain very low for five years or more after attack – parents do not readily commit offspring to a hostile world, even if an increase in illegitimate births consequent on increased promiscuity makes up some of the deficit. To some extent, the survival chances of will be increased by the absence of 'dependents' (since it increases the percentage of the productive population) but in the very long term the absence of an entire generation will have serious effect on

the structure of society. After this five years of 'drought' may then come a torrent of births as surviving families adjust to the new rate of infant mortality by reversion to the birth rate of pre-welfare rate society. A national average of 2.4 children per family may rise to 10 or even 15 where parents know that their children's chances of reaching maturity are dictated by chance, and the absence of effective contraception deny accustomed ability to plan families. Overall, the population must continue to decline. Lowry stated, 'for the years following such an attack, it is virtually certain that conditions will be less favourable to human life than at present … the stresses would be diffuse and persistent.' The survivors are, in effect, 'a population faced with chronic stresses.' [116] Most of the factors which have increased life expecting from its 1900 level of 45 years to the present 68 years – diet, sanitation, housing, medicine and the elimination of child labour -- would be lost Indeed; for Lowry, the *principal* source of mortality in nuclear war will not be direct effects of the weapons used, but will lie rather in the 'social and economic disruption which will inevitably follow.' [117] Thus, even in the second World War peak mortality for some states occurred not as 'the bombs were falling', but *after peace had been re-established*. The death rate for Soviet Union in 1941 was 18.1 per thousand but in 1947 it was 22.0 per thousand, and in East Germany the death rate in 1946 was almost double that of 1940 (22.9 and 12.7 per thousand respectively).

There is no real evidence to support the popular belief that nuclear war would be followed by the human mutation on a large scale – that humanity would change its shape. The generic effects of high-level radiation were not apparent on the Japanese experience and other sources are 'inconclusive'. It is *possible* that high radiation on a national, or indeed, 'global' scale could result in some permanent change to the human form, but it is more likely that it will not, and even if there is limited effect it should be eliminated in two or three generations. Neither is the 'balance of the post-attack population likely to change: although women are slightly more susceptible to immediate effects than men, and individuals of both sexes below 10 years old and above 39 years greatly more at risk, yet most groups will suffer in proportion in their composition. The only marked changes will be a relative absence of those (i) aged above 49 years, and (ii) below 10, at the time of attack. This high mortality-rate among children will exacerbate the effects of the baby-vacuum between ten and thirty years afterwards, when the numbers of young, productive adults in the population will be greatly reduce, and there will be a particular problem at, say, forty years after attack, when a 'large' umber of old people will require support from an extremely small productive age-band.

Agriculture, Industry and the Nadir of Population (pp.233-234)

Whether this support will be available or whether euthanasia will need to be institutionalised (perhaps on the lines of Aldous Huxley's *Brave New World*) must depend on what happens to agriculture and industry in the meantime. In the first case, there is no reason why Britain's agricultural land could not support a fair-sized vegetarian population – existing on a cereal-based

diet — even without the advanced, technologically-based farming methods now in use. Given the factors identified above, it seems likely that the 15-17 million 'able-bodied' survivors one year after attack will continue to be depleted in the years that follow and many of these will not be replaced. It is not unreasonable to propose that by ten years after attack the population of the UK might well be as low as 10 *million*. If industry and (particularly) agriculture have recovered, this figure of ten million ten years after the attack appears to be the nadir of population. Thereafter no particular reasons exist for further decline, but the population 'gap' will mean few young adults at this stage and any increase in the numbers of the UK population seems unlikely before, say, thirty years after attack, by which time physical and social conditions -- whatever they prove to be -- will have stabilised. There may well be pronounced *ecological* change consequent upon attack -- considering the greatly differing resistances of organisms to radiation [118] — but it will not necessarily be an environment fundamentally hostile to Man, provided of course that Man can adapt.

In the second case, the future of industry is less certain. Despite the Civil Defence expectation of 80 per cent industry loss, Horne Office planning is based on the assumption that it will be feasible to rebuild it, more or less, brick for brick. However, industry overall economy it represents, is a complex phenomenon – a series of interrelated and mutually dependent elements – and it may not be possible nor appropriate to rebuild in the old style. As deKadt has observed, the destruction of most of the urban areas and particularly the commercial city centres would destroy to all intents and purposes; (i) the central system of banking and credit, (ii) finance and insurance; (iii) many technical and organizational specialists, and (iv) the professions, [119] without which, irrespective of *physical* industrial loss, the present system could not continue. [120] Although essential transport should be restored by a year after the attack (and progressively improve thereafter), allowing interdependence between industrial units as well as efficient distribution of their products, yet '80 per cent' of British industry cannot be rebuilt in one year – or ten—and surviving plants will need to adapt both their production and means of production to the new environment, Most of the industrial losses will not be missed – there will not be the manpower nor expertise to work all the machines – and it is indeed possible that expected 20 per cent survival of industrial plant would be all that the population could cope with. To reduce transport needs, a much higher level of whole-product manufacture on one site is likely in reconstructed industry, and the goods produced will need to be very different in character. Nuclear war allows the UK the opportunity to rebuild its economy almost from scratch and to abandon its now burdensome dependence on exports to pay the costs of consumer society. What is likely to emerge, as all that is practical, is a partially rebuilt economy, supplying only the local needs of a fragmented society now based on 'self-contained' agriculture, as a development of immediate post-attack subsistence. Any attempts at more ambitious resuscitation would be likely to fail, given the probable absence of external recovery aid. In the Second World War the UK economy would have failed without aid, even in the absence of widespread destruction, and the dereliction that Marshall aid was *required* to restore after 1945, was by comparison to the post-nuclear war situation, not even

a flesh-wound but a graze. In that the Americans will be, if involved in the war, unable to provide such assistance, then the recovery of industry will need to proceed at the slowest of rates. Even with aid there will be a dearth of labour in post-war UK, the greater part of which will be required on the land for a large number of years.

Post-Reconstruction Society (pp.235-237)

Whilst the unemployment problems of the Western world will thus be solved, nevertheless, economic alterations on this scale must, result in a British society. At the micro level, manpower and technology loss coupled with fuel and power shortage will mean that many more individuals will be required for manual labour to work long hours for little reward, other than food and clothing. Apart from abolishing institutions like retirement, the necessity for everyone to work may conclude what remains of the British class and sex-caste structures. As Loomis states, 'severe disasters bring about a restructuring of the primacy of social norms', [121] including those of class and caste. He believes that

> common utilisation of facilities, restriction of free exchange, somewhat unpredictable and fortuitous rank determinants and a general levelling (drank relatively speaking suggest that tile seeds of socialism may exist in the disaster state … if it is not surprising that communistic agitators find conditions in the disaster situation favourable to the promulgation of their political theories [122]

However, this is not necessarily the case. Although Britain will indeed be a 'levelled' society, in the social sense, yet many of its features will he antithetical to socialism and unless such a system is imposed from without (see below), it is more likely that a *pure meritocracy* will grow out of the reward incentives of the immediate Post-attack period. It will have been a situation of survival of the fittest, in the broadest sense, with greatest benefits going to those who made the greatest contributions and this new system, established at the great social water-shed of nuclear war, is likely to persist. Were democracy to be restored, then possibly those at the `have-not' end of post-war Britain might press for a form of socialism, but there is no reason to suppose that such demands would be successful: those who achieved power, status and wealth in the new society would not willingly surrender their position. Indeed, democracy might not be restored. deKadt considers that 'the whole machinery of democracy could well disappear as a result of disintegration of the nation into regional units [the regional seats of government of the Home Office plan], or after the institution of authoritarian centralized power', [123] and given the chaos that would mark post-attack Britain, deKadt's suggestion of the emergence of a 'strong military or quasi-military government … which would rule the country under some form of martial law for a long time' [124] is not without foundation. The regional seat of government system is very likely country to collapse under strains of the post-attack environment, particularly since it will be staffed (as the Home Office has admitted) by 'people who …

have spent their whole working lives in an a atmosphere of seeking guidance, approval and authority for their actions from committees and councils'. [125] Alexander the Great defined the truth of such situation best when, on his death bed, asked who was to succeed him, he replied 'the strongest'.

Overall, Britain must be, in the extreme long term, a markedly different society, existing in a different world. Whatever its politics Britain will have to be, for a very long time, a largely agrarian society hut it will not necessarily be one that has lost all the benefit of contemporary civilisation. At the 10 million population level Britain may prove to be a more viable society than before the war; able to produce food needs without imports, high technology, or recourse to marginal land and on an ecologically acceptable basis. The inability to import oil or to produce vehicles on a large scale will reduce individual movement but, when coupled with the new agrarian nature of society and localised industry, should produce a 'nation' of small stable communities. It is improbable that the survivors would wish to, or could, rebuild the lost cities, which depend for their existence on a vast infrastructure, much of which win have been destroyed and whose replacement would take many years of wasteful effort. In any case, city existence would no longer be attractive: the amenities of the cities would have gone and they will have become symbols of mass death. Ikle agrees that cities might well disappear from the post-war world, 'one may wonder', he states, 'whether cities might not altogether disappear after a war with widespread bombing destruction ... future generations [might] … be unwilling or incapable of resuming urban life'. [126] For Ikle the issue revolves around how many city-dwellers survive - if a high percentage do, then they might automatically return to their usual place of residence and the Second World War , at least, had little effect on city existence. However, the scale of destruction in this case will be markedly higher and even the 1939.45 war was 110)1 without Where destruction was near-total, as in the Barbican area of London, the residents did not return (the population of the entire City of London was a mere 5,000 in the mid-196(s), and rebuilding was on an entirely different, basis. Further, in this study, the conclusion has been that city-dwellers does not survive in large numbers, that cities will be 'abandoned' after attack and that there will be plenty of vacant property elsewhere. In these circumstances the end of the great British cities seems near-certain.

Occupation (p.237)

It appears that, if Britain can survive the shock of nuclear attack and multiple crises of its aftermath, then in the long run, life in Britain may not prove unpleasant, at least if the UK *is left to itself and able to employ remaining resources to reconstruct,* or partially reconstruct. However, it was the conclusion of Chapter 5 that the Soviet Union cannot fee; confident of long-term victory unless it follows attack with invasion and physical possession. An appropriate stage for such an invasion would be sometime between, nine and twelve months after attack, when effective resistance would be unlikely, but radiation levels present no threat to the invader. Following invasion it is probable that

British capital assets would be stripped and removed to the Soviet Union to further its own reconstruction or augment continued war effort. Even should such wholesale removal prove impossible it is certain that any output from British industry would be used to benefit the Soviet economy rather than that of the UK -- as was that of the Soviet zone of Germany in and after the conquest of 1945. In these circumstances British recovery is again placed in doubt. Certainly, the Soviets would wish to impose direct rule; as P.H.Vigor has observed, 'if war breaks out, they [will] make, and have always made, provision for the enforced bolshevisation of the territory they conquer, thereby making virtually impossible a return to the status quo.' [127] It is *possible* that the British survivors will resist, but in the absence of pre-attack preparations for this eventuality and without effective government, without the remnants of the Army to form a cadre and without adequate means to produce arms, such a resistance would be futile. Indeed, given the experience of the survivors since attack they may absolutely prefer not to attempt resistance. At one year after attack there may still seem little to fight for, save personal survival, and although Soviet invasion may deny a hard-won chance of British societal survival, yet it has to be concluded that, in the circumstances, British resistance is most unlikely.

Summary (pp.237-240)

The issue of the effect of nuclear strike on the UK is a complex of interrelating factors whose importance tends to persist long after their manifestation and it is not possible to adopt any simple arithmetical approach. The effects of strike are cumulative, can only be, as a whole, and the physical damage caused is, in some respects, less important than the social consequences. The main effects can be summarised as follows.

1. A minimal or absent period of mounting tension will mean that few of the population have effective protection even against fall-out at the moment of attack. It is unlikely that official warnings will achieve the desired state of `unambiguity' and public response period immediately before attack, but some disorder will be at a low level. For this reason 'panic' is improbable in consequent on public realisation of the absence of protective measures. At the extreme, there may be spontaneous evacuation of the cities.
2. The immediate effect of the 188 target, 167 MT nuclear strike will be fatalities in the order of 6 to 8 million and seriously injured of between 10 and 16 million. At one month after attack there should be 31-39 million able-bodied survivors. The mortality rate per se does not appear to be a central issue for 'survival' and it cannot be calculated with any degree of certainty.
3. The UK will not be destroyed, in any sense, by the immediate effects of the nuclear strike alone. The blast and heat effects of nuclear weapons are exaggerated and the radiological element is the more important.
4. The cities of London, Birmingham, Edinburgh, Glasgow, Leeds-Bradford, Liverpool, Manchester,

Newcastle-on-Tyne, Cardiff and Swansea will all be severely — possibly irreversibly — damaged. The planned pre-attack exodus of fire services from the cities may allow firestorm to develop and consequent damage will effectively complete the destruction of these urban areas.

5. It is probable that there will be a mass exodus from the city peripheries, but these survivors of blast and heat will die from injuries sustained and/or exposure to lethal radiation. Medical services will be largely unavailable at this time and those hospitals still in operation will be quickly overwhelmed
6. In areas removed from targets but within perceptive range the Population will suffer shock and an initial 'freezing' of activity is likely, but this should give way to large-scale construction of home fall-out shelters and other protective activity. Those from targets should have adequate time for this activity.
7. One month after attack there will be widespread areas of lethal radiation and, despite sheltering, most individuals will experience radiation sickness to a greater or lesser degree. The majority of those injured by the immediate effects of attack will be dead by this time and there will be a considerable number of additional fatalities from radiation cause alone.
8. The period required in shelter will *certainly* exceed two weeks in most areas and may exceed eight weeks in some. Apart from psychological problems involved in shelter existence, food and certainly water will be used up in most homes before emergence becomes safe and great numbers will need to leave their shelters for protracted periods while the radiation level is still high.
9. Emergency feeding plans are inadequate and starvation will become widespread when domestic stocks, in homes and local shops, are exhausted.
10. By three months after attack there will be a minimum of 20 million dead from all causes – radiation, blast, firestorm and starvation — while, given the circumstances, epidemics are likely amongst the survivors. The morale of the population will be at its lowest at this point when survivors, hungry and weakened, will realise the extent of the disaster and will be faced with urgent tasks of consolidating their position, the first of which will be to dispose of bodies.
11. It is probable that the planned system of government by regional seats of government and local authorities will break down and if any control exists it will be imposed by the police.
12. Somewhere between three and six months after attack national food stocks will be exhausted. Although it will now be summer (if the attack comes in winter), agriculture will be problematic with shortages of fuel, fertilisers and other essentials, and a new supply of fresh food will depend on the propensity of the farming population to sow at the appropriate time. Certainly, a large percentage of the UK's soil will be irradiated and this must result in food contamination. Consumption of this contaminated produce will be unavoidable and there will be many deaths in the long term (five to twenty years) from this source. Food will become the means of government in the UK — the reward for effort — and likely shortages indicate further starvation. There will not be enough to allow the continued support of unproductive persons — the infirm, the insane and the old.

13. Apart from this, the situation improves six months after attack. There will be no shortage of housing for the survivors, an al-no supply of material goods (salvaged), and it is probable that a e limited electricity supply can be restored.
14. Nevertheless, there will be severe social problems. Mass death will have broken the 'death taboos, and food shortage, together with a continuing chaos (relative to the pre-attack situation), indicates competition rather than co-operation. At worst, British society may show a tendency to widespread violence.
15. By one year after attack radiation will have ceased to be a problem and the death rate, while still high, will be in decline. However, the birth rate will have collapsed and the susceptibility of those under 10 years of age to the effects of nuclear weapons and the conditions of the post-attack environment indicate the loss of a `whole' generation. This will result in severe social and economic problems in the UK between ten and thirty years after attack.
16. Thirty years after the attack the population of the UK will have declined - from all causes - to about 10 million.
17. This low level does not in itself indicate the collapse of British society. If reconstruction can be begun at three months after attack, with emphasis on agriculture, then a new - and 'healthy' - semi-agrarian society may emerge. In the years following attack all members of society will be required for work, class differentiation should disappear and a meritocracy may become the social order. Where reconstruction is concerned, outside aid cannot be expected and, in its absence, the rebuilding of British industry on pre-attack lines will not be possible. Democracy is unlikely to be restored for a long period (if at all), and military-style government is probable.
18. Thirty years after attack - if society has not collapsed in the meantime - existence in Britain should not be unpleasant. There will be limited industry and food should not be a problem.
19. Most of the population will live in the country or at the most in small towns. The rebuilding of cities is unlikely, given their psychological significance and the resources this would consume. In any case, cities are inappropriate for a population of 10 million.
20. The likelihood of Soviet invasion between nine and twelve months after attack casts a doubt on the realisation of this limited future but it is unlikely that it would be met with serious resistance. Soviet extraction of resources from the UK would probably deny the remaining British chance of resuscitation to a viable society.

Overall long-term British prospects are not good.

Notes

1. Quotes in this matter are from a Civil Defence training paper, prepared for a NATO briefing conference of May 1977 (non-attributable).
2. Ira S. Lowry, *The Post Attack Population of the United States* (Rand Corporation, Santa Monica, Ca, 1966), p.6
3. Herman Kahn, *Thinking about the Unthinkable* (Weidenfeld and Nicolson, London, 1962), p.98

4. Cmnd 98780, *The Hazard to Man of Nuclear and Allied Radiations,* (June 1956), p.10
5. Fred Charles Ikle, *The Social Impact of Bomb Destruction* (University of Oklahoma Press, Oklahoma, 1958), p.3
6. Lowry, *Post Attack Population of United States,* p.2
7. Domestic *fatalities* were relatively tiny: In Britain about a hundred thousand civilians died in bombing raids . . . This was the nearest the British came to suffering the effects of the total war.' (Gil Elliot, *Twentieth Century Book of Dead* (Allen Lane, London, 1972), p.87
8. Ikle, *Social Impact of Bomb Destruction,* p…16; emphasis added.
9. Home Office circular ES 2/1975, 'Information Services in War' describes that in the low-level period of mounting tension (see Chapter 4) little information would be released to the public, which would be reserved for the three weeks before the event and especially the 72 hours of the pre-attack period in which the media would be 'saturated with advice on survival (see also following chapter).
10. Emanual J. deKadt, *British Defence Policy and Nuclear war* (Frank Cass and Co. Ltd, London, 1964), p. 104; emphasis in original.
11. Ibid, p.101
12. Harry B. Williams, 'Human Factors in Warning and Response Systems' in George H. Grosser et al., *The Threat of Impending Disaster* (MIT Press,. Cambridge, Mass., 1964), p. 92.
13. Home Office circular ES 2/1975, seen 2.
14. Williams, 'Human Factors in Warning and Response Systems, p. 94.
15. Home Office circular ES 2/1975, secn 2(1).
16. Ikle, *Social Impact of Bomb Destruction*, p. 102
17. Charles P. Loomis, *Social Systems* (van Nostrand Co., Princeton, NJ, 1960), p. 146.
18. Walter Lord, *A Night to Remember* Readers' Union edn, (Longman, London, 1956), p. 77.
19. P.G. Nordlie, 'Societal Recovery' in Eugene P. Wigner, . (ed,) *Survival and the Bomb* (Indiana University Press, Bloomington, 1969), p. 298.
20. Takashi Nagai, We of Nagasaki, 7th edn. (Meredith Press, New York, 1969), p.76. Nagai also records that visiting out-of-town relatives had never been so popular.
21. Peter Laurie, *Beneath the City Street* (Penguin Press, London, 1970), p.2
22. Ikle, *Social Impact of Bomb Destruction*, p. 83.
23. John M. Fowler (ed.), *Survival* (MacGibbon and Kee, London, 1960), p.24.
24. Harold L. Brode and John S. Newman, 'Offensive Weapons and their Effectiveness' in Eugene P. Wigner, Survival and the Bomb, p. 118.
25. Nagai *We of Nagasaki* , p. 25.
26. White Paper on defence (1956), Cmnd 9691, secn 119.
27. Daily Mail, 4 February 1977; Guardian, 5 February 1971.
28. Ikle, Social Impact of Bomb Destruction, P. 25.
29. Nagai, We of Nagasaki, p. 126.

30. Plans for euthanasia may exist but have not been published. Hugh Jenkins MP suggested during the debate on the Civil Defence cuts in 1968. 'The Government ought to create a Euthanasia Corps … Have not the government a straightforward duty to provide for the painless extinction of the population of this country?' Hansard, Vol 761, col. 1763.
31. Home Office circular ES 5/1974, 'War Emergency Planning for the Fire Service', secn 4.
32. Ibid, secn 7.
33. See L. Goure, *War Survival in Soviet Strategy* (Centre for Advanced International Studies, Miami, Florida, 1976), p.14
34. Kahn, *Thinking about the unthinkable*, p. 85.
35. William Craig, *The Fall of Japan* (History Book Club, London 1968), p.25
36. 30,000 died in one night at Nuremburg, but the 'celebrated' Dresden total of 135,000 was the result of a *series* of raids,
37. This also acts as evidence of the advantages of an attack at Christmas -- see Chapter 5.
38. Constantine Fitzgibbon, *The Blitz* (Ace Books, London, 1959) p.158
39. Walter R. Guild, 'Biological Effects of Radiation' in Fowler (ed.), *Survival*, pp. 69-71.
40. Ikle, *Social Impact of Bomb Destruction* p. 13 (important as national recollection of war recedes)
41. Ibid, p.14
42. Although looting may occur as normality begins to return: at Hiroshima and Nagasaki it was confined to the mid-term post-attack environment - some weeks after attack, and peaked at 'surrender', apparently consequent on the collapse of police and military authority.
43. deKadt, *British Defence Policy and Nuclear War,* p.93
44. Loomis, *Social Systems*, p. 137.
45. Ibid. p. 137.
46. deKadt, *British Defence Policy and Nuclear War*, p. 109; emphasis in original
47. Ibid, p. 111.
48. Robert Jay Lifton, 'Psychological Effects of the Atomic Bomb in Hiroshima: the theme of death' in GH. Grosser, Threat of Impending Disaster, p.156
49. Ibid. p. 159.
50. Ibid, p. 162; emphasis in original.
51. Lester Grin Dori 'Fallout Shelters and the unacceptability of Disquieting Facts' in G.H. Grosser, *Threat of Impending Disaster,* p. 119.
52. Home Office circular, ES 10/1974, 'Public Survival under Fall-out Conditions', Annex, seen 2.2; emphasis added.
53. Ibid, p. 12.
54. Cmnd 9780, *Hazards to Man of Nuclear and Allied Radiations*, p. 11.
55. Ibid, p. 12; emphasis added.
56. Home Office circular, ES 10/1974, secn 2.8/9.

57. ES 10/1974 states, 'recent experiments . . . suggest that periods of a week or two in close confinement would be acceptable, provided essential supplies and sufficient information are made available to the occupants'. (secn 2.6). It also notes that it would take 73 days for a radiation level of 400 roentgens per hour 7 miles downwind to decay to the safe rate of 0.5 roentgens per hour (secn 3.5).
58. Home Office circular, ES 12/1974, '*Home Defence Training for the Police*', secn 12.
59. Grinspoon, 'Fallout Shelters and the Unacceptability of Disquieting Facts', p.120
60. Ibid, p.120
61. Ibid, p.117
62. A protection factor of 1 reduces gamma radiation by half, one of 2 by a half, one of 16 by 1/2 and so on.
63. Neville Brown, *Nuclear War* (Pall Mall Press, London, 1964), p.127.
64. Jerome D. Frank, *Sanity and Survival* (Cresset, London 1967), p.157.
65. Ibid, pp. 158-9
66. Home Office circular ES 10/1974, secn 2.7. 'Other means' means radio broadcast.
67. Ibid, secn 4.1.
68. *Advising the Householder on Protection against Nuclear Attack* (Civil Defence Handbook No. 10, HMSO, 1963), p. 12.
69. Ikle, *Social Impact of Bomb Destruction*, p. 138.
70. Civil Defence (Planning) Regulations (1974), Section 4, secn vii.
71. Home Office circular, ES 4/1974, 'Food and Agriculture Controls in War', secn 4.
72. Ibid, secn 4.
73. Ibid, secn 5.
74. Ibid, secn 6.
75. Ikle, *Social Impact of Bomb Destruction*, p. 147.
76. It may be that better arrangements could be made - what appears to be required is not 'field kitchens but large locally-held stockpiles (in the Soviet manner) with a fleet of high-protection factor delivery vehicles (`Securicor vans?) to deliver to streets or individual households.
77. Ikle, *Social Impact of Bomb Destruction*, p. 150.
78. A survivor at Nagasaki relates that all the bodies we saw were quickly decaying from the summer heat and had turned dark . . . We saw a great number of corpses rotting on the banks of the river and in the fields ... Dozens of flies buzzed around each corpse; whenever we passed one we would start up clouds of flies, which alighted on our backs and heads, fouling us with the stench of the corpse. This is turn attracted more flies and they swarmed after us ... (Nagai, We of Nagasaki, p. 54).
79. Ikle, *Social Impact of Bomb Destruction*, p. 159.
80. Nagai, *We of Nagasaki*, p. 160.
81. Cmnd 9780, Hazards to Man of Nuclear and Allied Radiations, p. 12.

82. (December 1947), Cmnd 7335, Committee of Privy Council for Medical Research, Medical Research in War p. 15; emphasis added.
83. Ikle, *Social Impact of Bomb Destruction*, p. 183.
84. Ibid, p. 188.
85. Home Office circular, ES 7/1973, 'Machinery of Government in War .. ', secn 12.
86. Ikle, *Social Impact of Bomb Destruction*, p. 198.
87. Lifton, '*Psychological Effects of the Atomic Bomb in Hiroshima*', p. 181.
88. deKadt, *British Defence Policy and Nuclear War*, p. 97.
89. Kahn, *Thinking about the Unthinkable*, p. 89.
90. Frank, *Sanity and Survival*, p. 159.
91. Ibid, pp. 159-60.
92. Ibid, p. 161. Frank goes on, 'As a form of insurance … civil defence is a gamble whose odds are impossible to calculate but include the possibility that it would not prevent the destruction of . . . a nation' (P. 162: emphasis added).
93. Norman Hanunian, *Dimensions of Survival: Post Attack Survival Disparities and National Viability* (Rand Corporation, Santa Mon, Ca, 1966), p. 33; emphasis in original.
94. Ibid, p. 111.
95. Ikle, *Social Impact of Bomb Destruction*, p. 165.
96. See Christopher Morris , The Big Catch (Angley Books, Maidstone, Kent, 1966), especially pp. 143 and 152-4.
97. Lowry, *Post Attack Population of United States*, p. 92.
98. Brown, *Nuclear War*, p. 133.
99. Cmnd 9780, *Hazards to Man of Nuclear and Allied Radiations*, p. 170.
100. Cmnd 7335, *Medical Research in War,* p. 96.
101. Cmnd 6564, *Statistics relating to the War Effort of the United Kingdom* (November 1944), p. 17.
102. Home Office circular, ES 4/1974, '*Food and Agriculture Controls War*', secn 6.
103. Ikle, *Social Impact of Bomb Destruction*, p. 151
104. Lowry, *Post Attack Population of United States*, p. 122.
105. Ikle, *Social Impact of Bomb Destruction*, p. 141.
106. Kurt Lang and Gladys Lang, '*Collective Responses to the Threat of Disaster*' in G.H. Grosser, *Threat of Impending Disaster*, p. 58.
107. Ibid, p. 60.
108. Ibid, p. 62.
109. Ibid, p. 64; for example, 1984's 5-minute 'hates'.
110. Ibid. p. 66.
111. Loomis, *Social Systems*, p. 142.
112. Nordlie at least is convinced that the situation will be favourable: he states, 'there seems to be no evidence to suggest that the effects of an attack … would [have deprived the survivors} of

their abilities to function within normal ranges . . . [or} that survivors would lack the motivation to continue to survive in the post-attack environment'. Social norms would not collapse and the population would be 'passive, quiet, docile and responsive to positive direction' (Nordlie, `Societal Recovery', p. 297).

113. Nagai, *We of Nagasaki* , p. 25.
114. Ibid, p. 118.
115. Quoted in William Scott, 'Soviet Military Doctrine and Strategy: realities and misunderstandings', Strategic Review (Summer 1975), p. 58.
116. Lowry, *Post Attack Population of United States*, p. 88.
117. Ibid, p. 93.
118. Whereas LD 50 for humans occurs at 450 R, many of the viruses can live through 100,000 R.
119. This represents further support for a daytime (but not holiday time) strike on the UK (see Chapter 5). A night attack would destroy the buildings but not the individuals who operate the system, which could be re-established elsewhere.
120. On the other hand, the loss of these services could be positively beneficial. Increase in German war production in 1944 and 1945, despite the allied assault, has been ascribed to the transfer of 'clerks', etc. to direct production. In other words, industry worked better and faster with less 'support' and less paper-work.
121. Loomis, *Social Systems*, p. 143.
122. Ibid, pp. 157-8.
123. deKadt, *British Defence Policy and Nuclear War*, p. 123.
124. Ibid, p. 124.
125. Paper to NATO briefing conference.
126. Ikle, *Social Impact of Bomb Destruction*, p. 211.
127. P.H. Vigor, The Soviet View of War, Peace and Neutrality (Routledge and Kegan Paul, London, 1975), p. 1594